Electronic Acknowledgement Receipt	
EFS ID:	44069803
Application Number:	96000355
International Application Number:	
Confirmation Number:	1538
Title of Invention:	CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF
First Named Inventor/Applicant Name:	8013568
Customer Number:	24573
Filer:	Matthew S. Dicke/Meg Boinski
Filer Authorized By:	Matthew S. Dicke
Attorney Docket Number:	0313071.00020
Receipt Date:	19-OCT-2021
Filing Date:	12-MAR-2021
Time Stamp:	17:28:28
Application Type:	Supplemental Examination
Patent Number:	

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Applicant summary of interview with examiner	0313071-00020_InterviewAgenda.pdf	147750 3d97c3b38b25d8b3a35f6f7946b4da197989acc9	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	147750	

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	LS CABLE & SYSTEM LTD.
Appl. No.:	96/000,355
Conf. No.:	1538
Filed:	March 12, 2021
Title:	CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF
Art Unit:	3992
Examiner:	Anjan K Deb
Docket No.:	0313071.00020

STATEMENT OF ISSUES TO BE DISCUSSED IN TELEPHONE INTERVIEW

Dear Examiner Anjan K Deb:

For the telephone interview scheduled on November 8, 2021 at 11 AM (Eastern), Applicant would like to discuss the Non-Final Office Action mailed September 29, 2021 for *Ex Parte* Reexamination proceeding no. 96/000,355. In particular, Applicant would like to discuss:

1. The 35 U.S.C. 112, 6th paragraph interpretation of certain terms in the pending claims.
2. The claim rejections under 35 U.S.C. 112, 1st paragraph and 2nd paragraph.
3. The rejection of claims 1-15 and 19-48 under 35 U.S.C. 102 as allegedly being anticipated by Korean Patent No. KR 950005819 ("Chung-Sik");
4. The rejection of claims 1-15 and 19-48 under 35 U.S.C. 103 as allegedly being obvious over Chung-Sik in view of U.S. Pat. No. 6,016,046 ("Kaite"); and
5. The rejection of claims 16-18 under 35 U.S.C. 103 as allegedly being unpatentable over Chung-Sik in view of Kaite and further in view of Korean Patent No. KR 100451606 ("Cho").

Applicant thanks the Examiner for their time and attention in this matter. The Examiner is invited to call the undersigned should the Examiner wish to re-schedule the telephone interview or if the Examiner has any questions in advance of the telephone interview.

Apple Inc. EX1004B Page 618

Respectfully submitted,

K&L GATES LLP

BY: /Matthew S. Dicke/
Matthew S. Dicke
Reg. No. 58,819
Customer No. 24573
Phone: (312) 578-5415

Dated: October 19, 2021

Electronic Acknowledgement Receipt	
EFS ID:	44158272
Application Number:	96000355
International Application Number:	
Confirmation Number:	1538
Title of Invention:	CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF
First Named Inventor/Applicant Name:	8013568
Customer Number:	24573
Filer:	Matthew S. Dicke/Meg Boinski
Filer Authorized By:	Matthew S. Dicke
Attorney Docket Number:	0313071.00020
Receipt Date:	29-OCT-2021
Filing Date:	12-MAR-2021
Time Stamp:	12:59:00
Application Type:	Supplemental Examination
Patent Number:	

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Letter Requesting Interview with Examiner	InterviewRequest.pdf	288871 490d8a25d34c4352d4e0e26d6f46f653abb3f689	no	3
Warnings:					
Information:					
			Total Files Size (in bytes):	288871	

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New Applications Under 35 U.S.C. 111

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National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Doc Code: M865 or FAI.REQ.INTV

PTOL-413A (07-16)
Approved for use through 12/31/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Applicant Initiated Interview Request Form

Application No.: 96/000,355 First Named Applicant: LS Cable & System Ltd.
Examiner: DEB, ANJAN K Art Unit: 3992 Status of Application: Pending

Tentative Participants:
(1) Matthew S. Dicke (2) Sherif N.A. Mahmoud
(3) _____ (4) _____

Proposed Date of Interview: November 8, 2021 **Proposed Time:** 2pm (EST) (○AM ◉PM)

Type of Interview Requested:
(1) ☐ Telephonic (2) ☐ Personal (3) ☑ Video Conference

Exhibit To Be Shown or Demonstrated: ☑ YES ☐ NO
If yes, provide brief description: PPT slides with talking points and illustrative figures

Issues To Be Discussed

Issues (Rej., Obj., etc)	Claims/ Fig. #s	Prior Art	Discussed	Agreed	Not Agreed
(1) 112	1-48		☐	☐	☐
(2) 102	1-15, 19-48	Chung-Sik	☐	☐	☐
(3) 103	1-15, 19-48	Chung-Sik, Kaite	☐	☐	☐
(4) 103	16-18	Chung-Sik, Kaite, Cho	☐	☐	☐

☐ Continuation Sheet Attached ☐ Proposed Amendment or Arguments Attached
Brief Description of Arguments to be Presented: See also separately filed statement of issues to be discussed during interview.

An interview was conducted on the above-identified application on _____

NOTE: This form should be completed and filed by applicant in advance of the interview (see MPEP § 713.01). If this form is signed by a registered practitioner not of record, the Office will accept this as an indication that he or she is authorized to conduct an interview on behalf of the principal (37 CFR 1.32(a)(3)) pursuant to 37 CFR 1.34. This is not a power of attorney to any above named practitioner. See the Instruction Sheet for this form, which is incorporated by reference. By signing this form, applicant or practitioner is certifying that he or she has read the Instruction Sheet. After the interview is conducted, applicant is advised to file a statement of the substance of this interview (37 CFR 1.133(b)) as soon as possible. This application will not be delayed from issue because of applicant's failure to submit a written record of this interview.

/Matthew S. Dicke/
Applicant/Applicant's Representative Signature

Examiner/SPE Signature

Matthew S. Dicke
Typed/Printed Name of Applicant or Representative

312-578-5415; matthew.dicke@klgates.com
Applicant's/Applicant's Representative's Telephone Number

58819
Registration Number, if applicable

This collection of information is required by 37 CFR 1.133. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 24 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Doc Code: M865 or FAI.REQ.INTV

PTOL-413A (08-10)
Approved for use through 12/31/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Instruction Sheet for:
APPLICANT INITIATED INTERVIEW REQUEST FORM

(Not to be Submitted to the USPTO)

1. If this form is signed by a registered practitioner not of record, the authority to submit the Applicant Initiated Interview Request Form is pursuant to limited authority to act in a representative capacity under 37 CFR 1.34 and further proof of authority to act in a representative capacity may be required. *See* 37 CFR 1.34.

   The Office will accept the signed form as an indication that the registered practitioner not of record is authorized to conduct an interview on behalf of the principal in pursuant to 37 CFR 1.34.

   For more information, see the "Conducting an Interview with a Registered Practitioner Acting in a Representative Capacity" notice which is available on the USPTO Web site at: http://www.uspto.gov/patents/law/notices/2010.jsp.

2. This is not a power of attorney to any named practitioner. Accordingly, any registered practitioner not of record named on the form does not have authority to sign a request to change the correspondence address, a request for express abandonment, a disclaimer, a power of attorney, or other document requiring the signature of the applicant, assignee of the entire interest or an attorney of record. If appropriate, a separate power of attorney to the named practitioner should be executed and filed in the US Patent and Trademark Office.

3. Any interview concerning an unpublished application under 35 U.S.C. § 122(b) with a registered practitioner not of record who obtains authorization through use of the PTOL-413A will be conducted based on the information and files supplied by the practitioner in view of the confidentiality requirements of 35 U.S.C. § 122(a).

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt	
EFS ID:	44383519
Application Number:	96000355
International Application Number:	
Confirmation Number:	1538
Title of Invention:	CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF
First Named Inventor/Applicant Name:	8013568
Customer Number:	24573
Filer:	Matthew S. Dicke/Meg Boinski
Filer Authorized By:	Matthew S. Dicke
Attorney Docket Number:	0313071.00020
Receipt Date:	29-NOV-2021
Filing Date:	12-MAR-2021
Time Stamp:	16:14:33
Application Type:	Supplemental Examination
Patent Number:	

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$10680
RAM confirmation Number	E2021ASG15231198
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		0313071-00020_SuppExam_RespNFOA.pdf	344578 d75b2dec74abdd296f659a2448dba5b28c564040	yes	48

Multipart Description/PDF files in .zip description

Document Description	Start	End
Amendment/Req. Reconsideration-After Non-Final Reject	1	1
Claims	2	22
Applicant Arguments/Remarks Made in an Amendment	23	48

Warnings:

Information:

2	Fee Worksheet (SB06)	fee-info.pdf	40276 b24c38adeb17b34ba3323f0bd9215335a43c2acd	no	2

Warnings:

Information:

Total Files Size (in bytes):	384854

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New Applications Under 35 U.S.C. 111

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New International Application Filed with the USPTO as a Receiving Office

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Electronic Patent Application Fee Transmittal

Application Number:	96000355
Filing Date:	12-Mar-2021
Title of Invention:	CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF
First Named Inventor/Applicant Name:	8013568
Filer:	Matthew S. Dicke/Meg Boinski
Attorney Docket Number:	0313071.00020

Filed as Large Entity

Filing Fees for Supplemental Examination

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
REEXAMINATION INDEPENDENT CLAIMS	1821	11	480	5280
REEXAMINATION CLAIMS IN EXCESS OF 20	1822	54	100	5400
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**10680**

REMARKS

Patent Owner submits this response in reply to the Non-Final Office Action mailed September 29, 2021.

In a previous Non-Final Office Action mailed June 30, 2021, claims 1-24 of U.S. Patent No. 8,013,568 (hereinafter "the '568 patent") were subject to reexamination. On August 30, 2021, Patent Owner filed a response to the previous Non-Final Office Action in which claims 3, 9, 11-12, and 16 were amended and new claims 25-48 were added.

In the Non-Final Office Action mailed September 29, 2021, claims 1-48 stand rejected. In this response, claim 36 is cancelled, new claims 49-75 are added, and claims 1-4, 7-10, 13, 15-18, 21, 23, 25, 30, 40-41, and 48 are amended.

No new matter was added with these amendments. These amendments do not enlarge the scope of the original patent claims. Favorable reconsideration of the pending claims and allowance of the new claims is respectfully requested in light of the following remarks.

1. Statement of Issues Discussed During Interview

The Patent Owner thanks the Examiners for the interview conducted on November 8, 2021 between the Examiners and the Patent Owner's Representatives, Matthew S. Dicke (USPTO Reg. No. 58,819) and Sherif N. A. Mahmoud (USPTO Reg. No. 71,860).

During the interview, the parties discussed the claims, technical problems solved by the claims, the cited prior art of record, the pending claim rejections, as well as proposed arguments and amendment concepts for overcoming the pending rejections and avoiding the invocation of 35 U.S.C. 112, sixth paragraph.

The parties also discussed Patent Owner's proposed arguments regarding why the claimed "overvoltage monitoring unit" and "monitoring result" patentably distinguish the claims from the prior art of record. As part of this discussion, the Examiners suggested one amendment concept for overcoming the prior art rejections that includes adjusting a charging power of an external charging device to two or more different levels during charging. The Examiners also agreed that another proposed amendment concept that includes adjusting magnetic intensity based on relative positions of the charging device and the chargeable battery would also likely overcome the prior art rejections.

The parties also discussed Patent Owner's proposed arguments regarding the claimed "constant voltage/constant current supplier," the claimed "overvoltage monitoring unit," and the claimed "microprocessor." The Examiners agreed that the specific portions of the specification discussed during the interview provide sufficient support to overcome the 35 U.S.C. 112, sixth paragraph invocation and the 35 U.S.C. 112 rejections of the claimed "constant voltage/constant current supplier" and the claimed "microprocessor."

The Examiners also explained and suggested other types of support that the Patent Owner can provide to rebut the pending 35 U.S.C. 112, sixth paragraph interpretations and overcome the pending 35 U.S.C. 112 rejections of the other claim terms identified in the Office Action.

No final agreement was reached regarding patentability of the claims. The Patent Owner thanks the Examiners for their time and consideration.

2. Status of the Claims

Claims 1-35 and 37-75 are currently pending, of which claims 1, 7, 13, 21, 23, 49, 55, 60, 65, 66, 68, 69, 74 and 75 are independent.

In the present response, claim 36 is cancelled, new claims 49-75 are added, claims 1-4, 7-13, 15-18, 21, and 23 are amended, and new claims 25, 30, 40-41, and 48 are amended.

Independent claims 1, 7, 13, 21, and 23 are amended as noted above. Support for these amendments is found at least at column 3, lines 35-39; column 9, lines 29-44 (e.g., "the contact-less charging device and chargeable battery need not be fixed to a certain relative position as in the prior art so as to constantly keep an intensity of magnetic flux linked to the secondary coil"); and column 11, lines 13-45; and column 12, lines 49-50.

Claims 2-4, 8-10, 15, and 17 are amended to address typographical issues, formalities, and ensure proper antecedent basis.

Claims 16 and 18 are amended to replace the term "constant voltage supplier" with the term "power supply" and to replace the term "constant voltage supplying part" with the term "constant voltage supplier." Support for these amendments is found at least at column 7, lines 13-16 and column 8, lines 12-19.

New claims 25, 30, and 40 are amended to remove the term "overvoltage monitoring unit." Support for these amendments is found at least at column 2, lines 13-20 (example specifying that the constant voltage/constant current supplier is a circuit element) and column 7, lines 33-63

(example illustrating control of the constant voltage/constant current supplier by the microprocessor).

New claims 41 and 48 are amended to address typographical issues, formalities, and ensure proper antecedent basis.

Claims 49-75 are newly added.

Support for new claims 49-75 is found at least at column 3, lines 35-39; column 9, lines 29-44; column 11, lines 13-45; column 12, lines 49-50; column 11, lines 13-26 (e.g., microprocessor 310 transmits a first adjustment request signal for adjusting a power applied to the primary coil 200 from a first level to a second level); and column 11, lines 32-45 (e.g., microprocessor 310 transmits a second adjustment request signal for adjusting the power applied to the primary coil 200 from the second level to a third level).

Support for new claims 66 and 68 is also found at least at column 7, lines 17-22 (e.g., the contact-less chargeable battery B includes a charging circuit module and a battery cell 300 that is charged by the charging circuit module); column 9, lines 35-44 (e.g., the contact-less charging device and chargeable battery need not be fixed to a certain relative position so as to constantly keep an intensity of magnetic flux linked to the secondary coil 270; and Fig. 7 (e.g., a user may charge the battery B by placing it on the pad of the charging device C without fixing it in a certain relative position). Moreover, support for new claim 67 is found at least at column 4, lines 18-22; column 9, lines 29-34; column 11, lines 32-45; and column 12, lines 46-52.

Support for new claim 74 is also found at least at column 4, lines 4-10; column 4, lines 46-52; and column 10, lines 14-25 (see, e.g., the wireless receiving unit 230 and the microprocessor 240).

Support for new claim 75 is also found at least at column 9, lines 35-39 (e.g., "the contact-less charging device and chargeable battery need not be fixed to a certain relative position as in the prior art so as to constantly keep an intensity of magnetic flux linked to the secondary coil").

3. Response to Claim Interpretation under 35 U.S.C. 112, Sixth Paragraph

In the Office Action, the Office invoked an interpretation under 35 U.S.C. 112, sixth paragraph with respect to claims 1, 3-4, and 16 for the following recited claim terms: "constant voltage/constant current supplier," "overvoltage monitoring unit," "microprocessor," "charging pause detecting unit," and "constant voltage supplying part." Patent Owner respectfully disagrees

and asserts that the pending claims were not intended to be and should not be interpreted as means-plus-function claims under 35 U.S.C. 112, sixth paragraph.

If persons of ordinary skill in the art reading the specification understand a term to have a sufficiently definite meaning as the name for the structure that performs the function, even when the term covers a broad class of structures or identifies the structures by their function (e.g., "filters," "brakes," "clamp," "screwdriver," and "locks"), 35 U.S.C. 112 sixth paragraph will not apply. *See* MPEP 2181(I)(A).

Persons of ordinary skill in the art reading the specification of the '568 patent would recognize that the recited claim terms have a sufficient definite meaning as the name for a structure. The recited claim terms are also modified by sufficient structure, material, and/or acts for a person skilled in the art reading the specification to recognize that the recited claim terms, together with the functions, structures, materials, and acts recited in the claims, connote sufficient definite structure.

To determine whether a word, term, or phrase coupled with a function denotes structure, examiners may check whether: (1) the specification provides a description sufficient to inform one of ordinary skill in the art that the term denotes structure; (2) general and subject matter specific dictionaries provide evidence that the term has achieved recognition as a noun denoting structure; and/or (3) the prior art provides evidence that the term is an art-recognized structure to perform the claimed function (emphasis added). *See* MPEP 2181(I)(C); and *Ex parte Rodriguez*, 92 USPQ2d 1395, 1404 (Bd. Pat. App. & Int. 2009) (precedential).

a. Constant voltage/constant current supplier

Persons of ordinary skill in the art reading the specification of the '568 patent would recognize the term "constant voltage/constant current supplier" as denoting a definite structure. Support for the claimed "constant voltage/constant current supplier" is found at least at column 2, lines 13-20; column 7, lines 33-44 ("constant voltage/constant current supplier 290 applies the rectified DC current to the battery cell 300 according to the control of the microprocessor 310 so as to charge the battery cell 300. At this time, the constant voltage/constant current supplier 290 charges the battery cell 300 in a constant current mode at an initial charging stage … [and then] charges the battery cell 300 in a constant voltage mode"); and column 10, lines 39-44 of the specification. The description of the various examples of the "constant voltage/constant current

supplier" in the specification is sufficient to inform one of ordinary skill of the art that the term connotes definite structure for performing the recited claim functions.

As noted above, during the Interview, the Examiners also agreed that this description in the specification is sufficient to inform one of ordinary skill in the art that the term "constant voltage/constant current supplier" connotes definite structure.

Furthermore, the prior art provides evidence supporting that this term connotes an art-recognized structure. For example, U.S. Pat. No. 6,016,046 (Kaite), which was cited by the Office in the Office Action, recites "the charging control station 123 is provided with a constant current constant voltage circuit to stabilize output from the rectifying circuit 122 … lithium ion rechargeable battery is charged to full charge initially by constant current charging and subsequently by constant voltage charging" (emphasis added). Katie at column 6, lines 40-64. This description in Kaite supports a finding that the term "constant voltage/constant current supplier" connotes an art-recognized structure.

Furthermore, the claims were amended to remove the term "for" that was previously recited after the claimed term to further clarify that the claimed term is not a generic placeholder.

b. Overvoltage monitoring unit

The specification of the '568 patent includes sufficient description to inform one of ordinary skill in the art that the term "overvoltage monitoring unit" denotes a definite structure for performing the functions recited in the claims. Support for the claimed "overvoltage monitoring unit" is found at least at column 4, lines 14-45 (e.g., "the overvoltage unit includes … a microprocessor") and column 7, line 43 to column 8, line 63 (e.g., "microprocessor 310 … monitors whether an excessive voltage is applied at both ends of the constant voltage/constant current supplier 290, and outputs an adjustment request signal of the charging power to the wireless transmitting unit 320 if an excessive voltage is applied … the operation of monitoring voltages at both ends of the constant voltage/constant current supplier 290 is conducted in a way of measuring … as a result, a power … induced to the secondary coil 270 … is decreased").

Furthermore, original claim 3 recites example structural components that can be included in an "overvoltage monitoring unit."

Furthermore, without conceding to the 35 U.S.C. 112, paragraph 6, interpretation of this term, claim 1 was amended to recite "an overvoltage monitoring unit that includes a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier

and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field" (emphasis added). Support for this amendment is found at least at column 4, lines 14-45 and at column 7, line 43 to column 8, line 63. Thus, the term "overvoltage monitoring unit" as recited in claim 1, for example, would also fail the second prong of the 3-prong analysis because it is no longer modified by functional language in amended claim 1.

Furthermore, the claims were amended to remove the term "for" that was previously recited after the claimed term to further clarify that the claimed term is not a generic placeholder.

c. Microprocessor

In invoking the 35 U.S.C. 112, paragraph 6, interpretation of the claimed "microprocessor" recited in claim 3, the Office Action alleged that "the microprocessor 310 is used for outputting the monitoring result according to the voltage comparison result to the wireless transmitting unit. There is no further structure provided, by way of an algorithm or a flowchart for the performing the entire claimed function." *See* Office Action, p. 17.

Applicant respectfully disagrees. Support for the claimed "microprocessor" is found at least at column 7, line 43 to column 8, line 63 (e.g., "microprocessor 310 … monitors whether an excessive voltage is applied at both ends of the constant voltage/constant current supplier 290, and outputs an adjustment request signal of the charging power to the wireless transmitting unit 320 if an excessive voltage is applied. Preferably, the operation of monitoring voltages at both ends of the constant voltage/constant current supplier 290 is conducted in a way of measuring … and then checks whether a difference…") and at column 10, lines 56-68 (e.g., "the microprocessor 310 monitors whether an overvoltage is applied"). Thus, the specification of the '568 patent provides sufficient description to inform one of ordinary skill in the art that the microprocessor denotes definite structure for performing the functions recited in claim 3.

As noted above, during the Interview, the parties agreed that the description in the specification of the '568 patent provides sufficient support for overcoming the 35 U.S.C. 112, paragraph 6, interpretation of the claimed "microprocessor" recited in claim 3.

Furthermore, the claims were amended to remove the term "for" that was previously recited after the claimed term to further clarify that the claimed term is not a generic placeholder.

d. Charging pause detecting unit

The description of the claimed "charging pause detecting unit" in the specification of the '568 patent is sufficient to inform a person of ordinary skill in the art that the term connotes definite structure for performing the function. Support for the claimed "charging pause detecting unit" is found at least at column 8, line 64 to column 9, line 16; column 10, lines 1-4; and Figs. 5-6 (e.g., the charging pause detector 390 measures the high frequency AC current induced in the secondary coil 270 and so as to detect when the induced high frequency AC current is interrupted (the pause region), and that inputs the detection signal to the microprocessor 310).

Furthermore, the claims were amended to remove the term "for" that was previously recited after the claimed term to further clarify that the claimed term is not a generic placeholder.

e. Constant voltage supplying part

Without conceding to the 35 U.S.C. 112, sixth paragraph, interpretation but out of an abundance of caution, claims 16 and 18 are amended to remove the term "constant voltage supplying part." For example, amended claims 16 and 18 recite, respectively, the terms "power supply" and "constant voltage supplier." Support for this amendment is found at least at column 7, lines 13-16.

In view of the foregoing, Patent Owner respectfully asserts that the pending claims are not means-plus-function claims and that each and every word of the claims should be given patentable weight. Furthermore, for at least the reasons stated above, Patent Owner respectfully requests withdrawal of the pending 35 U.S.C. 112, sixth paragraph, interpretation of the claim terms in the pending claims.

4. <u>Response to Claim Rejections under 35 U.S.C. 112</u>

Claims 1, 4, 7, 13, 21, and 23 were rejected under 35 U.S.C. 112, first paragraph, as allegedly failing to comply with the written description requirement and under 35. U.S.C. 112, second paragraph, as allegedly being indefinite. In particular, the 35 U.S.C. 112, first paragraph and second paragraph rejections are based on the recitation of the claim terms "constant voltage/constant current supplier," "overvoltage monitoring unit," "microprocessor," and "charging pause detecting unit." *See* Office Action, pp. 19-20.

Patent Owner respectfully traverses these rejections. Support for these claim terms is noted above in Patent Owner's response to the 35 U.S.C. 112, sixth paragraph, interpretation of these

claim terms. Furthermore, as noted above, the parties agreed during the Interview that the written description in the specification of the '568 patent provides sufficient support for at least the terms "constant voltage/constant current supplier" and "microprocessor."

Thus, for at least the same reasons stated above and the support provided above in response to the claim interpretation under 35 U.S.C. 112, sixth paragraph, Applicant respectfully requests withdrawal of the pending 35 U.S.C. 112, first and second paragraph rejections.

5. Response to Claim Rejections under 35 U.S.C. 102 and 35 U.S.C. 103

Claims 1-14 and 19-48 were rejected under 35 U.S.C. 102 as allegedly being anticipated by Korean Patent No. KR 950005819B1 (hereinafter "Chung-Sik"). Claims 1-14 and 19-48 were also rejected under 35 U.S.C. 103 as allegedly being unpatentable over Chung-Sik in view of U.S. Pat. No. 6,016,046 (hereinafter "Kaite"). Claims 16-18 were rejected under 35 U.S.C. 103 as allegedly being unpatentable over Chung-Sik in view of Kaite and further in view of Korean Patent No. KR100451606B1 (hereinafter "Cho").

Without conceding to these rejections, Patent Owner has amended the claims as noted above. Chung-Sik, Kaite, and Cho, alone or in combination, do not teach or suggest all features of any of independent claims 1, 7, 13, 21, 23, 49, 55, 60, 65, 66, 68, 69, 74, and 75.

a. Overview of Technical Problem

As illustrated in Fig. 1 of the '568 patent (reproduced below), in a conventional contact-less charging method, a charger 10 includes a primary coil 40 supplied with a high frequency AC current to form a magnetic field M, and a battery 50 includes a secondary coil 70 to which a high frequency AC current is induced according to the linkage of the magnetic field M generated in the primary coil 40. *See* Fig. 1 and column 1, line 66 to column 2, line 6.

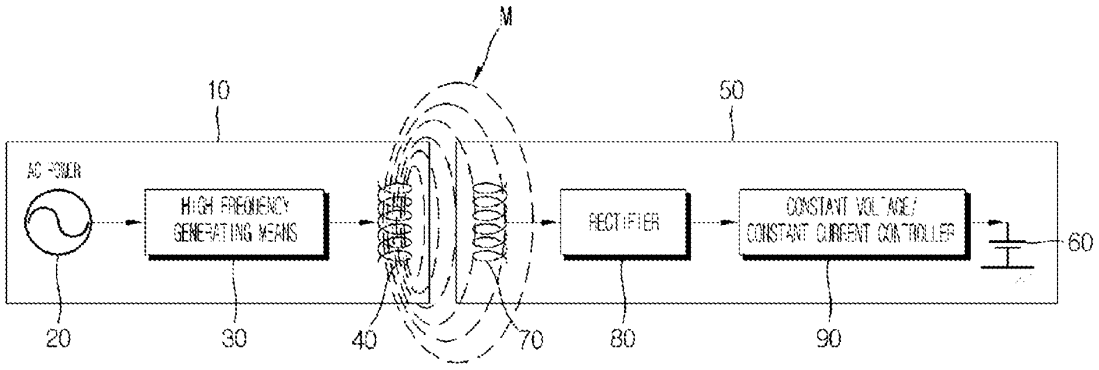

Fig. 1 of the '568 patent

An intensity of the AC current induced in the secondary coil 70 is proportional to an intensity of the magnetic flux linked to the secondary coil 70, which depends on a relative position of the secondary coil 70 and the primary coil 40. *See* column 2, lines 21-27. For example, if the secondary coil 70 is positioned closer to the primary coil 40, the intensity of the magnetic flux linked to the secondary coil 70 will increase, and as a result the intensity of the high frequency AC current induced in the secondary coil 70 will also increase. *See* column 2, lines 27-32. However, if a large high frequency AC current induced in the secondary coil 70 exceeds standards defined for a circuit part in battery 50 (e.g., constant voltage/constant current supplier 90), then it could cause damage to the circuit part. *See* column 2, lines 42-48.

b. Prior Art Principle of Operation

Considering the above, prior art contact-less charging methods employ a structure that fixes the relative positions between the charger 10 and the battery 50 to a position where the standards of a circuit part (e.g., the constant voltage/constant current supplier 90) in the battery 50 are defined. *See* column 2, lines 49-53.

For example, as illustrated in Fig. 2 of the '568 patent (reproduced below), an electric toothbrush 100 includes a toothbrush body 110 having a battery 115 mounted to its lower end, and a charger 120 for charging the battery 115. *See* Fig. 2 and column 2, lines 54-60. The toothbrush body 110 and the charger 120 are closely fixed with each other by matching the grooves 130, 140 and the protrusions 15, 160, and as a result relative positions of the charger 120 and the battery 150 are also closely fixed. *See* column 2, line 66 to column 3, line 3. Standards of a constant voltage/constant current supplier 170 provided to the battery 115 are defined with the

understanding that the toothbrush body 110 and the charger 120 are closely fixed in this manner, and thus damage to the constant voltage/constant current supplier 170 may be prevented while charging the battery 115 due to an unexpected overvoltage by strictly restricting relative positions of the battery 115 and the charger 120 in this manner. *See* column 3, lines 4-13. That is to say, whenever charging the battery 115, a user should fix the toothbrush body 110 on the charger 120 in this particular fixed relative position. *See* column 3, lines 12-17.

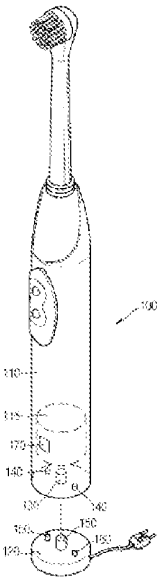

Fig. 2 of the '568 Patent

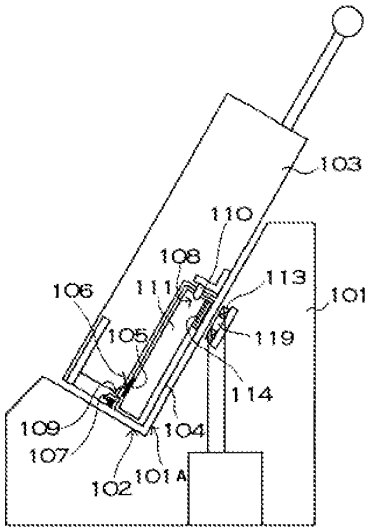

Fig. 1 of Kaite

Chung-Sik and Kaite rely on the same understanding of fixing the relative positions of the battery and charger whenever the charger is charging the battery.

For example, as illustrated in Fig. 1 of Kaite (reproduced above), Kaite teaches that the "charging stand 101 has an attachment section 101A for attaching the portable electrical equipment 103 with battery pack 102 connected at a specific position." *See* Fig. 1; and column 4, lines 60-62.

Similarly, Chung-Sik teaches that "the battery may be recharged only when the portable device 18 is installed on the base unit 12" (emphasis added). Page 8-2, lines 59-60. In Chung-Sik, "when the portable device 18 is installed on the base unit 12, the charge switch 30 is switched 'on' according to mechanical input" (emphasis added). Page 8-4, lines 30-40. Further, in Chung-Sik, "when a portion of the contactless charging unit 38 of the portable device 18 is mounted

(positioned) on the power transmitter 28 of the base unit 12, a charge switch 30 of the base unit 12 is started (turned 'on') by the mounting of the portable device 18." Page 8-2, line 62 to page 8-3, line 2. Further, in Chung-Sik "when the portable device 18 is separated from the base unit 12, operation of the contactless charging unit 28 and the power transmitter 28 are stopped to stop charging the battery 32." Page 8-3, lines 11-14. Further, in Chung-Sik, "when the two devices are coupled to each other, the core 78 of the induced voltage detecting unit 81 installed on the contactless charging unit 38 in the portable device 18 is positioned on an opposite surface of the core 76 of the induced voltage generating unit 46 in the power transmitter 28 and is space coupled thereto" (emphasis added). Page 8-4, lines 20-25.

c. Overview of Technical Solution

One object of the disclosure of the '568 patent is to provide a battery charging control method capable of preventing damage of an internal battery circuit together with solving a restriction for relative positions between the battery and the charger. *See* column 3, lines 35-39.

For example, as illustrated in Fig. 7 of the '568 patent (reproduced below), "the contact-less charging device and chargeable battery need not be fixed to a certain relative position as in the prior art so as to constantly keep an intensity of magnetic flux linked to the secondary coil 270" (emphasis added). *See* Fig. 7; and column 9, lines 35-38. For example, where the charging device C is designed in a pad shape as shown in Fig. 7, a user may conveniently charge a battery B just by placing a subject such as a cellular phone coupled with the battery B onto the pad, thereby allowing one to make a convenient charger and battery set. *See* column 9, lines 38-44.

To facilitate this, in one example, a contact-less charging device and chargeable battery may adjust a charging power via wireless feedback control during the battery charging process. *See* column 9, lines 29-32; and column 12, lines 46-51.

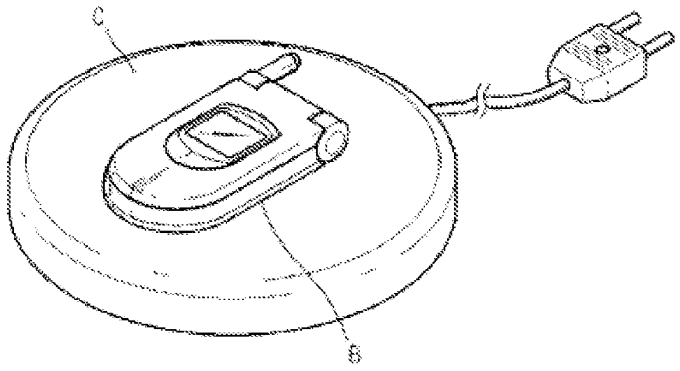

Fig. 7 of the '568 patent

d. Claims 1-35 and 37-48

Amended independent claim 1 recites:

> Claim 1: A contact-less chargeable battery including a charging circuit for charging an electric energy to a battery cell, the contact-less chargeable battery comprising:
>
> a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from the external contact-less charging device;
>
> a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;
>
> a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and
>
> an overvoltage monitoring unit that includes a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,
>
> wherein the monitoring result includes a wireless feedback control signal to induce the change of intensity of the magnetic field based on relative positions of the contact-less chargeable battery and the external contact-less charging device.

(Emphasis Added).

As noted above, Chung-Sik's principle of operation relies on an assumption that Chung-Sik's battery 32 will only be charged when the portable device 18 (and thus the battery 32) is mounted to the base unit 12 at a fixed position. Chung-Sik teaches that "the battery may be recharged only when the portable device 18 is installed on the base unit 12" (emphasis added). Page 8-2, lines 59-60. In Chung-Sik, "when the portable device 18 is installed on the base unit 12, the charge switch 30 is switched 'on' according to mechanical input" (emphasis added). Page 8-4, lines 30-40. Further, in Chung-Sik, "when a portion of the contactless charging unit 38 of the portable device 18 is mounted (positioned) on the power transmitter 28 of the base unit 12, a charge switch 30 of the base unit 12 is started (turned 'on') by the mounting of the portable device 18." Page 8-2, line 62 to page 8-3, line 2. Further, in Chung-Sik "when the portable device 18 is separated from the base unit 12, operation of the contactless charging unit 28 and the power

transmitter 28 are stopped to stop charging the battery 32." Page 8-3, lines 11-14. Further, in Chung-Sik, "when the two devices are coupled to each other, the core 78 of the induced voltage detecting unit 81 installed on the contactless charging unit 38 in the portable device 18 is positioned on an opposite surface of the core 76 of the induced voltage generating unit 46 in the power transmitter 28 and is space coupled thereto" (emphasis added). Page 8-4, lines 20-25.

Thus, Chung-Sik at best describes a system where signals transmitted from the portable device 18 to the base 12 will only occur "when the two devices are coupled to each other" in a fixed arrangement at which the core 78 of the portable device 18 is positioned on a surface of the core 76 of the transmitter 28 of the base unit 12. *See* Page 8-4, lines 20-25. In fact, Chung-Sik does not teach or suggest making any change to the intensity of the magnetic field on the basis of relative positions of the base 12 and the contactless charging unit 18 because Chung-Sik understands that their relative positions are fixed whenever the battery 32 is being charged.

Claim 1, on the other hand, recites "a microprocessor … transmitting a monitoring result to the external contact-less charging device … wherein the monitoring result includes a wireless feedback control signal to induce the change of intensity of the magnetic field based on relative positions of the contact-less chargeable battery and the external contact-less charging device" (emphasis added). Thus, Chung-Sik fails to teach or suggest this claimed feature.

Similarly, as noted above, Kaite's principle of operation relies on an understanding that Kaite's charging stand 101 charges Kaite's battery pack 102 only when "Kaite's portable electrical equipment 103 with battery pack 102 [is] connected at a specific position" (emphasis added). *See* col. 4, lines 60-62; and Fig. 1. Thus, for at least the same reasons stated above, Kaite also fails to teach or suggest this claimed feature.

Cho does not make up for the shortcomings of Chung-Sik and Kaite.

Independent claims 7, 13, 21, and 23 were amended similarly to claim 1.

For at least the foregoing reasons, independent claims 1, 7, 13, 21, and 23 are allowable and patentably distinguished over the prior art of record. Claims 2-6 and 25-29 are allowable for at least the reason that they depend from allowable claim 1. Claims 8-12 and 30-34 are allowable for at least the reason that they depend from allowable claim 7. Claims 14-20, 35, and 37-39 are allowable for at least the reason that they depend from allowable claim 13. Claims 22 and 40-44 are allowable for at least the reason that they depends from allowable claim 21. Claims 24 and 45-48 are allowable for at least the reason that they depends from allowable claim 23.

e. New claims 49-54

New independent claim 49 recites:

> Claim 49: A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:
>
> a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;
>
> a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;
>
> a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage; and
>
> an overvoltage monitoring unit that includes a wireless transmitting unit, first and second voltage detectors respectively detecting voltages at both ends of the constant voltage/constant current supplier, and a microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication through the wireless transmitting unit so as to induce a change of intensity of the magnetic field,
>
> wherein the change of intensity of the magnetic field is based on relative positions of the primary coil and the secondary coil.

(Emphasis Added).

New claim 49 includes similar features to amended claim 7 as well as additional features incorporated from the dependent claims (e.g., wireless transmitting unit, first and second voltage detectors, etc.) and the specification (e.g., primary coil, secondary coil) to further distinguish claim 49 from the prior art of record. Therefore, in addition to the reasons stated above, claim 49 is also allowable for reciting these additional features.

Chung-Sik, Kaite, and Cho do not teach or suggest "wherein the change of intensity of the magnetic field is based on relative positions of the primary coil and the secondary coil" (emphasis added), as well as other features recited in claim 49. In fact, as noted above, Chung-Sik and Kaite do not teach or suggest making any change to the intensity of a magnetic field on the basis of relative positions of a primary coil and a secondary coil.

For at least the foregoing reasons, claim 49 (and claims 50-54 dependent on claim 49) are allowable and patentably distinguished over the prior art of record.

f. Claims 55-59

New independent claim 55 recites:

> Claim 55: A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:
>
> a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil in an external contact-less charging device;
>
> a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;
>
> a constant voltage/constant current supplier that includes circuitry controlled by at least one microprocessor, the constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage; and
>
> an overvoltage monitoring unit that includes a wireless transmitting unit, first and second voltage detectors respectively detecting voltages at both ends of the constant voltage/constant current supplier, and the at least one microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication through the wireless transmitting unit so as to induce a change of intensity of the magnetic field,
>
> wherein the at least one microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting a power applied to the primary coil from a first level to a second level,
>
> wherein the at least one microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the power applied to the primary coil from the second level to a third level.

(Emphasis Added).

New claim 55 recites additional features from the dependent claims (e.g., wireless transmitting unit, first and second voltage detectors, circuitry controlled by at least one microprocessor, etc.) and from the specification (e.g., primary coil, secondary coil, first and second charging power adjustment request signals, etc.) to further distinguish claim 55 from the prior art

of record. Therefore, in addition to the reasons stated above, claim 55 is also allowable for reciting these additional features.

Support for new claim 55 is found at least at column 11, lines 13-26 (e.g., microprocessor 310 transmits a first charging power adjustment request signal for adjusting a power applied to the primary coil 200 from a first level to a second level); and column 11, lines 32-45 (e.g., microprocessor 310 then transmits a second charging power adjustment request signal for adjusting the power applied to the primary coil 200 from the second level to a third level).

Chung-Sik, Kaite, and Cho do not teach or suggest "wherein the at least one microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting a power applied to the primary coil from a first level to a second level, wherein the at least one microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the power applied to the primary coil from the second level to a third level" (emphasis added), as well as other features recited in claim 55.

At best, Chung-Sik describes a second microcomputer 56 that outputs a charge completion signal so as to induce the base unit 12 to stop or switch "off" charging the battery 32. Thus, Chung-Sik fails to teach or suggest a microprocessor that transmits a first charging power adjustment request signal for adjusting a power applied to the primary coil from a first level to a second level and a second charging power adjustment request signal for adjusting the power applied to the primary coil from the second level to a third level. Kaite and Cho do not make up for the shortcomings of Chung-Sik.

For at least the foregoing reasons as well, claim 55 (and claims 56-59 dependent upon claim 55) are allowable and patentably distinguished over the prior art of record..

g. New claims 60-64

New independent claim 60 recites:

> Claim 60: A contact-less charging circuit module electrically connected to a battery cell and used for receiving a charging power from an external contact-less charging device and charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:
>
> a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from the external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes a microprocessor monitoring the voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device from a first level to a second level,

wherein the microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device from the second level to a third level.

(Emphasis Added).

New claim 60 recites features similar to those discussed above in connection with new clam 55 (e.g., first and second charging power adjustment request signals, first level, second level, third level, etc.) to further distinguish claim 60 from the prior art of record. Therefore, for at least the same reasons stated above, claim 60 is also allowable for reciting these features.

For at least the foregoing reasons as well, claim 60 (and claims 61-64 dependent upon claim 61) are allowable and patentably distinguished over the prior art of record..

h. New claim 65

New Independent claim 65 recites:

Claim 65: A contact-less charging circuit module electrically connected to a battery cell and used for and charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting unit transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

(Emphasis Added).

New claim 65 recites similar features as amended claim 7 as well as additional features incorporated from the dependent claims (e.g., wireless transmitting unit) to further distinguish claim 65 from the prior art of record. Therefore, for at least the same reasons stated above, claim 65 and claim 66, depending therefrom, are also allowable and patentably distinguished over the prior art of record.

i. New claims 66-67

New independent claim 66 recites:

Claim 66: A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit including a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting unit transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the secondary coil is movable relative to the primary coil during the charging of the battery cell by the contact-less charging circuit module.

(Emphasis Added).

New claim 66 recites similar features as original claim 7 as well as features incorporated from the dependent claims (e.g., microprocessor, wireless transmitting unit) and additional features (e.g., "wherein the secondary coil is movable relative to the primary coil during the charging of the battery cell by the contact-less charging circuit module") incorporated from the specification to further distinguish claim 66 from the prior art of record.

Support for new claim 66 is found at least at column 7, lines 17-22 (e.g., the contact-less chargeable battery B includes a charging circuit module and a battery cell 300 that is charged by the charging circuit module); column 9, lines 35-44 (e.g., the contact-less charging device and chargeable battery need not be fixed to a certain relative position so as to constantly keep an intensity of magnetic flux linked to the secondary coil 270); and Fig. 7 (e.g., a user may charge the battery B by placing it on the pad of the charging device C without fixing it in a certain relative position). For example, as shown in Fig. 7 (and as described column 9, lines 35-44), the chargeable battery B is charged without fixing it to the charging device C in a certain relative position. Therefore, the battery B (which includes the secondary coil) is movable relative to the charging device C (which includes the primary coil) while the battery B is being charged.

In contrast, as noted above, Chung-Sik's principle of operation relies on the understanding that Chung-Sik's battery 32 will only be charged when the portable device 18 (and thus the battery 32 and the charging circuit including the induced voltage detecting unit 81) is mounted to the base unit 12 at a fixed position. Chung-Sik teaches that "the battery may be recharged only when the portable device 18 is installed on the base unit 12" (emphasis added). Page 8-2, lines 59-60. In Chung-Sik, "when the portable device 18 is installed on the base unit 12, the charge switch 30 is switched 'on' according to mechanical input" (emphasis added). Page 8-4, lines 30-40. Further, in Chung-Sik, "when a portion of the contactless charging unit 38 of the portable device 18 is mounted (positioned) on the power transmitter 28 of the base unit 12, a charge switch 30 of the base unit 12 is started (turned 'on') by the mounting of the portable device 18" (emphasis added). Page 8-2, line 62 to page 8-3, line 2. Further, in Chung-Sik "when the portable device 18 is separated from the base unit 12, operation of the contactless charging unit 28 and the power transmitter 28 are stopped to stop charging the battery 32" (emphasis added). Page 8-3, lines 11-14. Further, in Chung-Sik, "when the two devices are coupled to each other, the core 78 of the induced voltage detecting unit 81 installed on the contactless charging unit 38 in the portable device 18 is positioned on an opposite surface of the core 76 of the induced voltage generating

unit 46 in the power transmitter 28 and is space coupled thereto" (emphasis added). Page 8-4, lines 20-25.

Thus, Chung-Sik teaches away from moving the secondary coil relative to the primary coil while charging the battery 32 because in Chung-Sik the battery 32 can only be charged when the core 78 must be positioned on the opposite surface of the core 76.

Similarly, as noted above, Kaite's principle of operation relies on the understanding that Kaite's charging stand 101 charges Kaite's battery pack 102 only when "Kaite's portable electrical equipment 103 with battery pack 102 [is] connected at a specific position" (emphasis added). *See* col. 4, lines 60-62; and Fig. 1.

Thus, for at least the reasons stated above, Chung-Sik and Kaite fail to teach or suggest the claimed feature of "wherein the secondary coil is movable relative to the primary coil during the charging of the battery cell by the contact-less charging circuit module" recited in claim 66. Cho does not make up for the shortcomings of Chung-Sik and Kaite. In view of the foregoing, claim 66 is allowable and patentably distinguished over the prior art of record.

Moreover, support for new claim 67 is found at least at column 4, lines 18-22; column 9, lines 29-34; column 11, lines 32-45; and column 12, lines 46-52. For at least the reasons stated above in relation to independent claim 66, claim 67 is allowable and patentably distinguished over the prior art of record for at least the reason that it depends from allowable claim 66.

j. New claim 68

New independent claim 68 recites:

> Claim 68: A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:
>
> a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;
>
> a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;
>
> a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and
>
> an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting unit transmitting a monitoring result to the external contact-

less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the contact-less charging circuit module is movable relative to the external contact-less charging device during the charging of the battery cell by the contact-less charging circuit module.

(Emphasis Added).

New claim 68 recites similar limitations as new claim 66. Therefore, new claim 68 is also allowable for at least the same reasons stated above in connection with new claim 66. Chung -Sik, Kaite, and Cho do not teach or suggest "wherein the contact-less charging circuit module is movable relative to the external contact-less charging device during the charging of the battery cell by the contact-less charging circuit module" as recited in claim 68.

In view of the foregoing, claim 68 is allowable and patentably distinguished over the prior art of record.

k. New claims 69-73

New independent claim 69 recites:

Claim 69: A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit for monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result is a charging power adjustment request signal.

(Emphasis Added).

New claim 69 recites the features of original claim 7 together with features incorporated from original claim 11 (e.g., "wherein the monitoring result is a charging power adjustment request

signal"). In addition to the reasons stated above, claim 69 is also allowable for the reasons set forth below.

In rejecting claim 11, the Office Action seems to have identified Chung-Sik's charge state signal (VDL) as allegedly corresponding to the claimed "charging power adjustment request signal." *See* Office Action, pp. 36-37. Patent Owner respectfully disagrees.

Chung-Sik discloses that "when the detection voltage V2 becomes higher than the reference voltage V1, the output VDL of the comparator 96 is transitioned to logic 'high' from logic 'low' and is input to the second microcomputer 56 … the second microcomputer 56 scans the output VDL of the comparator 96 and searches for whether or not the charge voltage is normal determines that the charge voltage of the battery 32 is normal. That is a voltage of the battery 32 is determined to be completely charged to a set voltage level, and a charge completion alarm signal is output through line 37 in operation 122. The charge completion alarm signal through line 37 is transmitted to the base unit 12 … [and] the first microcomputer 48 … determines that the charge completion signal is received from the portable device 18 … and performs operation 112" (emphasis added). Page 8-5, lines 30-42. In Chung-Sik, operation 112 stops charging. *See* page 8-5, line 29.

Therefore, at best, Chung-Sik's charge state signal (VDL) is an output of a comparator that only has two values: "H" representing that the battery is fully charged and "L" representing that the battery is not fully charged. *See* page 8-5, lines, 30-42. Similarly, at best, Chung-Sik's charge completion alarm signal is a signal that is only transmitted to the base unit 12 when the "voltage of the battery 32 is determined to completely charged."

Neither the description of the charge state signal (VDL) nor the description of the charge completion alarm signal in Chung-Sik encompasses the claimed "charging power adjustment request signal."

During patent examination, the pending claims must be given their broadest reasonable interpretation consistent with the specification (emphasis added). MPEP 2111. The broadest reasonable interpretation does not mean the broadest possible interpretation (emphasis added). *Id.* Rather, the meaning given to a claim term must be consistent with the ordinary and customary meaning of the term (unless the term has been given a special definition in the specification), and must be consistent with the use of the claim term in the specification and drawings (emphasis

added). *Id.* Further, the broadest reasonable interpretation of the claims must be consistent with the interpretation that those skilled in the art would reach (emphasis added). *Id.*

The Office's interpretation of the claimed "charging power adjustment request signal" transmitted to the external contact-less charging device as corresponding to Chung-Sik's VDL output from the comparator 96 is inconsistent with the specification of the '568 patent.

For example, as described in the specification of the '568 patent, microprocessor 310 may output a charging power adjustment request signal to adjust the power applied to the primary coil by as much as a predetermined level (column 11, lines 14-26), and output the charging power adjustment request signal once again to lower the power applied to the primary coil once again by as much as the predetermined level (column 11, lines 39-43), and so on.

Thus, one of ordinary skill in the art would not interpret the claimed "charging power adjustment request signal" to correspond to Chung-Sik's charge state level (VDL) or Chung-Sik's "charge completion alarm signal," which are signals that are only sent to the base 12 when Chung-Sik's battery 32 is fully charged to stop charging the battery, because such an incorrect interpretation is inconsistent with the description of the claimed "charging power adjustment request signal" in the specification of the '568 patent.

Rather, one of ordinary skill in the art reading the specification of the '568 patent would recognize the claimed "charging power adjustment request signal" to have a different meaning that is inconsistent with Chung-Sik's VDL and/or Chung-Sik's charge completion alarm signal. For example, as described in the specification of the '568 patent, the external contact-less charging device may adjust "a charging power by modulating a width of a pulse current, a frequency of the pulse current, an amplitude of a pulse or the number of pulses" (emphasis added). *See* column 4, lines 64-67. As another example, the "microprocessor 240 [of the contact-less charging device C of Fig. 3] … adjust[s] a power of the high frequency AC current applied to the primary coil 200 if an adjustment request signal of the charging power is received … Preferably, the microprocessor 240 controls the high frequency power driving unit 210 for high frequency pulse width modulation, pulse frequency modulation, pulse number modulation, or pulse amplitude modulation so as to adjust the power of the high frequency current. Then, a level of the charging power transmitted to the chargeable battery B is adjusted" (emphasis added). *See* column 6, line 66 to column 7, line 12.

Thus, one of ordinary skill in the art reading this description in the specification of the '568 would recognize the claimed "charging power adjustment signal" as a signal for adjusting a level of the charging power being transmitted by the external contact-less charging device to a different positive level (not zero). In contrast, Chung-Sik's VDL signal and Chung-Sik's charge completion alarm signal are at best signals for stopping or preventing the transmission of power from the base 12 altogether.

In sum, the claimed "charging power adjustment request signal" does not correspond to Chung-Sik's VDL signal nor does it correspond to Chung-Sik's charge completion alarm signal.

Kaite and Cho do not make up for the shortcomings of Chung-Sik.

Accordingly, for at least the reasons stated above, Patent Owner submits that independent claim 69 is allowable and patentably distinguished over the prior art of record. Dependent claims 70-73 are also allowable for at least the reason that they depend from allowable claim 69.

l. New claim 74

New independent claim 74 recites:

> Claim 74: A contact-less charging device for transmitting a charging power by means of electromagnetic induction phenomenon to a contact-less chargeable battery that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode and wirelessly transmits a monitoring result for voltages at both ends of the constant voltage/constant current supplier, the contact-less charging device comprising:
>
> a magnetic field generating unit for receiving an AC current and forming a magnetic field in an outer space;
>
> a high frequency power driving unit for applying a high frequency AC current to the magnetic field generating unit; and
>
> a charging power adjusting unit that includes: a wireless receiving unit receiving the monitoring result from the contact-less chargeable battery by means of wireless communication, and a microprocessor controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that the charging power transmitted to the contact-less chargeable battery is adjusted,
>
> <u>wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device</u>.

(Emphasis Added).

New claim 74 recites similar features as amended claim 13 together with additional features incorporated from the dependent claims (e.g., microprocessor, wireless receiving unit) to further distinguish claim 74 from the prior art of record. Therefore, in addition to the reasons stated above, claim 74 is also allowable for reciting these additional features.

In view of the foregoing, claim 74 is allowable and patentably distinguished over the prior art of record.

m. New claim 75

New independent claim 75 recites:

> Claim 75: A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:
>
> a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;
>
> a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;
>
> a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and
>
> an overvoltage monitoring unit that includes a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,
>
> wherein the change of intensity of the magnetic field includes a change of intensity of the magnetic field based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

(Emphasis Added).

New claim 75 recites similar features to amended claim 1. Therefore, new claim 75 is also allowable for at least the same reasons stated above in connection with amended claim 1. Chung-Sik and Kaite does not teach or suggest making any change to the intensity of the magnetic field on the basis of relative positions of the base 12 and the contactless charging unit 18. Cho does not make up for the shortcomings of Chung-Sik and Kaite.

In view of the foregoing, claim 75 is allowable and patentably distinguished over the prior art of record.

6. Conclusion

For at least the foregoing reasons, the Patent Owner respectfully submits that the present reexamination proceeding is in condition for allowance and earnestly solicits reconsideration of the same. The Commissioner is hereby authorized to charge Deposit Account No. 02-1818 for any fees which are due and owing. If such a withdrawal is made, please indicate the Attorney Docket No. 0313071.00020 on the account statement.

Respectfully submitted,

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Dated: November 29, 2021

AMENDMENTS TO THE CLAIMS

Claim 1 (Amended): A contact-less chargeable battery including a charging circuit for charging an electric energy to a battery cell, the contact-less chargeable battery comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from [an] the external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit [for] that includes a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result includes a wireless feedback control signal to induce the change of intensity of the magnetic field based on relative positions of the contact-less chargeable battery and the external contact-less charging device.

Claim 2 (Amended): The contact-less chargeable battery according to claim 1, wherein the high frequency AC current inducing unit is a coil to which a magnetic flux of [a] the magnetic field generated from the external contact-less charging device is linked.

Claim 3 (Twice amended): The contact-less chargeable battery according to claim 1, wherein the overvoltage monitoring unit includes:

a wireless transmitting unit for wirelessly propagating the monitoring result through an antenna;

first and second voltage detectors for respectively detecting first and second voltages at front and rear ends of the constant voltage/constant current supplier; and

a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and [outputs] outputting a voltage comparison result, [;] and

wherein the [a] microprocessor [for outputting a] outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 4 (Amended): The contact-less chargeable battery according to claim 3, wherein [a] the magnetic field generated by the external contact-less charging device is generated intermittently,

wherein the overvoltage monitoring unit further includes a charging pause detecting unit [for receiving] that receives the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then [outputting] outputs the end time point to the microprocessor, and wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 5 (Original): The contact-less chargeable battery according to claim 1, wherein the monitoring result is a charging power adjustment request signal.

Claim 6 (Original): The contact-less chargeable battery according to claim 1, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values of both ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 7 (Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from [an] the external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit [for] that includes a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 8 (Amended): The contact-less charging circuit module according to claim 7, wherein the high frequency AC current inducing unit is a coil to which a magnetic flux of [a] the magnetic field generated from the external contact-less charging device is linked.

Claim 9 (Twice amended): The contact-less charging circuit module according to claim 7, wherein the overvoltage monitoring unit includes:

a wireless transmitting unit for wirelessly propagating the monitoring result through an antenna;

first and second voltage detectors for respectively detecting first and second voltages at front and rear ends of the constant voltage/constant current supplier; and

a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and [outputs] outputting a voltage comparison result, [;] and

wherein the [a] microprocessor [for outputting a] outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 10 (Amended): The contact-less charging circuit module according to claim 9, wherein [a] the magnetic field generated by the external contact-less charging device is generated intermittently,

wherein the overvoltage monitoring unit further includes a charging pause detecting unit [for] receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, and

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 11 (Amended): The contact-less charging circuit module according to claim [1] 7, wherein the monitoring result is a charging power adjustment request signal.

Claim 12 (Amended): The contact-less charging circuit module according to claim [1] 7, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 13 (Amended): A contact-less charging device for transmitting a charging power by means of electromagnetic induction phenomenon to a contact-less chargeable battery that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode and wirelessly transmits a monitoring result for voltages at both ends of the constant voltage/constant current supplier, the contact-less charging device comprising:

a magnetic field generating unit for receiving an AC current and forming a magnetic field in an outer space;

a high frequency power driving unit for applying a high frequency AC current to the magnetic field generating unit; and

a charging power adjusting unit for receiving the monitoring result from the contact-less chargeable battery by means of wireless communication and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that [a] the charging power transmitted to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 14 (Original): The contact-less charging device according to claim 13, wherein the magnetic field generating unit is a coil to both sides of which a high frequency AC current is applied.

Claim 15 (Amended): The contact-less charging device according to claim 13, wherein the charging power adjusting unit includes:

a wireless receiving unit for wirelessly receiving the monitoring result through an antenna; and

a microprocessor for receiving the monitoring result from the wireless receiving unit and controlling the high frequency power driving unit to adjust [a] the power of the high frequency AC current applied to the magnetic field generating unit.

Claim 16 (Twice amended): The contact-less [chargeable battery] charging device according to claim 15, further comprising a [constant voltage supplier for] power supply [converting] receiving a common AC current, converting the common AC current into a DC current, and then supplying a constant-voltage current to the high frequency power driving unit, wherein the high frequency power driving unit includes:

a pulse signal generator for receiving a pulse driving signal from the microprocessor and outputting a pulse signal; and

a power driving part for receiving the pulse signal to rapidly switch the constant-voltage current input from the constant voltage supplier, thereby generating a high frequency AC current in a pulse pattern.

Claim 17 (Amended): The contact-less charging device according to claim 16, wherein the charging power adjusting unit adjusts [a] the charging power by modulating a width of a pulse current, a frequency of the pulse current, an amplitude of a pulse, or [the] a number of pulses.

Claim 18 (Amended): The contact-less charging device according to claim 16, wherein the [constant voltage supplier] power supply includes:

an overvoltage filter for receiving a common AC current and intercepting an overvoltage current;

a rectifier for rectifying the AC current passing through the filter to convert the AC current into a DC current; and

a constant voltage [supplying part for receiving] supplier that receives the converted DC current and outputs a constant voltage current.

Claim 19 (Original): The contact-less charging device according to claim 13, wherein the high frequency power driving unit intermittently applies a high frequency AC current to the magnetic field generating unit, and

wherein the charging power adjusting unit receives the monitoring result while a high frequency AC current is not applied to the magnetic field generating unit.

Claim 20 (Original): The contact-less charging device according to claim 13, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 21 (Amended): A battery charging set including a contact-less chargeable battery and a contact-less charging device,

wherein the contact-less chargeable battery includes:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field intermittently generated from an external contactless charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to a battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit [for] that includes a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced,

wherein the contact-less charging device includes:

a magnetic field generating unit for receiving an AC current and forming [a] the magnetic field in an outer space;

a high frequency power driving unit for intermittently applying a high frequency AC current to the magnetic field generating unit; and

a charging power adjusting unit for, while a high frequency AC current is not applied to the magnetic field generating unit, receiving the monitoring result by means of wireless communication and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that a charging power transmitted from the contact-less charging device to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 22 (Original): The battery charging set according to claim 21, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 23 (Amended): A method for controlling charging of a contact-less chargeable battery using a contact-less charging device by means of electromagnetic induction phenomenon, the method comprising:

(a) intermittently applying a high frequency AC current to a primary coil provided to the charging device so as to intermittently generate a magnetic field in an outer region;

(b) linking a magnetic flux of the generated magnetic field to a secondary coil provided to the battery so as to intermittently output an electromagnetically-induced high frequency AC current;

(c) rectifying the output high frequency AC current to be converted into a DC current;

(d) applying the DC current to a battery cell through a constant voltage/constant current supplier so as to charge the battery cell in a constant voltage/constant current mode;

(e) monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the charging device by means of wireless communication while a high frequency AC current is not induced in the secondary coil; and

(f) adjusting a power of the high frequency AC current applied to the primary coil according to the transmitted monitoring result,

wherein the adjusting the power of the high frequency AC current applied to the primary coil is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Clam 24 (Original): The method according to claim 23, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 25 (New, amended): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 26 (New): The contact-less chargeable battery according to claim 1, wherein the overvoltage monitoring unit controls, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 27 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 28 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier supplies the charging power in a constant current

mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 29 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 30 (New, amended): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 31 (New): The contact-less charging circuit module according to claim 7, wherein the overvoltage monitoring unit controls, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 32 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 33 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 34 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 35 (New): The contact-less chargeable battery according to claim 13, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 36 (Canceled).

Claim 37 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier has a front end and a rear end, and wherein the constant voltage/constant current supplier receives a DC current from a rectifier at the front end and supplies a charging power at the rear end.

Claim 38 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier charges the battery in a constant current mode at an initial charging stage and then charges the battery in a constant voltage mode at a later charging stage.

Claim 39 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier charges the battery in a constant voltage mode based on a charging voltage of the battery exceeding a predetermined level.

Claim 40 (New, amended): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 41 (New, amended): The battery charging set according to claim 21, wherein the overvoltage monitoring unit controls, through wireless feedback control of charging the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 42 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant

voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 43 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 44 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 45 (New): The method of claim 23, further comprising:

receiving, by the constant voltage/constant current supplier, the DC current at a front end of the constant voltage/constant current supplier; and

supplying, by the constant voltage/constant current supplier, the DC current at a rear end of the constant voltage/constant current supplier to the battery cell.

Claim 46 (New): The method of claim 23, further comprising:

supplying, by the constant voltage/constant current supplier, the DC current to the battery cell in a constant current mode during an initial charging stage and then in a constant voltage mode at a later charging stage.

Claim 47 (New): The method of claim 23, further comprising:

charging, by the constant voltage/constant current supplier, the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 48 (New, amended): The method of claim 23, further comprising:

controlling, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing a change of intensity of the magnetic field.

Claim 49 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage; and

an overvoltage monitoring unit that includes a wireless transmitting unit, first and second voltage detectors respectively detecting voltages at both ends of the constant voltage/constant current supplier, and a microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication through the wireless transmitting unit so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field is based on relative positions of the primary coil and the secondary coil.

Claim 50 (New): The contact-less charging circuit module according to claim 49, wherein a magnetic flux of the magnetic field generated from the external contact-less charging device is linked to the secondary coil of the high frequency AC current inducing unit.

Claim 51 (New): The contact-less charging circuit module according to claim 49, wherein the wireless transmitting unit wirelessly propagates the monitoring result through an antenna,

wherein the overvoltage monitoring unit includes a voltage comparator comparing first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

wherein the microprocessor outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 52 (New): The contact-less charging circuit module according to claim 51, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the overvoltage monitoring unit further includes a charging pause detecting unit receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, and

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 53 (New): The contact-less charging circuit module according to claim 49, wherein the monitoring result is a charging power adjustment request signal.

Claim 54 (New): The contact-less charging circuit module according to claim 49, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 55 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier that includes circuitry controlled by at least one microprocessor, the constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage; and

an overvoltage monitoring unit that includes a wireless transmitting unit, first and second voltage detectors respectively detecting voltages at both ends of the constant voltage/constant current supplier, and the at least one microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication through the wireless transmitting unit so as to induce a change of intensity of the magnetic field,

wherein the at least one microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting a power applied to the primary coil from a first level to a second level,

wherein the at least one microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the power applied to the primary coil from the second level to a third level.

Claim 56 (New): The contact-less charging circuit module according to claim 55, wherein at least one of the first charging power adjustment request signal and the second charging power adjustment request signal is based on relative positions of the primary coil and the secondary coil.

Claim 57 (New): The contact-less charging circuit module according to claim 55, wherein the wireless transmitting unit wirelessly propagates the monitoring result through an antenna,

wherein the overvoltage monitoring unit includes a voltage comparator comparing first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

wherein the at least one microprocessor outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 58 (New): The contact-less charging circuit module according to claim 55, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the overvoltage monitoring unit further includes a charging pause detecting unit receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the at least one microprocessor, and

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 59 (New): The contact-less charging circuit module according to claim 55, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 60 (New): A contact-less charging circuit module electrically connected to a battery cell and used for receiving a charging power from an external contact-less charging device and charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from the external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes a microprocessor monitoring the voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device from a first level to a second level,

wherein the microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device from the second level to a third level.

Claim 61 (New): The contact-less charging circuit module according to claim 60, wherein at least one of the first charging power adjustment request signal and the second charging power adjustment request signal is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 62 (New): The contact-less charging circuit module according to claim 60, wherein the overvoltage monitoring unit includes:

a wireless transmitting unit wirelessly propagating the monitoring result through an antenna;

first and second voltage detectors respectively detecting first and second voltages at front and rear ends of the constant voltage/constant current supplier; and

a voltage comparator comparing the first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

wherein the microprocessor outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 63 (New): The contact-less charging circuit module according to claim 60, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the overvoltage monitoring unit further includes a charging pause detecting unit receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, and

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 64 (New): The contact-less charging circuit module according to claim 60, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 65 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting unit transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 66 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit including a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting unit transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the secondary coil is movable relative to the primary coil during the charging of the battery cell by the contact-less charging circuit module.

Claim 67 (New): The contact-less charging circuit module according to claim 66, wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting the intensity of the magnetic field.

Claim 68 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting unit transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the contact-less charging circuit module is movable relative to the external contact-less charging device during the charging of the battery cell by the contact-less charging circuit module.

Claim 69 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit for monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result is a charging power adjustment request signal.

Claim 70 (New): The contact-less charging circuit module according to claim 69, wherein the high frequency AC current inducing unit is a coil to which a magnetic flux of the magnetic field generated from the external contact-less charging device is linked.

Claim 71 (New): The contact-less charging circuit module according to claim 69, wherein the overvoltage monitoring unit includes:

a wireless transmitting unit for wirelessly propagating the monitoring result through an antenna;

first and second voltage detectors for respectively detecting voltages at front and rear ends of the constant voltage/constant current supplier;

a voltage comparator for comparing first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result; and

a microprocessor for outputting the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 72 (New): The contact-less charging circuit module according to claim 71, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the overvoltage monitoring unit further includes a charging pause detecting unit for receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, and

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 73 (New): The contact-less charging circuit module according to claim 69, wherein the charging power adjustment request signal is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 74 (New): A contact-less charging device for transmitting a charging power by means of electromagnetic induction phenomenon to a contact-less chargeable battery that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode and wirelessly transmits a monitoring result for voltages at both ends of the constant voltage/constant current supplier, the contact-less charging device comprising:

a magnetic field generating unit for receiving an AC current and forming a magnetic field in an outer space;

a high frequency power driving unit for applying a high frequency AC current to the magnetic field generating unit; and

a charging power adjusting unit that includes: a wireless receiving unit receiving the monitoring result from the contact-less chargeable battery by means of wireless communication, and a microprocessor controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that the charging power transmitted to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 75 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field includes a change of intensity of the magnetic field based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Owner:	LS CABLE & SYSTEM LTD.
Reexam Control No.:	96/000,355
Conf. No.:	1538
Art Unit:	3992
Examiner:	Anjan K Deb
Attorney Docket No.:	0313071.00020
Reexam Filing Date:	March 12, 2021
Patent Under Reexam:	8,013,568
Title:	CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF

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Central Reexamination Unit
Commissioner for Patents
United States Patent & Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE TO NON-FINAL OFFICE ACTION

This Response is submitted in reply to the Non-Final Office Action dated September 29, 2021 and in furtherance of the telephone interview conducted on November 8, 2021. The Patent Owner respectfully requests entry of the following amendments and consideration of the following remarks.

Amendments to the Claims are reflected in the listing of claims, which begins on page 2 of this paper.

Remarks begin on page 23 of this paper.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
96/000,355	03/12/2021	8013568	0313071.00020	1538

24573 7590 03/03/2022

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ART UNIT	PAPER NUMBER
3992	

MAIL DATE	DELIVERY MODE
03/03/2022	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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DETAILED ACTION

1.0 SUMMARY

This Office action is in response to Patent Owner's amendment/request for reconsideration filed on 11/29/2021 response to the non-final rejection mailed on 9/29/2021.

Claims 1-24 of United States Patent Number US 8,013,568 (hereinafter "the '568 patent"), issued September 6, 2011 to Park et al., are subject to reexamination wherein it has been determined in the 96/000,355 reexamination, regarding the Order mailed 04/21/2021 granting *ex parte* reexamination, that a substantial new question of patentability was raised in the request for *ex parte* reexamination, filed on 03/12/2021 (hereafter "the Request").

Interview Summary dated November 08, 2021 (previously not mailed) is attached with this office action.

1.1 Priority

As noted on its front page, the '568 patent claims priority from:

KR 10-2005-0069871 filed July 29, 2005

KR 10-2006-0038960 filed April 28, 2006

1.2 Status of Claims

Claims 1-35 and 37-75 are currently pending.

Claim 36 is cancelled by Patent Owner.

Claims 1-4, 7-10, 13, 15-18, 21, 23, 25, 30, 40-41, and 48 are amended.

New claims 49-75 are added.

Claims 1-35 and 37-75 are rejected.

2.0 REFERENCES CITED IN REQUEST

The examiner has considered a substantial new question of patentability has been raised by at least the following prior art reference submitted by Third Party Requester:

1. Korean Patent No. KR950005819B1 to Hong Chung-Sik, English Language Translation ("Chung-Sik")

3.0 ISSUES RAISED IN THE REQUEST

Issue 1: Primary reference: Chung-Sik (KR950005819B1)

Requester states that the teaching of Chung-Sik references raises a substantial new question of patentability with respect to claims 1-24 of the '568 Patent (Request pages, 4-26).

4.0 REJECTIONS PROPOSED IN THE REQUEST

The following rejection is proposed in the request:

1) Claims 1-24 of the '568 Patent are obvious under 35 U.S.C. § 103(a) over Chung-Sik taken alone (request pages 4-26).

5.0 RESPONSE TO ARGUMENTS

5.1 Claim Interpretation Under 35 U.S.C. §112(6th ¶)

In response to Patent Owner's arguments and amendment to the claims, the Examiner withdraws interpretation terms under 35 U.S.C. §112(6th ¶) of the claim "constant voltage/constant current supplier," and "microprocessor," as these are terms known in the art and do convey a particular structure. (Remarks pages 25-29).

However the following terms "overvoltage monitoring unit" (claims 1, 4, 10, 21, 26, 31, 41, 49, 52, 55, 58, 60, 62, 63, 65, 66, 68, 69, 72, 75), "wireless transmitting unit" (claims 3, 9, 49, 51, 55, 57, 62, 65, 66, 68, 71), "charging pause detecting unit" (claims 4, 10, 52, 58, 63, 72), "charging power adjustment unit" (claim 13, 17, 19, 21, 74), and "wireless receiving unit" (claim 15, 74), are subject to interpretation under 35 U.S.C. §112(6th ¶) as per the analysis given below.

5.2 Claim Rejection Under 35 U.S.C. §112

In response to Patent Owner's arguments and amendment to the claims, the Examiner withdraws the previous rejection of claims 1, 4, 7, 13, 21, and 23 under 35 U.S.C. 112(a) or 35 U.S.C. 112 (pre-AIA), first and second paragraphs. (Remarks pages 29-30). However claims 1, 21, and 65 and claims 4, 10, 52, 58, 63 are rejected under 35 U.S.C. 112 2nd paragraph'; and Claims 55 and 60 are rejected under 35 U.S.C. 112 1st paragraph (see claim rejections below).

5.3 Claim Rejections under 35 U.S.C. 102 and 35 U.S.C. 103

In response to the rejection of claim(s) 1-15, and 19-48, under pre-AIA 35 U.S.C. 102(b) as being anticipated by Chung-Sik (KR 950005819B1), Patent Owner has amended independent claims 1, 7, 13, 21, and 23 by adding (underlined), "overvoltage monitoring unit that includes a microprocessor" and "wherein the monitoring result includes a wireless feedback control signal to induce the change of intensity of the magnetic field based on relative positions of the contact-less chargeable battery and the external contact-less charging device".

Patent Owner argued that Chung-Sik at best describes a system where signals transmitted from the portable device 18 to the base 12 will only occur "when the two devices are coupled to

each other" in a fixed arrangement at which the core 78 of the portable device 18 is positioned on a surface of the core 76 of the transmitter 28 of the base unit 12 (Chung-Sik, page 8-4, lines 20-25. Patent Owner further argued that Chung-Sik does not teach or suggest making any change to the intensity of the magnetic field based on relative positions of the base 12 and the contactless charging unit 18 because in Chung-Sik the relative positions of the base 12 and the contactless charging unit 18 are fixed whenever the battery 32 is being charged. (Remarks, page 35).

Patent Owner's arguments have been fully considered by the Examiner but are moot in view of the new grounds of rejection set forth in this office action. The added limitation argued by the Patent Owner is disclosed in a prior art (Shigefumi Matsuki JP H0145230 Y2)(See claim rejections below).

Regarding new claims 55-59, and 60-64, Patent Owner argued that Chung-Sik fails to teach or suggest a microprocessor that transmits a first charging power adjustment request signal for adjusting a power applied to the primary coil from a first level to a second level and a second charging power adjustment request signal for adjusting the power applied to the primary coil from the second level to a third level. (Remarks, pages 37-39). Claims 55-64 has been rejected under 35 USC 1st paragraph for lack of support in the specification for the claimed "first level", "second-level" and "third-level") (See claim rejection below). These claims have been rejected in this office action as best understood by the Examiner.

Regarding new independent claims 65 and 66, Patent Owner argued that the claim recites similar features as independent claim 7 and should be allowable for the same as reasons as claim 7 particularly for reciting "wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Patent Owner's arguments have been fully considered by the Examiner but are moot in view of the new grounds of rejection set forth in this office action. The added limitation argued by the Patent Owner is disclosed in a prior art (Shigefumi Matsuki JP H0145230 Y2)(See claim rejections below).

Regarding independent claim 69, Patent Owner argued that Chung-Sik fails to disclose "wherein the monitoring result is a charging power adjustment request signal". (Remarks, page 43-45). Specifically, Patent Owner argued that the Chung-Sik' s VDL signal and Chung-Sik' s charge completion alarm signal are at best signals for stopping or preventing the transmission of power from the base 12 altogether and does not correspond to the claimed "charging power adjustment request signal". (Remarks, page 46). The Examiner disagrees, for the reasons set forth in the rejection of the claim. Moreover Chung-Sik clearly explains, "Thus, when a battery in a portable device is discharged to a voltage equal to or less than a predetermined level, it becomes necessary to charge the battery for smooth communication" (See Chung-Sik, page 8-1, under DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS).

Regarding new claims 74 and 75, Patent Owner argued new claim 74 and 75 recites similar features to amended claims 13 and 1 respectively. Therefore, new claims 74 and 75 are also allowable for at least the same reasons stated above in connection with amended claims 13 and . 1 respectively. Particularly, Patent Owner argued Chung-Sik and Kaite does not teach or suggest making any change/adjustment to the high frequency AC current/ intensity of the magnetic field on the basis of relative positions of the contact-less chargeable battery and the contact-less charging device base.

Patent Owner's arguments have been fully considered by the Examiner but are moot in view of the new grounds of rejection set forth in this office action. The added limitation argued

by the Patent Owner is disclosed in a prior art (Shigefumi Matsuki JP H0145230 Y2)(See claim rejections below).

6.0 CLAIM INTERPRETATION UNDER 35 U.S.C. §112(6th ¶)

The MPEP explains when a limitation invokes 35 U.S.C. 112(f) and how to interpret such limitations. See MPEP 2181-2183; *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1348 (Fed. Cir. 2015) (en banc). As noted in MPEP 2181, a three prong test is used to determine whether a limitation invokes 112(f):

(A) the claim limitation uses the term "means" or "step" or a term used as a substitute for "means" that is a generic placeholder (also called a nonce term or a non-structural term having no specific structural meaning) for performing the claimed function

(B) the term "means" or "step" or the generic placeholder is modified by functional language, typically, but not always linked by the transition word "for" (e.g., "means for") or another linking word or phrase, such as "configured to" or "so that"

(C) the term "means" or "step" or the generic placeholder is not modified by sufficient structure, material, or acts for performing the claimed function.

The following analysis is provided to clarify the record of claim interpretation.

(1) "overvoltage monitoring unit" (claims 1, 4, 7, 9, 10, 21, 26, 31, 41, 49, 52, 55, 58, 60, 62, 63, 65, 66, 68, 69, 71, 72, 75)

This term does not use means, but it provides no structure therefore it can be deemed a generic placeholder that substitutes for means. It is modified by functional language for,

"monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field", recited in claim 1, and includes a microprocessor. There is no further structure of the term. The three-prong test is met and 112(f) is invoked. Corresponding structure of the overvoltage monitoring unit as described in the specification of the '568 patent includes a wireless transmitting unit 320 for wirelessly propagating the monitoring result through an antenna 330; first and second voltage

detectors (350, 360) for respectively detecting voltages at front and rear ends of the constant voltage/constant current supplier; a voltage comparator 380 for comparing first and second voltages detected by the first and second voltage detectors (350, 360) and outputs a voltage comparison result; a microprocessor 310 for outputting a monitoring result according to the voltage comparison result to the wireless transmitting unit 320; and charging pause detection unit 390 receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the micro-processor 310 (col. 4, lines 28-45) (Fig. 5).

(2) "wireless transmitting unit" (claim 3)

This term does not use means, but it provides no structure therefore it can be deemed a generic placeholder that substitutes for means. It is modified by functional language for,

"wirelessly propagating the monitoring result through an antenna." There is no further structure of the term. The three-prong test is met and 112(f) is invoked. Corresponding structure of the wireless transmitting unit is any generic wireless transmitter such as a radio transmitter that transmits through an antenna.

(3) "charging pause detecting unit" (Claim 4, 10, 52, 58, 63, 72)

This term does not use means, but it provides no structure therefore it can be deemed a generic placeholder that substitutes for means. It is modified by functional language in that it,

"receives the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputs the end time point to the microprocessor," recited in claim 4. There is no further structure of the term. The three-prong test is met and 112(f) is invoked. Corresponding structure

of the charging pause detecting unit as described in the specification of the '568 patent is the box labelled 390 in Fig. 6 (col. 9, lines 7-15). The specification does not disclose any further structure of the box labelled 390 in Fig. 6. For examination purpose the term is interpreted as a device that measures time such as a clock.

(4) "charging power adjustment unit" (Claim 13, 17, 19, 21, 74)

This term does not use means, but it provides no structure therefore it can be deemed a generic placeholder that substitutes for means. It is modified by functional language.

"for receiving the monitoring result from the contact-less chargeable battery by means of wireless communication and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that the charging power transmitted to the contact-less chargeable battery is adjusted" recited in claim 13. Thus the charging power adjustment unit adjusts the charging power transmitted to the contact-less chargeable battery by controlling the high frequency power driving unit. There is no further structure of the term. Corresponding structure of the charging power adjustment unit as described in the specification of the '568 patent includes a wireless receiving unit 230 for wirelessly receiving the monitoring result through an antenna; and a microprocessor 240 for receiving the monitoring result from the wireless receiving unit 230 and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit (col. 4, lines 46-52, 64-67) (Fig. 3). Thus the structure of charging power adjustment unit includes a wireless receiver and a microprocessor.

(5) "wireless receiving unit" (Claims 15, 74)

This term does not use means, but it provides no structure therefore it can be deemed a generic placeholder that substitutes for means. It is modified by functional language,

"for wirelessly receiving the monitoring result through an antenna," recited in claim 15. There is no further structure of the term other than the box labelled 230 in Fig. 3. Although the specification of the '568 patent describes frequency band of 10 to 15 MHz is used for wireless transmission, and the wireless receiving unit 230 is configured using a photo couple, the present invention is not limited to such frequency band of the carrier and such elements for configuring the wireless receiving unit 230 (col., 6, lines 37-45). In view of the above description, the corresponding structure of the term is a generic wireless receiver such as a radio receiver.

7.0 CLAIM REJECTIONS - 35 USC § 112

7.1 Rejection 35 U.S.C. 112(a): Second Paragraph

The following is a quotation of 35 U.S.C. 112(b):

> (b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 21, and 65 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor (or for applications subject to pre-AIA 35 U.S.C. 112, the applicant), regards as the invention.

It is not clear as to what component of the claimed "overvoltage monitoring unit" recited in claims 1, 21, and 65, is monitoring the voltages at both ends of the constant voltage/constant current supplier.

Claim limitation "charging pause detecting unit," recited in claims 4, 10, 52, 58, 63, and 72 invokes 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph. However, the written description fails to disclose the corresponding structure, material, or acts for performing the entire claimed function and to clearly link the structure, material, or acts to the function. Therefore, the claims 4, 10, 52, 58, 63, and 72 are indefinite and is rejected under 35 U.S.C. 112(b) or pre-AIA 35 U.S.C. 112, second paragraph.

Applicant may:

(a) Amend the claim so that the claim limitation will no longer be interpreted as a limitation under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph;

(b) Amend the written description of the specification such that it expressly recites what structure, material, or acts perform the entire claimed function, without introducing any new matter (35 U.S.C. 132(a)); or

(c) Amend the written description of the specification such that it clearly links the structure, material, or acts disclosed therein to the function recited in the claim, without introducing any new matter (35 U.S.C. 132(a)).

If applicant is of the opinion that the written description of the specification already implicitly or inherently discloses the corresponding structure, material, or acts and clearly links them to the function so that one of ordinary skill in the art would recognize what structure, material, or acts perform the claimed function, applicant should clarify the record by either:

(a) Amending the written description of the specification such that it expressly recites the corresponding structure, material, or acts for performing the claimed function and clearly links or associates the structure, material, or acts to the claimed function, without introducing any new matter (35 U.S.C. 132(a)); or

(b) Stating on the record what the corresponding structure, material, or acts, which are implicitly or inherently set forth in the written description of the specification, perform the claimed function. For more information, see 37 CFR 1.75(d) and MPEP §§ 608.01(o) and 2181.

7.2 Rejection 35 U.S.C. 112(a): First Paragraph (cl. 55, 60)

The following is a quotation of the first paragraph of 35 U.S.C. 112(a):

> (a) IN GENERAL.—The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor or joint inventor of carrying out the invention.

The following is a quotation of the first paragraph of pre-AIA 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 55 and 60, are rejected under 35 U.S.C. 112(a) or 35 U.S.C. 112 (pre-AIA), first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor or a joint inventor, or for applications subject to pre-AIA 35 U.S.C. 112, the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 55 and 60 recites, "adjusting a power applied to the primary coil from a first level to a second level", and "adjusting the power applied to the primary coil from the second level to a third level" which are not described in the specification. Specifically, the first, second, and third level fail to comply with the written description requirement.

The Examiner has reviewed the sections (column 11, lines 13-45) cited by the Patent Owner for providing support for new claims 55 and 60, but the cited section fails to describe the claimed first, second, and third level recited in the claims.

8.0 CLAIM REJECTIONS - 35 USC § 103

The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8.1 Chung-Sik/Kaite, Matsuki (cl. 1-15, 19-54, 56, 61, 65-68, 73-75)

Claim(s) 19-54, 56, 61, 65-68, and 73-75 are rejected under 35 U.S.C. 103(a) as being obvious over Chung-Sik (KR 950005819Bl) and Matsuki (JP H0145230 Y2) or in the alternative as being obvious over Chung-Sik (KR 950005819Bl), Kaite et al. (US 6,016,046) and Matsuki (JP H0145230 Y2).

1. A contact-less chargeable battery including a charging circuit for charging an electric energy to a battery cell, the contact-less chargeable battery comprising:

Chung-Sik discloses system for charging a battery 32 in a portable device by inductively coupling a voltage from a charger 12 (base unit) to a portable device 18. Inductively coupling a voltage from a charger to a portable device 18 is considered the same as contact-less chargeable battery (page 8-2, lines 6-7) (Fig. 1).

> The present invention relates to a charge system of a radio-telephone. More specifically, the present invention relates to a contactless charge system of a radio-telephone for charging a battery in a portable device without contact between a charger of a radio-telephone and a voltage terminal of the portable device.

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from the external contact-less charging device;

Chung-Sik disclosed high frequency AC current inducing unit 38 (CONTACTLESS CHARGING UNIT) to which a high frequency AC current (10 KHZ) is induced by means of a magnetic field generated from an external contact-less charging device (induced voltage generating unit) (page 8-2, lines 17-18, and page 8-4, lines 47-51).

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

Chung-Sik discloses rectifier 80 for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current (page 8-2, lines 17-19) (Fig. 2).

a constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

Chung-Sik discloses constant voltage/current supplier for receiving DC current from the rectifier 80 and supplying a charging power to the battery cell 32 in a constant voltage/constant current charge mode (Fig. 2). (See "constant voltage unit", page 8-3, lines 24-27). Chung-Sik further discloses rectifier 80 supplies DC current at a constant voltage V1 (reference voltage) (See "voltage V1 is constant", page 8-5 line 5). Since voltage V1 is constant it is supplying a charging power to the battery cell in a constant voltage/constant current mode.

Additionally, Chung-Sik discloses constant voltage/constant current supplier 52 supplies the charging power in a constant current mode at an initial charging stage by limiting the current drawn by the battery 32 by a resistor 84 ("the resistor 84 is a current limiter resistor") (Chung-Sik, English Translation, page 8-4, last paragraph 2nd last line) connected in series with diode 86 and when the battery begins to get charged the current drawn by the battery reduces (current is no longer constant) and supplies the charging power at a constant voltage until the battery is fully charged. (Fig. 2).

In this case, the rectified voltage IDC is input to a first voltage splitter 89, simultaneously limited to a predetermined level through the resistor 84 and the diode 86, then applied to the battery 32. That is, the battery 32 is charged. In the above case, the resistor 84 is a current limiter resistor, and the diode 86 is a diode for preventing countercurrent when the voltage IDC is lower than a voltage of the battery 32.

terminal (+) of the comparator 96. In this case, the reference voltage V1 is constant and the charge level detection voltage V2

To the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode it would have been obvious over Kaite et al.

Kaite et al. specifically disclosed constant voltage constant current supplier 123 for receiving DC current from rectifier 122 and supplying a charging power to the battery cell 111 in a constant voltage/constant current mode (col. 6, lines 41-44) (Fig. 2).

charge. Therefore, the charging control section **123** is provided with a constant current constant voltage circuit to stabilize output from the rectifying circuit **122**, and a switching device to stop charging when the rechargeable batteries **111** reach full charge under control of the computation circuit **124**. The constant current constant voltage circuit measures charging current and battery voltage to control the output to a constant current and constant voltage. The

At the time the invention was made it would have been obvious to one of ordinary skill in the to modify the constant voltage supplier disclosed by Chung-Sik by adding the constant current constant voltage circuit disclosed by Kaite et al. to stabilize output from the rectifying circuit.

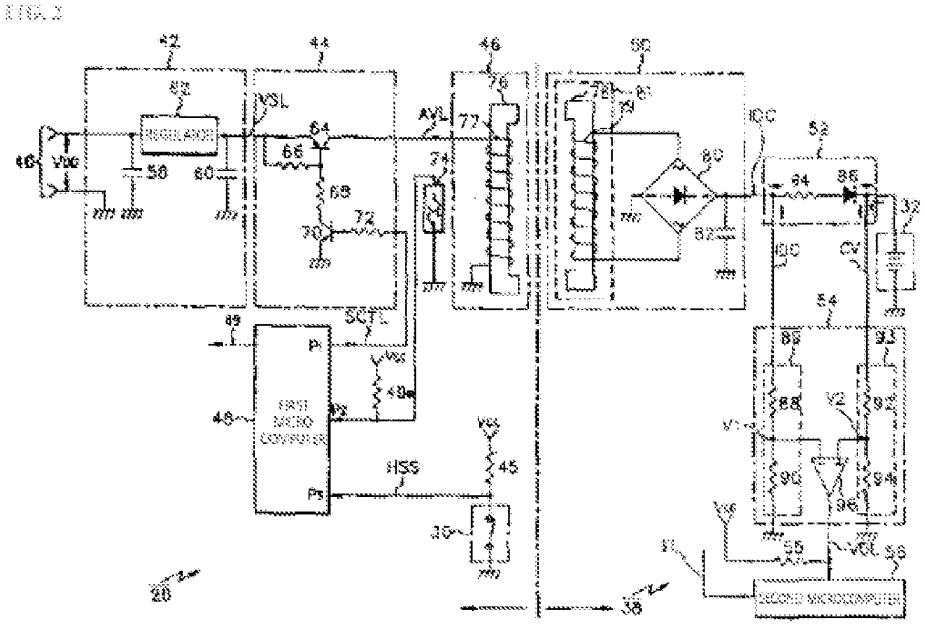
an overvoltage monitoring unit <u>that includes a microprocessor</u> for monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

Chung-Sik also discloses contactless charge system for detecting a voltage of a rechargeable battery 32 including charge pause detection unit comprising microprocessor 56 that receives clock and power information 104 (Fig. 1)(page 8-4, lines 32-39) to control the charge between the charger 12 and the portable device 18 (page 8-2, lines 8-9) (Fig. 1) and specifically disclosed over voltage monitoring unit 54 and microprocessor 56 for monitoring voltages (V1, V2) at both ends of the constant voltage/current supplier 52 and microprocessor 56 scans the output VDL of the comparator 96 and searches for whether or not the charge voltage of battery 32 is normal. Microprocessor 56 transmits a monitoring result to the external contactless charging device 12 by means of wireless communication (RADIO UNIT 34) through line 37 so as to induce a change of intensity of the magnetic field of the induced voltage generating unit 46 (Fig. 1, 2) (page 8-2, lines 31-34, 40-55; page 8-3, lines 36-40; page 8-5, lines 35-43) (Fig. 2).

<u>wherein the monitoring result includes a wireless feedback control signal to induce the change of intensity of the magnetic field based on relative positions of the contact-less chargeable battery and the external contact-less charging device.</u>

Chung-Sik discloses transmitting a monitoring result of the state of charge of the battery from microprocessor 56 through line 37 wirelessly which is received by the microprocessor 48 to decide whether or not to supply current for further charging of the battery 32. Thus Chung-Sik discloses wherein the monitoring result (output VDL of the comparator 96) includes a wireless feedback control signal (wireless signal 37 transmitted by microprocessor 56 to microprocessor 48 for controlling the supply of current to induce the change of intensity of the magnetic field) (Chung-Sik, English Translation, page 8-5, Fig. 2 and Fig. 3B).

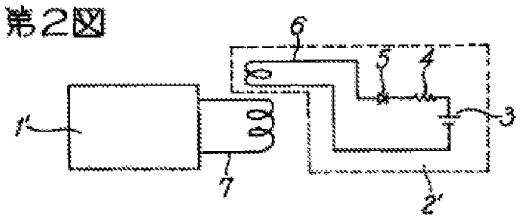
While Chung-Sik discloses to induce the change of intensity of the magnetic field based on battery voltage monitoring, it did not specifically disclose to induce the change of intensity of the magnetic field based on relative positions of the contact-less chargeable battery and the external contact-less charging device.



Chung-Sik. Fig. 2

In analogous art, Shigefumi Matsuki (JP H0145230 Y2), DATE PUBLISHED 1989-12-27 disclosed wireless battery charging wherein charging current can be adjusted based on the distance of output coil 7 of charging equipment 1 and input coil 6 of battery 2'(See Figs. 2-4, and Matsuki, Machine Translation copied below)(Example Fig. 2, coped below).

input coil 6 in the upper surface of charging equipment 1'. Charging current can be adjusted by [which control a high frequency output or changes the distance of output coil 7 of charging equipment 1', and input coil 6 of storage battery 2'] grazing, and can change the charge time of storage battery 2'. As mentioned



Matsuki. Fig. 2

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify contact-less wireless charging of battery disclosed by Chung-Sik by adding wireless feedback control signal to induce the change of intensity of the magnetic field based on relative positions of the contact-less chargeable battery and the external contact-less charging device disclosed by Matsuki for charging a battery.

2. The contact-less chargeable battery according to claim 1,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less chargeable battery according to claim 1 as set forth above.

wherein the high frequency AC current inducing unit is a coil to which a magnetic flux of the magnetic field generated from the external contact-less charging device is linked.

Chung-Sik discloses wherein the high frequency AC current inducing unit is a coil 79 to which a magnetic flux of the magnetic field generated from the external (coil 77) contact-less charging device is linked. (Fig. 2).

3. The contact-less chargeable battery according to claim 1,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less chargeable battery according to claim 1 as set forth above.

wherein the overvoltage monitoring unit includes: a wireless transmitting unit for wirelessly propagating the monitoring result through an antenna; first and second voltage detectors for respectively detecting first and second voltages at front and rear ends of the constant voltage/constant current supplier; and

Chung-Sik discloses over voltage monitoring unit 54 for monitoring first and second voltages (V1, V2) at front and rear ends of the constant voltage/current supplier 52 and transmitting a monitoring result to the external contactless charging device 12 by means of wireless communication (RADIO UNIT 34) through an antenna so as to induce a change of intensity of the magnetic field (page 8-2, paragraphs 7-8) of the induced voltage generating unit 46 (Fig. 2) (page 8-3, lines 31-34; page 8-5, lines 31-34) (Fig. 2).

a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result; and

Chung-Sik discloses voltage comparator 96 for comparing first and second voltages (V1, V2) detected by the first and second voltage detectors and outputs a voltage comparison result (charge state VDL) (Fig. 2, page 8-4, 8-5).

wherein the microprocessor outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Chung-Sik further disclosed microprocessor 56 outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit (RADIO UNIT 34) (Chung-Sik, Fig. 2, and English Translation, pages 8-4, 8-5).

> Here, in the aforementioned operation 120 of FIG. 3B, the second microcomputer 56 that scans the output VDL of the comparator 96 and searches for whether or not the charge voltage is normal determines that the charge voltage of the battery 32 is normal. That is, a voltage of the battery 32 is determined to be completely charged to a set voltage level, and a charge completion alarm signal is output through line 37 in operation 122. The charge completion alarm signal through line 37 is transmitted to the base unit 12 through the audio and logic unit 36 and the radio unit 34, and the radio unit 25 and the audio and logic unit 24 of the base unit 12 receive and demodulate the signal and input the signal to the first microcomputer 48 through the line 49. The first microcomputer 48 that receives a data signal through the line 49 determines that the charge completion signal is received from the portable device 18 in the aforementioned operation 110 of FIG. 3A (the portable device is normal), and performs operation 112.

4. The contact-less chargeable battery according to claim 3,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less chargeable battery according to claim 3 as set forth above.

wherein the magnetic field generated by the external contact-less charging device is generated intermittently,

Chung-Sik discloses magnetic field generated by the external contact-less charging device is generated intermittently (switches on/off transistor 64, 70) (Fig. 2, page 8-4).

wherein the overvoltage monitoring unit further includes a charging pause detecting unit that receives the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputs the end time point to the microprocessor, and

Chung-Sik also discloses contactless charge system for detecting a voltage of a rechargeable battery 32 including charge pause detection unit comprising microprocessor 56 that receives clock and power information 104 (Fig. 1)(page 8-4, lines 32-39) to control the charge between the charger 12 and the portable device 18 (page 8-2, lines 8-9) (Fig. 1) and specifically disclosed over voltage monitoring unit 54 and microprocessor 56 for monitoring voltages (V1, V2) at both ends of the constant voltage/current supplier 52 and microprocessor 56 scans the output VDL of the comparator 96 and searches for whether or not the charge voltage of battery 32 is normal. Microprocessor 56 transmits a monitoring result to the external contactless charging device 12 by means of wireless communication (RADIO UNIT 34) through line 37 so as to induce a change of intensity of the magnetic field of the induced voltage generating unit 46 (Fig. 1, 2) (page 8-2, lines 31-34, 40-55; page 8-3, lines 36-40; page 8-5, lines 35-43) (Fig. 2).

Chung-Sik discloses a control signal (SCTL) output from the output port Pl of FIRST MICRO COMPUTER 48 is applied to a base of the transistor 70 through a resistor 72 and switches "on/off' the transistor 70 around ten thousand times per second. In this case, a potential of a collector terminal of the transistor 70 is switched between "low" and "high" depending on a period of the control signal (SCT) and the signal is applied to a base of the transistor 64." (Chung-Sik, English Translation, page 8-4 and Fig. 2).

Regarding charge pause detection unit and detecting a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, Chung-Sik discloses that the charging of battery continues until the detection voltage V2 in the overvoltage detection unit 54 becomes higher than V1 and the output signal VDL of comparator 96 is transitioned to logic "high" from logic "low" and is input to second microcomputer 56 to produce charging completion alarm (Fig. 2, page 8-5, lines 31-43). The transition to logic "high" from logic "low" is considered a time point when the induction of high frequency AC current ends, and then outputting the end time point (charge completion) to the microprocessor. The microcomputer 56 is broadly considered the same as charging pause detecting unit that produces charging completion alarm when the voltage of battery is determined to be normal and completely charged. Thus the microprocessor 56 determines the ON/OFF period of charging the battery.

Additionally, Chung-Sik specifically disclosed a "time point" when the charge operation may be automatically stopped by communication between contact less charging unit 38 and power transmitter 28 (Chung-Sik, English Translation, page 8-5, lines 44-46 and Fig. 1).

> Thus, in the present invention according to the above embodiments, a battery begins to be charged from a time point when the portable device 18 operated at an operating voltage of the battery is installed on the base unit 12, and the charge operation may be automatically stopped either by communication between devices or overheating of the devices.

To the extent that Chung-Sik may not specifically disclose charging pause detecting unit it would have been obvious to modify the overvoltage monitoring unit disclosed by Chung-Sik by adding a charging pause detecting unit including a clock because Chung-Sik specifically disclosed battery begins to be charged from a "time point" and the charge operation may be automatically stopped by communication between devices.

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Chung-Sik discloses wherein the monitoring result is transmitted to the external contact-less charging device 12 by means of wireless communication by RADIO UNIT 34. (Chung-Sik, page 8-5, lines 35-43, Fig. 1, 2). High frequency AC current is not induced after the end time point is input (charge completion, step 122) (Fig. 3B).

> Here, in the aforementioned operation 120 of FIG. 3B, the second microcomputer 56 that scans the output VDL of the comparator 96 and searches for whether or not the charge voltage is normal determines that the charge voltage of the battery 32 is normal. That is, a voltage of the battery 32 is determined to be completely charged to a set voltage level, and a charge completion alarm signal is output through line 37 in operation 122. The charge completion alarm signal through line 37 is transmitted to the base unit 12 through the audio and logic unit 36 and the radio unit 34, and the radio unit 25 and the audio and logic unit 24 of the base unit 12 receive and demodulate the signal and input the signal to the first microcomputer 48 through the line 49. The first microcomputer 48 that receives a data signal through the line 49 determines that the charge completion signal is received from the portable device 18 in the aforementioned operation 110 of FIG. 3A (the portable device is normal), and performs operation 112.

To the extent that Chung-Sik may not specifically disclose transmitting a monitoring result to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced it would have been obvious for charging the battery when a voltage of the battery is determined to be less than normal (Fig. 2).

At the time the invention was made it would have been obvious to modify the overvoltage monitoring unit disclosed by Chung-Sik to transmit the monitoring result while a high frequency AC current is not applied to the magnetic field generating unit for starting charging of the battery when voltage of the battery is determined to be less than normal.

5. The contact-less chargeable battery according to claim 1, wherein the monitoring result is a charging power adjustment request signal.

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less chargeable battery according to claim 1 as set forth above.

Chung-Sik discloses outputting a monitoring result by charge state signal (VDL) which is input to second microcomputer 56 to provide charging power adjustment request signal for controlling the portable device 18 (battery) (Fig. 2, page 8-3).

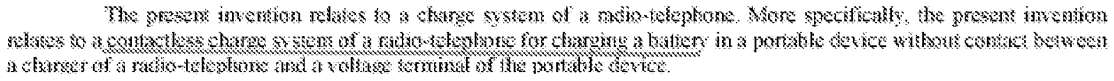
6. The contact-less chargeable battery according to claim 1, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values of both ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less chargeable battery according to claim 1 as set forth above.

Chung-Sik discloses battery voltage detector circuit 54 that includes first and second voltage splitters 89 and 93 for comparing a voltage V1 of an input terminal of the charging unit 52 with a voltage V2 of an output terminal and clocking the result, and a comparator 96 for comparing outputs of the first and second voltage splitters 89 and 93 (V1, V2) and outputting a charge state signal (VDL) to second microcomputer 56 based on the difference of voltage (V1-V2) at both ends of the constant voltage/constant current supplier. The second microcomputer 56 searches for whether or not a charge voltage of the battery 32 is normal in an operation (120 of FIG. 3B) based on the result of the difference of voltage (V1-V2). Additionally, Chung-Sik discloses outputting code (NO) indicating (overvoltage state) if charge voltage is not normal (see (120 of FIG. 3B) (Fig. 2, page 8-4, lines 40-42).

7. A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

Chung-Sik disclosed contact-less charging circuit module electrically connected to a battery cell 32 of portable device 18 and used for charging an electric energy to the battery cell 32 in a contact-less method (Fig. 1, page 8-1).


The present invention relates to a charge system of a radio-telephone. More specifically, the present invention relates to a contactless charge system of a radio-telephone for charging a battery in a portable device without contact between a charger of a radio-telephone and a voltage terminal of the portable device.

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from the external contact-less charging device;

Chung-Sik disclosed high frequency AC current inducing unit 38 (CONTACTLESS CHARGING UNIT) to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device (induced voltage generating unit) (page 8-2, lines 17-18).

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

Chung-Sik discloses rectifier 80 for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current (page 8-2, lines 17-19).(Fig. 2).

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

Chung-Sik discloses constant voltage/current supplier 42 for receiving DC current from the rectifier 80 and supplying a charging power to the battery cell 32 in a constant voltage/constant current charge mode (Fig. 2). (See "constant voltage unit", page 8-3, lines 28-33). Chung-Sik further discloses rectifier 80 supplies DC current at a constant voltage V1 (reference voltage). (See "voltage V1 is constant", page 8-5 line 5).

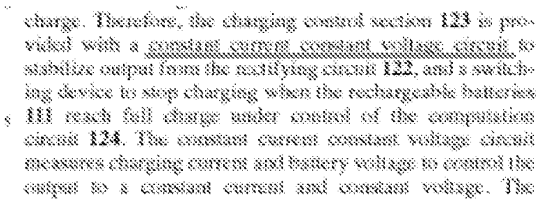
Additionally, Chung-Sik discloses constant voltage/constant current supplier 52 supplies the charging power in a constant current mode at an initial charging stage by limiting the current drawn by the battery 32 by a resistor 84 ("the resistor 84 is a current limiter resistor") (Chung-Sik, English Translation, page 8-4, last paragraph 2nd last line) connected in series with diode 86 and when the battery begins to get charged the current drawn by the battery reduces (current is no longer constant) and supplies the charging power at a constant voltage until the battery is fully charged. (Fig. 2).

In this case, the rectified voltage IDC is input to a first voltage splitter 89, simultaneously limited to a predetermined level through the resistor 84 and the diode 86, then applied to the battery 32. That is, the battery 32 is charged. In the above case, the resistor 84 is a current limiter resistor, and the diode 86 is a diode for preventing countercurrent when the voltage IDC is lower than a voltage of the battery 32.

terminal (+) of the comparator 96. In this case, the reference voltage V1 is constant and the charge level detection voltage V2

To the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode it would have been obvious over Kaite et al.

Kaite et al. specifically disclosed constant voltage constant current supplier 123 for receiving DC current from rectifier 122 and supplying a charging power to the battery cell 111 in a constant voltage/constant current mode (col. 6, lines 41-44) (Fig. 2).


charge. Therefore, the charging control section 123 is provided with a constant current constant voltage circuit to stabilize output from the rectifying circuit 122, and a switching device to stop charging when the rechargeable batteries 111 reach full charge under control of the computation circuit 124. The constant current constant voltage circuit measures charging current and battery voltage to control the output to a constant current and constant voltage. The

At the time the invention was made it would have been obvious to one of ordinary skill in the to modify the constant voltage supplier disclosed by Chung-Sik by adding the constant current constant voltage circuit disclosed by Kaite et al. to stabilize output from a rectifying circuit.

an overvoltage monitoring unit <u>that includes a microprocessor</u> monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

Chung-Sik also discloses contactless charge system for detecting a voltage of a rechargeable battery 32 including charge pause detection unit comprising microprocessor 56 that receives clock and power information 104 (Fig. 1)(page 8-4, lines 32-39) to control the charge between the charger 12 and the portable device 18 (page 8-2, lines 8-9) (Fig. 1) and specifically disclosed over voltage monitoring unit 54 and microprocessor 56 for monitoring voltages (V1, V2) at both ends of the constant voltage/current supplier 52 and microprocessor 56 scans the output VDL of the comparator 96 and searches for whether or not the charge voltage of battery 32 is normal. Microprocessor 56 transmits a monitoring result to the external contactless charging device 12 by means of wireless communication (RADIO UNIT 34) through line 37 so as to induce a change of intensity of the magnetic field of the induced voltage generating unit 46 (Fig. 1, 2) (page 8-2, lines 31-34, 40-55; page 8-3, lines 36-40; page 8-5, lines 35-43) (Fig. 2).

wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

While Chung-Sik discloses to induce the change of intensity of the magnetic field based on battery voltage monitoring it did not specifically disclose to induce the change of intensity of the magnetic field based on relative positions of the contact-less chargeable battery and the external contact-less charging device.

Inventor Shigefumi Matsuki (JP H0145230 Y2), DATE PUBLISHED 1989-12-27 disclosed wireless battery charging device wherein charging current can be adjusted based on the distance of output coil 7 of charging equipment 1 and input coil 6 of battery 2' ("storage battery") (Matsuki, Figs. 2-4 and English Translation: "Detailed explanation of the device" "Charging current can be adjusted by [which control a high frequency output or changes the distance of output coil 7 of charging equipment 1', and input coil 6 of storage battery 2']").

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify contact-less wireless charging of battery disclosed by Chung-Sik by adding wireless feedback control signal to induce the change of intensity of the magnetic field based on relative positions of the contact-less chargeable battery and the external contact-less charging device disclosed by Matsuki for charging a battery.

8. The contact-less charging circuit module according to claim 7, wherein the high frequency AC current inducing unit is a coil to which a magnetic flux of the magnetic field generated from the external contact-less charging device is linked.

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less chargeable battery according to claim 7 as set forth above.

Chung-Sik discloses wherein the high frequency AC current inducing unit is a coil 79 to which a magnetic flux of a magnetic field generated from the external (coil 77) contact-less charging device is linked. (Fig. 2).

9. The contact-less charging circuit module according to claim 7,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less chargeable battery according to claim 7 as set forth above.

wherein the overvoltage monitoring unit includes:

a wireless transmitting unit for wirelessly propagating the monitoring result through an antenna;

Chung-Sik disclosed wireless transmitting unit (RADIO UNIT 34) for wirelessly propagating the monitoring result through an antenna (Fig. 1, and Fig. 2, page 8-5).

In this case, the data input to the line 49 is input as data that is wirelessly transmitted from the portable device 18 when the battery 32 is completely charged. If analysis of input data in operation 110 indicates the portable device is abnormal (i.e. charge is incomplete), the first microcomputer 48 jumps to the aforementioned step 106 to continuously generate a charge voltage, and when the portable device is normal, the first microcomputer 48 jumps to operation 112 to stop charging.

When a charge level of the battery 32 is increased through the aforementioned operation, the charge level detection voltage V2 of a second voltage splitter 93 increases, and when the detection voltage V2 becomes higher than the reference voltage V1, the output VDL of the comparator 96 is transitioned to logic "high" from logic "low" and is input to the second microcomputer 56.

Here, in the aforementioned operation 120 of FIG. 3B, the second microcomputer 56 that scans the output VDL of the comparator 96 and searches for whether or not the charge voltage is normal determines that the charge voltage of the battery 32 is normal. That is, a voltage of the battery 32 is determined to be completely charged to a set voltage level, and a charge completion alarm signal is output through line 57 in operation 122. The charge completion alarm signal through line 57 is transmitted to the base unit 12 through the audio and logic unit 36 and the radio unit 34, and the radio unit 25 and the audio and logic unit 24 of the base unit 12 receive and demodulate the signal and input the signal to the first microcomputer 48 through the line 49. The first microcomputer 48 that receives a data signal through the line 49 determines that the charge completion signal is received from the portable device 18 in the aforementioned operation 110 of FIG. 3A (the portable device is normal), and performs operation 112.

first and second voltage detectors for respectively detecting voltages at front and rear ends of the constant voltage/constant current supplier;

Chung-Sik also discloses first and second voltage detectors (V1, V2) for respectively detecting first and second voltage (V1, V2) at front and rear ends of the constant voltage/constant current supplier 52 (Fig. 2).

a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result; and

Chung-Sik discloses voltage comparator 96 for comparing first and second voltages (V1, V2) detected by the first and second voltage detectors and outputting a voltage comparison result (charge state VDL) (Fig. 2, page 8-4).

wherein the microprocessor outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Chung-Sik discloses second microprocessor 56 outputs the monitoring result (charge state VDL) according to the voltage comparison result through line 37 to the wireless transmitting unit (RADIO UNIT 34). (Chung-Sik, Fig. 1, 2, and English Translation, pages 8-4, 8-5).

> Here, in the aforementioned operation 120 of FIG. 3B, the second microcomputer 56 that scans the output VDL of the comparator 96 and searches for whether or not the charge voltage is normal determines that the charge voltage of the battery 32 is normal. That is, a voltage of the battery 32 is determined to be completely charged to a set voltage level, and a charge completion alarm signal is output through line 37 in operation 122. The charge completion alarm signal through line 37 is transmitted to the base unit 12 through the audio and logic unit 36 and the radio unit 34, and the radio unit 25 and the audio and logic unit 24 of the base unit 12 receive and demodulate the signal and input the signal to the first microcomputer 48 through the line 49. The first microcomputer 48 that receives a data signal through the line 49 determines that the charge completion signal is received from the portable device 18 in the aforementioned operation 110 of FIG. 3A (the portable device is normal), and performs operation 112.

10. The contact-less charging circuit module according to claim 9,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less charging circuit module according to claim 9 as set forth above.

wherein the magnetic field generated by the external contact-less charging device is generated intermittently,

Chung-Sik discloses magnetic field generated by the contact-less charging device is generated intermittently (switches on/off transistor 70) (Fig. 2, page 8-4).

wherein the overvoltage monitoring unit further includes a charging pause detecting unit receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, and

Chung-Sik also discloses contactless charge system for detecting a voltage of a rechargeable battery 32 including charging pause detection unit comprising microprocessor 56 that receives clock and power information 104 (Fig. 1)(page 8-4, lines 32-39) to control the charge between the charger 12 and the portable device 18 (page 8-2, lines 8-9) (Fig. 1).

Chung-Sik discloses a control signal (SCTL) output from the output port Pl of FIRST MICRO COMPUTER 48 is applied to a base of the transistor 70 through a resistor 72 and switches "on/off' the transistor 70 around ten thousand times per second. In this case, a potential of a collector terminal of the transistor 70 is switched between "low" and "high" depending on a period of the control signal (SCTL) and the signal is applied to a base of the transistor 64."

(Chung-Sik, page 8-4, Fig. 2). Chung-Sik discloses charge pause detection unit comprising microprocessor 56 that receives clock and power information 104 (Fig. 1)(page 8-4, lines 32-39) to control the charge between the charger 12 and the portable device 18 (page 8-2, lines 8-9) (Fig. 1)

Regarding detecting a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, Chung-Sik discloses that the charging of battery continues until the detection voltage V2 becomes higher than V1 and the output signal VDL of comparator 96 is transitioned to logic "high" from logic "low" and is input to second microcomputer 56 to produce charging completion alarm (Fig. 2, page 8-5, lines 31-43). The transition to logic "high" from logic "low" is considered a time point when the induction of high frequency AC current ends, and then outputting the end time point (charge completion) to the microprocessor 56. The microcomputer 56 is broadly considered the same as charging pause detecting unit that produces charging completion alarm when the voltage of battery is determined to be normal and completely charged.

Additionally, Chung-Sik specifically disclosed a "time point" when the charge operation may be automatically stopped by communication between contact less charging unit 38 and power transmitter 28 (Chung-Sik, English Translation, page 8-5, lines 44-46 and Fig. 1).

> Thus, in the present invention according to the above embodiments, a battery begins to be charged from a time point when the portable device 18 operated at an operating voltage of the battery is installed on the base unit 12, and the charge operation may be automatically stopped either by communication between devices or overheating of the devices.

To the extent that Chung-Sik may not specifically disclose a charging pause detecting unit it would have been obvious to modify the overvoltage monitoring unit disclosed by Chung-Sik by adding a charging pause detecting unit because Chung-Sik specifically disclosed battery begins to be charged from a "time point" and the charge operation may be automatically stopped by communication between devices.

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Chung-Sik discloses wherein the monitoring result (VDL) output to second microprocessor 56 is transmitted to the external contact-less charging device by means of wireless communication by an antenna connected to radio unit 34. (Fig. 2, page 8-5).

> Here, in the aforementioned operation 120 of FIG. 3B, the second microcomputer 56 that scans the output VDL of the comparator 96 and searches for whether or not the charge voltage is normal determines that the charge voltage of the battery 32 is normal. That is, a voltage of the battery 32 is determined to be completely charged to a set voltage level, and a charge completion alarm signal is output through line 37 in operation 122. The charge completion alarm signal through line 37 is transmitted to the base unit 12 through the audio and logic unit 36 and the radio unit 34, and the radio unit 25 and the audio and logic unit 24 of the base unit 12 receive and demodulate the signal and input the signal to the first microcomputer 48 through the line 49. The first microcomputer 48 that receives a data signal through the line 49 determines that the charge completion signal is received from the portable device 18 in the aforementioned operation 110 of FIG. 3A (the portable device is normal), and performs operation 112.

To the extent that Chung-Sik may not specifically disclose transmitting a monitoring result to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced it would have been obvious for charging the battery when a voltage of the battery is determined to be less than normal (Fig. 2).

At the time the invention was made it would have been obvious to modify the overvoltage monitoring unit disclosed by Chung-Sik to transmit the monitoring result while a high frequency AC current is not applied to the magnetic field generating unit for starting charging of the battery when voltage of the battery is determined to be less than normal.

11. The contact-less charging circuit module according to claim 7,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less chargeable battery according to claim 7 as set forth above.

wherein the monitoring result is a charging power adjustment request signal.

Chung-Sik discloses outputting a charge state signal (VDL) which is input to second microcomputer 56 for controlling the portable device 18 (battery) (Fig. 2, page 8-3).

Chung-Sik discloses battery voltage detector circuit 54 that includes first and second voltage splitters 89 and 93 for comparing a voltage V1 of an input terminal of the charging unit 52 with a voltage V2 of an output terminal and clocking the result, and a comparator 96 for comparing outputs of the first and second voltage splitters 89 and 93 (V1, V2) and outputting a charge state signal (VDL) to second microcomputer 56 based on the difference of voltage (V1-V2) at both ends of the constant voltage/constant current supplier. The second microcomputer 56 searches for whether or not a charge voltage of the battery 32 is normal in an operation (120 of FIG. 3B) based on the result of the difference of voltage (V1-V2). Additionally, Chung-Sik discloses outputting code (NO) indicating (overvoltage state) if charge voltage is not normal (see 120 of FIG. 3B) (Fig. 2, page 8-4, lines 40-42).

12. The contact-less charging circuit module according to claim 7,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less chargeable battery according to claim 7 as set forth above.

wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Chung-Sik discloses battery voltage detector circuit 54 that includes first and second voltage splitters 89 and 93 for comparing a voltage V1 of an input terminal of the charging unit 52 with a voltage V2 of an output terminal and clocking the result, and a comparator 96 for comparing outputs of the first and second voltage splitters 89 and 93 (V1, V2) and outputting a charge state signal (VDL) to second microcomputer 56 based on the difference of voltage (V1-V2) at both ends of the constant voltage/constant current supplier. The second microcomputer 56 searches for whether or not a charge voltage of the battery 32 is normal in an operation (120 of FIG. 3B) based on the result of the difference of voltage (V1-V2). Additionally, Chung-Sik discloses outputting code (NO) indicating (overvoltage state) if charge voltage is not normal (see (120 of FIG. 3B) (Fig. 2, page 8-4, lines 40-42).

13. A contact-less charging device for transmitting a charging power by means of electromagnetic induction phenomenon to a contact-less chargeable battery that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode and,

Chung-Sik discloses contact-less charging device for transmitting a charging power by means of electromagnetic induction phenomenon to a contact-less chargeable battery 32 that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode (page 8-2, lines 6-7) (Fig. 1).

The present invention relates to a charge system of a radio-telephone. More specifically, the present invention relates to a contactless charge system of a radio-telephone for charging a battery in a portable device without contact between a charger of a radio-telephone and a voltage terminal of the portable device.

Chung-Sik discloses constant voltage/current supplier 52 for receiving DC current from the rectifier 80 and supplying a charging power to the battery cell 32 in a constant

voltage/constant current charge mode (Fig. 2). (See "constant voltage unit", page 8-3, lines 24-27). Chung-Sik further discloses rectifier 80 supplies DC current at a constant voltage V1 (reference voltage). (See "voltage V1 is constant", page 8-5 line 5).

Additionally, Chung-Sik discloses constant voltage/constant current supplier 52 supplies the charging power in a constant current mode at an initial charging stage by limiting the current drawn by the battery 32 by a resistor 84 ("the resistor 84 is a current limiter resistor") (Chung-Sik, English Translation, page 8-4, last paragraph 2nd last line) connected in series with diode 86 and when the battery begins to get charged the current drawn by the battery reduces (current is no longer constant) and supplies the charging power at a constant voltage until the battery is fully charged. (Fig. 2).

In this case, the rectified voltage IDC is input to a first voltage splitter 89, simultaneously limited to a predetermined level through the resistor 84 and the diode 86, then applied to the battery 32. That is, the battery 32 is charged. In the above case, the resistor 84 is a current limiter resistor, and the diode 86 is a diode for preventing counterflow when the voltage IDC is lower than a voltage of the battery 32.

terminal (+) of the comparator 96. In this case, the reference voltage V1 is constant and the charge level detection voltage V2

To the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode it would have been obvious over Kaite et al.

Kaite et al. specifically disclosed constant voltage constant current supplier 123 for receiving DC current from rectifier 122 and supplying a charging power to the battery cell 111 in a constant voltage/constant current mode (col. 6, lines 41-44) (Fig. 2).

charge. Therefore, the charging control section **123** is provided with a constant current constant voltage circuit to stabilize output from the rectifying circuit **122**, and a switching device to stop charging when the rechargeable batteries **111** reach full charge under control of the computation circuit **124**. The constant current constant voltage circuit measures charging current and battery voltage to control the output to a constant current and constant voltage. The

At the time the invention was made it would have been obvious to one of ordinary skill in the to modify the constant voltage supplier disclosed by Chung-Sik by adding the constant current constant voltage circuit disclosed by Kaite et al. to stabilize output from the rectifying circuit.

wirelessly transmits a monitoring result for voltages at both ends of the constant voltage/constant current supplier, the contact-less charging device comprising:

Chung-Sik discloses wirelessly transmitting (RADIO 34) (Fig. 1) a monitoring result for voltages at both ends of the constant voltage/constant current supplier (Chung-Sik, English Translation, pages 8-5, Fig. 2).

Here, in the aforementioned operation 120 of FIG. 3B, the second microcomputer 56 that scans the output VDL of the comparator 96 and searches for whether or not the charge voltage is normal determines that the charge voltage of the battery 32 is normal. That is, a voltage of the battery 32 is determined to be completely charged to a set voltage level, and a charge completion alarm signal is output through line 37 in operation 122. The charge completion alarm signal through line 37 is transmitted to the base unit 12 through the audio and logic unit 36 and the radio unit 34, and the radio unit 25 and the audio and logic unit 24 of the base unit 12 receive and demodulate the signal and input the signal to the first microcomputer 48 through the line 49. The first microcomputer 48 that receives a data signal through the line 49 determines that the charge completion signal is received from the portable device 18 in the aforementioned operation 110 of FIG. 3A (the portable device is normal), and performs operation 112.

a magnetic field generating unit for receiving an AC current and forming a magnetic field in an outer space;

Chung-Sik discloses magnetic field generating unit 46 (induced voltage generating unit) for receiving an AC current and forming a magnetic field in an outer space (space around coil

77). (Chung-Sik, English Translation, page 8-4 lines 47-51; and Fig. 2).

10 KHZ is generated from a collector of the transistor 64. The AC voltage of 10 KHZ generated from the collector of the transistor 64 is applied to the coil 77 wound in the induced voltage generating unit 46 through the alternating current line (AVL). When current of an AC voltage that alternates with a period of 10 KHZ flows in the coil 77, an electromagnetic field is generated around the coil 77, and a portion of a magnetic line of force is linked with the coil 79 wound around the core 78 in the induced voltage detecting unit 81.

a high frequency power driving unit for applying a high frequency AC current to the magnetic field generating unit; and

Chung-Sik discloses a high frequency power driving unit (transistor 64) for applying a high frequency AC current to the magnetic field generating unit 46 (Fig. 2, page 8-4).

control signal (SCTL), and the signal is applied to a base of the transistor 64. Thus, when the control signal (SCTL) having a period of about 10 KHZ is output from the output port P1 of the first microcomputer 48, AC power having a period of about 10 KHZ is generated from a collector of the transistor 64. The AC voltage of 10 KHZ generated from the collector of the transistor 64 is applied to the coil 77 wound in the induced voltage generating unit 46 through the alternating current line (AVL). When current of an AC voltage that alternates with a period of 10 KHZ flows in the coil 77, an electromagnetic field is generated around the coil 77, and a portion of a magnetic line of force is linked with the coil 79 wound around the core 78 in the induced voltage detecting unit 81.

a charging power adjusting unit for receiving the monitoring result from the contact-less chargeable battery by means of wireless communication and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that the charging power transmitted to the contact-less chargeable battery is adjusted,

Chung-Sik disclosed charging power adjusting unit including first microcomputer 48 receiving the monitoring result from the contact-less chargeable battery by means of wireless communication (RADIO UNIT 26 connected to antenna) (Fig. 1) and controlling a pulse generator which generates a pulse sequence with a predetermined period (Chung-Sik, English Translation, page 8-6, lines 22-25) and high frequency power driving unit 44 including transistor 64 to adjust a power of the high frequency AC current applied to the magnetic field generating

unit 46 so that the charging power transmitted to the contact-less chargeable battery 32 is adjusted. (Figs. 1, 2 & 3A, page 8-5).

> Here, in the aforementioned operation 120 of FIG. 3B, the second microcomputer 56 that scans the output VDL of the comparator 96 and searches for whether or not the charge voltage is normal determines that the charge voltage of the battery 32 is normal. That is, a voltage of the battery 32 is determined to be completely charged to a set voltage level, and a charge completion alarm signal is output through line 37 in operation 122. The charge completion alarm signal through line 37 is transmitted to the base unit 12 through the audio and logic unit 36 and the radio unit 34, and the radio unit 25 and the audio and logic unit 24 of the base unit 12 receive and demodulate the signal and input the signal to the first microcomputer 48 through the line 49. The first microcomputer 48 that receives a data signal through the line 49 determines that the charge completion signal is received from the portable device 18 in the aforementioned operation 110 of FIG. 3A (the portable device is normal), and performs operation 112.

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

While Chung-Sik discloses to adjust the power of the high frequency AC current applied to the magnetic field generating unit is based on the voltage of the contact-less chargeable battery, Chung-Sik did not specifically disclose adjusting the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Inventor Shigefumi Matsuki (JP H0145230 Y2), DATE PUBLISHED 1989-12-27 disclosed wireless battery charging device wherein charging current (power of the high frequency AC current applied to the magnetic field generating unit) can be adjusted based on the distance of output coil 7 of charging equipment 1 and input coil 6 of battery 2' ("storage battery") (Matsuki, Figs. 2-4 and English Translation, "Detailed explanation of the device" "Charging current can be adjusted by [which control a high frequency output or changes the **distance** of output coil 7 of charging equipment 1', and input coil 6 of storage battery 2']").

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify contact-less wireless charging of battery disclosed by Chung-Sik by adding wireless feedback control signal to induce the change of intensity of the magnetic field based on relative positions of the contact-less chargeable battery and the external contact-less charging device disclosed by Matsuki for charging a battery.

14. The contact-less charging device according to claim 13, wherein the magnetic field generating unit is a coil to both sides of which a high frequency AC current is applied.

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less chargeable battery according to claim 13 as set forth above.

Chung-Sik discloses wherein the magnetic field generating unit is a coil (77, 78) to both sides of which a high frequency AC current is applied. (Fig. 2, page 8-3).

15. The contact-less charging device according to claim 13,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less charging device according to claim 13 as set forth above.

wherein the charging power adjusting unit includes:

Chung-Sik discloses charging power adjusting unit 12, 48 (base unit having a charge function) (Fig. 1) (Chung-Sik, page 8-5, paragraph 4).

a wireless receiving unit for wirelessly receiving the monitoring result through an antenna; and

Chung-Sik discloses wireless receiving unit (RADIO UNIT 26 connected to antenna) for wirelessly receiving the monitoring result through the antenna (Fig. 1).

a microprocessor for receiving the monitoring result from the wireless receiving unit and controlling the high frequency power driving unit to adjust the power of the high frequency AC current applied to the magnetic field generating unit.

Chung-Sik discloses first microprocessor 48 for receiving the monitoring result from the wireless receiving unit (radio unit 26) and controlling the high frequency power driving unit 44 including transistor 64 to adjust a power of the high frequency AC current applied to the magnetic field generating unit (induced voltage generating unit 46) (Fig. 1, 2 & 3A, pages 8-4, 8-5).

48 through the line 49. The first microcomputer 48 that receives a data signal through the line 49 determines that the charge completion signal is received from the portable device 18 in the aforementioned operation 110 of FIG. 3A (the portable device is normal), and performs operation 112.

19 (original). The contact-less charging device according to claim 13,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less charging device according to claim 13 as set forth above.

wherein the high frequency power driving unit intermittently applies a high frequency AC current to the magnetic field generating unit, and

Chung-Sik discloses a high frequency power driving unit 44 (voltage switching unit) for intermittently applying a high frequency AC current by switching on/off transistor (64, 70) to the magnetic field generating unit 46 (induce voltage generating unit) (Fig. 2, page 8-3).

wherein the charging power adjusting unit receives the monitoring result while a high frequency AC current is not applied to the magnetic field generating unit.

Chung-Sik discloses the charging power adjusting unit including microprocessor 48 receives the monitoring result by means of wireless communication (RADIO UNIT 26 connected to antenna). (Chung-Sik, page 8-5, Fig. 1, 2).

> Here, in the aforementioned operation 120 of FIG. 3B, the second microcomputer 56 that scans the output VDL of the comparator 96 and searches for whether or not the charge voltage is normal determines that the charge voltage of the battery 32 is normal. That is, a voltage of the battery 32 is determined to be completely charged to a set voltage level, and a charge completion alarm signal is output through line 37 in operation 122. The charge completion alarm signal through line 37 is transmitted to the base unit 12 through the audio and logic unit 56 and the radio unit 34, and the radio unit 25 and the audio and logic unit 24 of the base unit 12 receive and demodulate the signal and input the signal to the first microcomputer 48 through the line 49. The first microcomputer 48 that receives a data signal through the line 49 determines that the charge completion signal is received from the portable device 18 in the aforementioned operation 110 of FIG. 3A (the portable device is normal), and performs operation 112.

To the extent that Chung-Sik may not specifically disclose charging power adjusting unit receives the monitoring result while a high frequency AC current is not applied to the magnetic field generating unit it would have been obvious for charging of the battery when voltage of the battery is determined to be less than normal (Fig. 2).

At the time the invention was made it would have been obvious for the charging power adjusting unit disclosed by Chung-Sik to transmit a monitoring result to the charging device by means of wireless communication while a high frequency AC current is not induced in the secondary coil for starting charging of the battery when voltage of the battery is determined to be less than normal.

20 (original). The contact-less charging device according to claim 13,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less charging device according to claim 13 as set forth above.

wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Chung-Sik discloses battery voltage detector circuit 54 that includes first and second voltage splitters 89 and 93 for comparing a voltage V1 of an input terminal of the charging unit 52 with a voltage V2 of an output terminal and clocking the result, and a comparator 96 for comparing outputs of the first and second voltage splitters 89 and 93 (V1, V2) and outputting a charge state signal (VDL) to second microcomputer 56 based on the difference of voltage (V1-V2) at both ends of the constant voltage/constant current supplier. The second microcomputer 56 searches for whether or not a charge voltage of the battery 32 is normal in an operation (120 of FIG. 3B) based on the result of the difference of voltage (V1-V2). Additionally, Chung-Sik discloses outputting code (NO) indicating (overvoltage state) if charge voltage is not normal (see (120 of FIG. 3B) (Fig. 2, page 8-4, lines 40-42).

21 (amended). A battery charging set including a contact-less chargeable battery and a contact-less charging device, wherein the contact-less chargeable battery includes:

Chung-Sik discloses battery charging set including a contact-less chargeable battery and a contact-less charging device. (page 8-2, lines 6-7) (Fig. 1).

The present invention relates to a charge system of a radio-telephone. More specifically, the present invention relates to a contactless charge system of a radio-telephone for charging a battery in a portable device without contact between a charger of a radio-telephone and a voltage terminal of the portable device.

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field intermittently generated from an external contact-less charging device;

Chung-Sik discloses high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field intermittently generated from an external contact-less charging device. (Fig. 2, page 8-4).

control signal (SCTL), and the signal is applied to a base of the transistor 64. Thus, when the control signal (SCTL) having a period of about 10 KHZ is output from the output port P1 of the first microcomputer 48, AC power having a period of about 10 KHZ is generated from a collector of the transistor 64. The AC voltage of 10 KHZ generated from the collector of the transistor 64 is applied to the coil 77 wound in the induced voltage generating unit 46 through the alternating current line (AVL). When current of an AC voltage that alternates with a period of 10 KHZ flows in the coil 77, an electromagnetic field is generated around the coil 77, and a portion of a magnetic line of force is linked with the coil 79 wound around the core 78 in the induced voltage detecting unit 81.

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

Chung-Sik discloses rectifier 80 for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current (page 8-2, lines 17-19) (Fig. 2).

a constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to a battery cell in a constant voltage/constant current mode; and

Chung-Sik discloses constant voltage/current supplier 52 for receiving DC current from the rectifier 80 and supplying a charging power to the battery cell 32 in a constant voltage/constant current charge mode (Fig. 2). (See “constant voltage unit”, page 8-3, lines 24-

27). Chung-Sik further discloses rectifier 80 supplies DC current at a constant voltage V1 (reference voltage). (See "voltage V1 is constant", page 8-5 line 5).

Additionally, Chung-Sik discloses constant voltage/constant current supplier 52 supplies the charging power in a constant current mode at an initial charging stage by limiting the current drawn by the battery 32 by a resistor 84 ("the resistor 84 is a current limiter resistor") (Chung-Sik, English Translation, page 8-4, last paragraph 2nd last line) connected in series with diode 86 and when the battery begins to get charged the current drawn by the battery reduces (current is no longer constant) and supplies the charging power at a constant voltage until the battery is fully charged. (Fig. 2).

To the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode it would have been obvious over Kaite et al.

Kaite et al. specifically disclosed constant voltage constant current supplier 123 for receiving DC current from rectifier 122 and supplying a charging power to the battery cell 111 in a constant voltage/constant current mode (col. 6, lines 41-44) (Fig. 2).

charge. Therefore, the charging control section **123** is provided with a constant current constant voltage circuit to stabilize output from the rectifying circuit **122**, and a switching device to stop charging when the rechargeable batteries **111** reach full charge under control of the computation circuit **124**. The constant current constant voltage circuit measures charging current and battery voltage to control the output to a constant current and constant voltage. The

At the time the invention was made it would have been obvious to one of ordinary skill in the to modify the constant voltage supplier disclosed by Chung-Sik by adding the constant

current constant voltage circuit disclosed by Kaite et al. to stabilize output from a rectifying circuit.

an overvoltage monitoring unit <u>that includes a microprocessor</u> for monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced, wherein the <u>contact-less</u> charging device includes:

Chung-Sik also discloses contactless charge system for detecting a voltage of a rechargeable battery 32 including charge pause detection unit comprising microprocessor 56 that receives clock and power information 104 (Fig. 1)(page 8-4, lines 32-39) to control the charge between the charger 12 and the portable device 18 (page 8-2, lines 8-9) (Fig. 1) and specifically disclosed an over voltage monitoring unit 54 for monitoring voltages (V1, V2) broadly interpreted the same as the claimed voltage detectors (V1, V2) at both ends of the constant voltage/current supplier 52, and a comparator 96 for comparing the voltages (V1, V2), and a transmitter for transmitting a monitoring result from comparator 96 to the external contactless charging device 12 by means of wireless communication (RADIO UNIT 34), and a microprocessor (48, 56) providing signal SCTL at the output port P1 based on the monitoring result for controlling the switching ON/OFF of transistors (70, 64) for controlling AC line voltage (AVL) so as to induce a change of intensity of the magnetic field of the induced voltage generating unit 46 (Fig. 1, 2) (page 8-2, lines 31-34, 40-55; page 8-3, lines 36-40; page 8-5, lines 35-43) (Fig. 2). Chung-Sik further discloses wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication. (Chung-Sik, pages 8-

5, Fig. 2).

> Here, in the aforementioned operation 120 of FIG. 3B, the second microcomputer 56 that scans the output VDL of the comparator 96 and searches for whether or not the charge voltage is normal determines that the charge voltage of the battery 32 is normal. That is, a voltage of the battery 32 is determined to be completely charged to a set voltage level, and a charge completion alarm signal is output through line 37 in operation 122. The charge completion alarm signal through line 37 is transmitted to the base unit 12 through the audio and logic unit 36 and the radio unit 34, and the radio unit 25 and the audio and logic unit 24 of the base unit 12 receive and demodulate the signal and input the signal to the first microcomputer 48 through the line 49. The first microcomputer 48 that receives a data signal through the line 49 determines that the charge completion signal is received from the portable device 18 in the aforementioned operation 110 of FIG. 3A (the portable device is normal), and performs operation 112.

To the extent that Chung-Sik may not specifically disclose transmitting a monitoring result to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced it would have been obvious for charging the battery when a voltage of the battery is determined to be less than normal (Fig. 2).

At the time the invention was made it would have been obvious to modify the overvoltage monitoring unit disclosed by Chung-Sik to transmit the monitoring result while a high frequency AC current is not applied to the magnetic field generating unit for starting charging of the battery when voltage of the battery is determined to be less than normal.

a magnetic field generating unit for receiving an AC current and forming a magnetic field in an outer space;

Chung-Sik discloses magnetic field generating unit 46 (induced voltage generating unit) for receiving an AC current and forming a magnetic field in an outer space (space around coil 77). (Fig. 2, page 8-4).

a high frequency power driving unit for intermittently applying a high frequency AC current to the magnetic field generating unit; and

Chung-Sik discloses a high frequency power driving unit 44 (voltage switching unit) for intermittently applying a high frequency AC current by switching on/off transistor 70 to the magnetic field generating unit 46 (induce voltage generating unit) (Fig. 2, page 8-3).

a charging power adjusting unit for, while a high frequency AC current is not applied to the magnetic field generating unit, receiving the monitoring result by means of wireless communication and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that a charging power transmitted from the contact-less charging device to the contact-less chargeable battery is adjusted,

Chung-Sik discloses charging power adjusting including first microcomputer unit 48 receiving the monitoring result from the contact-less chargeable battery by wireless communication (RADIO UNIT 26 connected to antenna) and controlling the high frequency power driving unit (transistor 64) to adjust a power of the high frequency AC current applied to the magnetic field generating unit 46 so that a charging power transmitted to the battery 32 is adjusted. (Figs. 1, 2 & 3A, page 8-5).

> Here, in the aforementioned operation 120 of FIG. 3B, the second microcomputer 56 that scans the output VDL of the comparator 96 and searches for whether or not the charge voltage is normal determines that the charge voltage of the battery 32 is normal. That is, a voltage of the battery 32 is determined to be completely charged to a set voltage level, and a charge completion alarm signal is output through line 37 in operation 122. The charge completion alarm signal through line 37 is transmitted to the base unit 12 through the audio and logic unit 36 and the radio unit 34, and the radio unit 25 and the audio and logic unit 24 of the base unit 12 receive and demodulate the signal and input the signal to the first microcomputer 48 through the line 49. The first microcomputer 48 that receives a data signal through the line 49 determines that the charge completion signal is received from the portable device 18 in the aforementioned operation 110 of FIG. 3A (the portable device is normal), and performs operation 112.

To the extent that Chung-Sik may not specifically disclose charging power adjusting unit 48 (first microcomputer) receives the monitoring result while a high frequency AC current is not applied to the magnetic field generating unit 46 (induced voltage generating unit) it would have

been obvious for charging of the battery when voltage of the battery is determined to be less than normal (Fig. 2).

At the time the invention was made it would have been obvious for the charging power adjusting unit disclosed by Chung-Sik to receives the monitoring result while a high frequency AC current is not applied to the magnetic field generating unit for starting charging of the battery when voltage of the battery is determined to be less than normal.

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

While Chung-Sik discloses to adjust the power of the high frequency AC current applied to the magnetic field generating unit is based on the voltage of the contact-less chargeable battery, Chung-Sik did not specifically disclose adjusting the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Shigefumi Matsuki (JP H0145230 Y2), DATE PUBLISHED 1989-12-27 disclosed wireless battery charging device wherein charging current (power of the high frequency AC current applied to the magnetic field generating unit) can be adjusted based on the distance of output coil 7 of charging equipment 1 and input coil 6 of battery 2' ("storage battery") (Matsuki, Figs. 2-4 and English Translation, "Detailed explanation of the device" "Charging current can be adjusted by [which control a high frequency output or changes the distance of output coil 7 of charging equipment 1', and input coil 6 of storage battery 2']").

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify contact-less wireless charging of battery disclosed by Chung-Sik by adding wireless feedback control signal to induce the change of intensity of the magnetic field based on relative positions of the contact-less chargeable battery and the external contact-less charging device disclosed by Matsuki for charging a battery.

22 (Original). The battery charging set according to claim 21,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses battery charging set according to claim 21 as set forth above.

wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Chung-Sik discloses battery voltage detector circuit 54 that includes first and second voltage splitters 89 and 93 for comparing a voltage V1 of an input terminal of the charging unit 52 with a voltage V2 of an output terminal and clocking the result, and a comparator 96 for comparing outputs of the first and second voltage splitters 89 and 93 (V1, V2) and outputting a charge state signal (VDL) to second microcomputer 56 based on the difference of voltage (V1-V2) at both ends of the constant voltage/constant current supplier. The second microcomputer 56 searches for whether or not a charge voltage of the battery 32 is normal in an operation (120 of FIG. 3B) based on the result of the difference of voltage (V1-V2).

Additionally, Chung-Sik discloses outputting code (NO) indicating (overvoltage state) if charge voltage is not normal (see (120 of FIG. 3B) (Fig. 2, page 8-4, lines 40-42).

23 (Amended). A method for controlling charging of a contact-less chargeable battery using a contact-less charging device by means of electromagnetic induction phenomenon, the method comprising:

Chung-Sik discloses method for controlling charging of a contact-less chargeable battery 32 in a portable device by means of electromagnetic induction phenomenon by inductively coupling a voltage from a charger 12 (base unit) to a portable device 18 comprising contactless charging unit 38 for charging chargeable battery 32 (page 8-2, lines 6-7) (Fig. 1).

The present invention relates to a charge system of a radio-telephone. More specifically, the present invention relates to a contactless charge system of a radio-telephone for charging a battery in a portable device without contact between a charger of a radio-telephone and a voltage terminal of the portable device.

(a) intermittently applying a high frequency AC current to a primary coil provided to the charging device so as to intermittently generate a magnetic field in an outer region;

Chung-Sik discloses intermittently applying a high frequency AC current to a primary coil 77 provided to the charging device by a voltage switching unit 44 by turning on/off transistor 64 so as to intermittently generate a magnetic field in an outer region around coil 77 (Fig. 2).

(b) linking a magnetic flux of the generated magnetic field to a secondary coil provided to the battery so as to intermittently output an electromagnetically-induced high frequency AC current;

Chung-Sik discloses linking a magnetic flux of the generated magnetic field of coil 77 to a secondary coil 79 provided to the battery 32 so as to intermittently output an electromagnetically-induced high frequency AC current (Fig. 2).

(c) rectifying the output high frequency AC current to be converted into a DC current;

Chung-Sik discloses rectifying the high frequency AC current output from coil 79 by rectifier 80 and converted into a DC current (Fig. 2, page 8-3).

> The induced voltage rectifying unit 50 includes a core 78 and a coil 79 wound around the core 78, and includes an induced voltage detecting unit 81 that is inductively coupled to the induced voltage generating unit 46, and a rectifier 80 for rectifying a voltage output from the coil 79 of the induced voltage detecting unit 81.

(d) applying the DC current to a battery cell through a constant voltage/constant current supplier so as to charge the battery cell in a constant voltage/constant current mode;

Chung-Sik discloses applying the DC current to a battery cell 32 through a constant voltage/constant current supplier (80, 52) (see "constant voltage V1") so as to charge the battery cell in a constant voltage/constant current mode (Fig. 2, page 8-4, lines 59-62; page 8-5, line 5).

Additionally, Chung-Sik discloses constant voltage/constant current supplier 52 supplies the charging power in a constant current mode at an initial charging stage by limiting the current drawn by the battery 32 by a resistor 84 ("the resistor 84 is a current limiter resistor") (Chung-Sik, English Translation, page 8-4, last paragraph 2nd last line) connected in series with diode 86 and when the battery begins to get charged the current drawn by the battery reduces (current is

no longer constant) and supplies the charging power at a constant voltage until the battery is fully charged. (Fig. 2).

In this case, the rectified voltage IDC is input to a first voltage splitter 89, simultaneously limited to a predetermined level through the resistor 84 and the diode 86, then applied to the battery 32. That is, the battery 32 is charged. In the above case, the resistor 84 is a current limiter resistor, and the diode 86 is a diode for preventing countercurrent when the voltage IDC is lower than a voltage of the battery 32.

terminal (+) of the comparator 96. In this case, the reference voltage V1 is constant and the charge level detection voltage V2

To the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier so as to charge the battery cell in a constant voltage/constant current mode it would have been obvious over Kaite et al.

Kaite et al. specifically disclosed constant voltage constant current supplier 123 for receiving DC current from rectifier 122 and supplying a charging power to the battery cell 111 in a constant voltage/constant current mode (col. 6, lines 41-44) (Fig. 2).

charge. Therefore, the charging control section **123** is provided with a constant current constant voltage circuit to stabilize output from the rectifying circuit **122**, and a switching device to stop charging when the rechargeable batteries **111** reach full charge under control of the comparison circuit **124**. The constant current constant voltage circuit measures charging current and battery voltage to control the output to a constant current and constant voltage. The

At the time the invention was made it would have been obvious to one of ordinary skill in the to modify the constant voltage supplier disclosed by Chung-Sik by adding the constant current constant voltage circuit disclosed by Kaite et al. to stabilize output from a rectifying circuit.

(e) monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the charging device by means of wireless

communication while a high frequency AC current is not induced in the secondary coil; and

Chung-Sik discloses contactless charge device for detecting a voltage of a rechargeable battery 32 to control the charge between the charger 12 and the portable device 18 (Chung-Sik , English Translation, page 8-2, lines 8-9)(Fig. 1) and monitoring voltages (V1, V2) at both ends of constant voltage/constant current supplier 52 and transmitting a monitoring result to the external contactless charging device 12 by means of wireless communication (RADIO UNIT 34) so as to induce a change of intensity of the magnetic field of the induced voltage generating unit 46 (Fig. 2)(Chung-Sik , English Translation, page 8-2, lines 40-55; page 8-3, lines 36-40; page 8-5, lines 35-43) (Fig. 2).

To the extent that Chung-Sik may not specifically disclose communication while a high frequency AC current is not induced in the secondary coil it would have been obvious to do so for charging of the battery when voltage of the battery is determined to be less than normal (Fig. 2).

At the time the invention was made it would have been obvious for the charging power adjusting unit disclosed by Chung-Sik to transmit a monitoring result to the charging device by means of wireless communication while a high frequency AC current is not induced in the secondary coil for starting charging of the battery when voltage of the battery is determined to be less than normal.

(f) adjusting a power of the high frequency AC current applied to the primary coil according to the transmitted monitoring result,

Chung-Sik disclosed charging power adjusting unit 48 (first microcomputer) for receiving the monitoring result from the contact-less chargeable battery by means of wireless communication (RADIO UNIT 26 connected to antenna) and controlling the high frequency power driving unit (transistor 64) to adjust a power of the high frequency AC current applied to the magnetic field generating unit 46 so that a charging power transmitted to the battery 32 is adjusted. (Figs. 1, 2 & 3A, page 8-5).

> Here, in the aforementioned operation 120 of FIG. 3B, the second microcomputer 56 that scans the output VDL of the comparator 96 and searches for whether or not the charge voltage is normal determines that the charge voltage of the battery 32 is normal. That is, a voltage of the battery 32 is determined to be completely charged to a set voltage level, and a charge completion alarm signal is output through line 37 in operation 122. The charge completion alarm signal through line 37 is transmitted to the base unit 12 through the audio and logic unit 36 and the radio unit 34, and the radio unit 25 and the audio and logic unit 24 of the base unit 12 receive and demodulate the signal and input the signal to the first microcomputer 48 through the line 49. The first microcomputer 48 that receives a data signal through the line 49 determines that the charge completion signal is received from the portable device 18 in the aforementioned operation 110 of FIG. 3A (the portable device is normal), and performs operation 112.

wherein the adjusting the power of the high frequency AC current applied to the primary coil is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

While Chung-Sik discloses to adjust the power of the high frequency AC current applied to the magnetic field generating unit is based on the voltage of the contact-less chargeable battery, Chung-Sik did not specifically disclose adjusting the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Shigefumi Matsuki (JP H0145230 Y2), DATE PUBLISHED 1989-12-27 disclosed wireless battery charging device wherein charging current (power of the high frequency AC current applied to the magnetic field generating unit) can be adjusted based on the distance of output coil 7 of charging equipment 1 and input coil 6 of battery 2' ("storage battery") (Matsuki,

Figs. 2-4 and English Translation, "Detailed explanation of the device" "Charging current can be adjusted by [which control a high frequency output or changes the distance of output coil 7 of charging equipment 1', and input coil 6 of storage battery 2']").

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify contact-less wireless charging of battery disclosed by Chung-Sik by adding wireless feedback control signal to induce the change of intensity of the magnetic field based on relative positions of the contact-less chargeable battery and the external contact-less charging device disclosed by Matsuki for charging a battery.

24 (Original). The method according to claim 23, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses method according to claim 23 as set forth above.

Chung-Sik discloses battery voltage detector circuit 54 includes first and second voltage splitters 89 and 93 for comparing a voltage V1 of an input terminal of the charging unit 52 with a voltage V2 of an output terminal and clocking the result, and a comparator 96 for comparing outputs of the first and second voltage splitters 89 and 93 (V1, V2) and outputting a charge state signal (VDL) to second microcomputer 56 based on the difference of voltage (V1-V2) at both ends of the constant voltage/constant current supplier. The second microcomputer 56 searches for whether or not a charge voltage of the battery 32 is normal in an operation (120 of FIG. 3B)

based on the result of the difference of voltage (V1-V2). Additionally, Chung-Sik discloses outputting code (NO) indicating (overvoltage state) if charge voltage is not normal (see (120 of FIG. 3B) (Fig. 2, page 8-4, lines 40-42).

Claim 25 (New amended): The contact-less chargeable battery according to claim 1,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less chargeable battery according to claim 1 as set forth above.

wherein the constant voltage/constant current supplier includes circuitry and the controlled by at least one microprocessor.

Chung-Sik discloses wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor (48, 56) (Fig. 2).

Claim 26 (New): The contact-less chargeable battery according to claim 1,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less chargeable battery according to claim 1 as set forth above.

wherein the overvoltage monitoring unit controls, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Chung-Sik discloses feedback is provided wirelessly to the base unit 12 by the output (VDL) of the comparator 96 in the overvoltage monitoring unit 54 for controlling the voltages at both ends of a constant voltage/constant current supplier 52 by inducing the change of intensity of the magnetic field in coil 77 by switching transistor 64 at a frequency of 10 KHZ so as to induce an AC voltage from the coil 77 to the inductively coupled coil 79 and AC voltage output

from coil 79 is rectified by the rectifier 80 so as to control the voltages at both ends of the constant voltage/constant current supplier 52 for charging the battery 32. (Chung-Sik, English Translation, page 8-4).

Claim 27 (New): The contact-less chargeable battery according to claim 1,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less chargeable battery according to claim 1 as set forth above.

wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Chung-Sik disclosed constant voltage/constant current supplier 52 receives the DC current at the front end from the rectifier 80 and supplies the charging power at the rear end to the battery cell 32 (The other end of the battery 32 is grounded) (Fig. 2).

Claim 28 (New): The contact-less chargeable battery according to claim 1,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less chargeable battery according to claim 1 as set forth above.

wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Chung-Sik discloses constant voltage/constant current supplier 52 supplies the charging power in a constant current mode at an initial charging stage by limiting the current drawn by the

battery 32 by a resistor 84 ("the resistor 84 is a current limiter resistor") (Chung-Sik, English Translation, page 8-4, last paragraph 2nd last line) connected in series with diode 86 and when the battery begins to get charged the current drawn by the battery reduces (current is no longer constant) and supplies the charging power at a constant voltage until the battery is fully charged. (Fig. 2).

In this case, the rectified voltage IDC is input to a first voltage splitter 89, simultaneously limited to a predetermined level through the resistor 84 and the diode 86, then applied to the battery 32. That is, the battery 32 is charged. In the above case, the resistor 84 is a current limiter resistor, and the diode 86 is a diode for preventing countercurrent when the voltage IDC is lower than a voltage of the battery 32.

terminal (+) of the comparator 96. In this case, the reference voltage V1 is constant and the charge level detection voltage V2

To the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage it would have been obvious over Kaite et al. (US 6,016,046).

In analogous art Kaite et al. discloses constant voltage/constant current supplier (122, 123) supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage (col. 6, lines 61-65) (Fig. 2).

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify the contact-less charging circuit of Chung-Sik and Matsuki by adding the constant voltage/constant current supplier disclosed by Kaite et al. to supply the charging power in a constant current mode at an initial charging stage and then supply the charging power in a constant voltage mode at a later charging stage for efficient charging of the battery.

Claim 29 (New): The contact-less chargeable battery according to claim 1,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less chargeable battery according to claim 1 as set forth above.

wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Chung-Sik discloses constant voltage/constant current supplier 52 charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level 120 (charge voltage normal?) (Fig. 3B).

To the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level, it would have been obvious over Kaite et al.

In analogous art Kaite et al. discloses constant voltage/constant current supplier (122, 123) charges the battery cell (batteries 111) (Fig. 2) in a constant voltage mode based on a charging voltage measured by the VOLTAGE MEASURING SECTION 126 of the battery cell 111 exceeding a predetermined level ("battery voltage or current are outside the specified range") (col. 6, line 64 to col. 7, line 4; col. 7, lines 45-46). Kaite et al. discloses computational circuit 124 stops charging (SWITCHING DEVICE OFF) (Fig. 3) when the rechargeable batteries 111 have reached full charge based on the charging voltage of the battery cell exceeding a predetermined level measured by voltage measuring section 126 (Fig. 2).

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify the constant voltage/constant current supplier disclosed by Chung-Sik by adding computational circuit disclosed by Kaite et al to stop charging of the battery when the

rechargeable batteries have reached full charge based on the charging voltage of the battery cell exceeding a predetermined level measured by voltage measuring section.

Claim 30 (New, amended): The contact-less charging circuit module according to claim 7,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less charging circuit module according to claim 7 as set forth above.

wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Chung-Sik discloses wherein the constant voltage/constant current supplier 52 include circuitry controlled by at least one microprocessor (48, 56) (Fig. 2).

To the extent that Chung-Sik may not specifically disclose wherein the constant voltage/constant current supplier and the overvoltage monitoring unit include circuitry controlled by at least one microprocessor, it would have been obvious over Kaite et al.

In analogous art Kaite et al. discloses constant voltage/constant current supplier (122, 123) and the overvoltage monitoring unit 126 include circuitry controlled by at least one microprocessor 120 (CONTROL CIRCUIT). Kaite et al. discloses that the control circuit 120 may be a microprocessor (col. 7, lines 28-36) (Fig. 2).

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify the constant voltage/constant current supplier disclosed by Chung-Sik by adding microprocessor disclosed by Kaite et al. for controlling the battery charging switching device (Fig. 3).

Claim 31 (New): The contact-less charging circuit module according to claim 7,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less chargeable battery according to claim 7 as set forth above.

wherein the overvoltage monitoring unit controls, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Chung-Sik discloses overvoltage monitoring unit 54 controls, through wireless feedback by (RADIO UNIT 34) to control of the charging of the battery cell 32 by switching on and off transistor 64, inducing the change of intensity of the magnetic field in coil 77 of the induced voltage generating unit 46 to control the voltages at both ends of the constant voltage/constant current supplier 52. (Fig. 2).

Claim 32 (New): The contact-less charging circuit module according to claim 7,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less chargeable battery according to claim 7 as set forth above.

wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Chung-Sik disclosed constant voltage/constant current supplier 52 receives the DC current at the front end from the rectifier 80 and supplies the charging power at the rear end to the battery cell 32 (The other end of the battery 32 is grounded) (Fig. 2).

Additionally, Kaite et al. disclosed constant voltage/constant current supplier 123 has a front end and a rear end, wherein the constant voltage/constant current supplier 123 receives the DC current at the front end from the rectifier 122 and supplies the charging power at the rear end to the battery cell 111 (col. 6, lines 25-36) (Fig. 2).

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify the contact-less charging circuit of Chung-Sik and Matsuki by adding the constant voltage/constant current supplier disclosed by Kaite et al. to supply the charging power in a constant current mode at an initial charging stage and then supply the charging power in a constant voltage mode at a later charging stage for efficient charging of the battery.

Claim 33 (New): The contact-less charging circuit module according to claim 7,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less charging circuit module according to claim 7 as set forth above.

wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Chung-Sik discloses constant voltage/constant current supplier 52 supplies the charging power in a constant current mode at an initial charging stage by limiting the current drawn by the battery 32 by a resistor 84 ("the resistor 84 is a current limiter resistor") (Chung-Sik, English Translation, page 8-4, last paragraph 2nd last line) connected in series with diode 86 and when the battery begins to get charged the current drawn by the battery reduces (current is no longer constant) and supplies the charging power at a constant voltage until the battery is fully charged. (Fig. 2).

In this case, the rectified voltage IDC is input to a first voltage splitter 89, simultaneously limited to a predetermined level through the resistor 84 and the diode 86, then applied to the battery 32. That is, the battery 32 is charged. In the above case, the resistor 84 is a current limiter resistor, and the diode 86 is a diode for preventing countercurrent when the voltage IDC is lower than a voltage of the battery 32.

terminal (+) of the comparator 96. In this case, the reference voltage V1 is constant and the charge level detection voltage V2

To the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage it would have been obvious over Kaite et al. (US 6,016,046).

In analogous art Kaite et al. discloses constant voltage/constant current supplier (122, 123) supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage (col. 6, lines 61-65) (Fig. 2).

Claim 34 (New): The contact-less charging circuit module according to claim 7,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less charging circuit module according to claim 7 as set forth above.

wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Chung-Sik discloses constant voltage/constant current supplier 52 charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level 120 (charge voltage normal?) (Fig. 3B).

To the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level, it would have been obvious over Kaite et al.

In analogous art Kaite et al. discloses constant voltage/constant current supplier (122, 123) charges the battery cell (batteries 111) (Fig. 2) in a constant voltage mode based on a charging voltage measured by the VOLTAGE MEASURING SECTION 126 of the battery cell 111 exceeding a predetermined level ("battery voltage or current are outside the specified range") (col. 6, line 64 to col. 7, line 4; col. 7, lines 45-46). Kaite et al. discloses computational circuit 124 stops charging (SWITCHING DEVICE OFF) (Fig. 3) when the rechargeable batteries 111 have reached full charge based on the charging voltage of the battery cell exceeding a predetermined level measured by voltage measuring section 126 (Fig. 2).

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify the constant voltage/constant current supplier disclosed by Chung-Sik by adding computational circuit disclosed by Kaite et al to stop charging when the rechargeable batteries have reached full charge based on the charging voltage of the battery cell exceeding a predetermined level measured by voltage measuring section.

Claim 35 (New): The contact-less chargeable battery according to claim 13,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less chargeable battery according to claim 13 as set forth above.

wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Chung-Sik discloses wherein the constant voltage/constant current supplier 52 and the overvoltage monitoring unit 54 include circuitry controlled by at least one microprocessor (48, 56) (Fig. 2).

To the extent that Chung-Sik may not specifically disclose wherein the constant voltage/constant current supplier and the overvoltage monitoring unit include circuitry controlled by at least one microprocessor, it would have been obvious over Kaite et al.

In analogous art Kaite et al. discloses constant voltage/constant current supplier (122, 123) and the overvoltage monitoring unit 126 include circuitry controlled by at least one microprocessor 120 (CONTROL CIRCUIT). Kaite et al. discloses that the control circuit 120 may be a microprocessor (col. 7, lines 28-36) (Fig. 2).

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify the constant voltage/constant current supplier disclosed by Chung-Sik by adding microprocessor disclosed by Kaite et al. for controlling the battery charging switching device (Fig. 3).

Claim 36 (New): (Cancelled)

Claim 37 (New): The contact-less charging device according to claim 13,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less chargeable battery according to claim 13 as set forth above.

wherein the constant voltage/constant current supplier has a front end and a rear end, and wherein the constant voltage/constant current supplier receives a DC current from a rectifier at the front end and supplies a charging power at the rear end.

Chung-Sik discloses wherein the constant voltage/constant current supplier 52 has a front end and a rear end, and wherein the constant voltage/constant current supplier receives a DC current from a rectifier 80 at the front end and supplies a charging power at the rear end to battery 32 (Chung-Sik, English Translation, page 8-4, last paragraph) (Fig. 2).

Additionally, Kaite et al. disclosed constant voltage/constant current supplier 123 has a front end and a rear end, wherein the constant voltage/constant current supplier 123 receives the DC current at the front end from the rectifier 122 and supplies the charging power at the rear end to the battery cell 111 (col. 6, lines 25-36) (Fig. 2).

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify the contact-less charging circuit of Chung-Sik and Matsuki by adding the constant voltage/constant current supplier disclosed by Kaite et al. to supply the charging power in a constant current mode at an initial charging stage and then supply the charging power in a constant voltage mode at a later charging stage for efficient charging of the battery.

Claim 38 (New): The contact-less charging device according to claim 13,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less charging device according to claim 13 as set forth above.

wherein the constant voltage/constant current supplier charges the battery in a constant current mode at an initial charging stage and then charges the battery in a constant voltage mode at a later charging stage.

Chung-Sik discloses constant voltage/constant current supplier 52 supplies the charging power in a constant current mode at an initial charging stage by limiting the current drawn by the battery 32 by a resistor 84 (“the resistor 84 is a current limiter resistor”) (Chung-Sik, English

Translation, page 8-4, last paragraph 2nd last line) connected in series with diode 86 and when the battery begins to get charged the current drawn by the battery reduces (current is no longer constant) and supplies the charging power at a constant voltage until the battery is fully charged. (Fig. 2).

In this case, the rectified voltage IDC is input to a first voltage splitter 89, simultaneously limited to a predetermined level through the resistor 84 and the diode 86, then applied to the battery 32. That is, the battery 32 is charged. In the above case, the resistor 84 is a current limiter resistor, and the diode 86 is a diode for preventing countercurrent when the voltage IDC is lower than a voltage of the battery 32.

terminal (+) of the comparator 96. In this case, the reference voltage V1 is constant and the charge level detection voltage V2

To the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage it would have been obvious over Kaite et al. (US 6,016,046).

In analogous art Kaite et al. discloses constant voltage/constant current supplier (122, 123) supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage (col. 6, lines 61-65) (Fig. 2).

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify the charge control circuit disclosed by Chung-Sik by adding constant voltage/constant current supplier (122, 123) disclosed by Kaite et al. for charging the battery in a in a constant current mode at an initial charging stage for charging the battery and then supplies the charging power in a constant voltage mode at a later charging stage so that the charging current may gradually decrease according to the charging state of battery until the battery is fully charged.

Claim 39 (New): The contact-less charging device according to claim 13,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less charging device according to claim 13 as set forth above.

wherein the constant voltage/constant current supplier charges the battery in a constant voltage mode based on a charging voltage of the battery exceeding a predetermined level.

Chung-Sik discloses constant voltage/constant current supplier 52 charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level 120 (charge voltage normal?) (Fig. 3B).

To the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level, it would have been obvious over Kaite et al.

In analogous art Kaite et al. discloses constant voltage/constant current supplier (122, 123) charges the battery cell (batteries 111) (Fig. 2) in a constant voltage mode based on a charging voltage measured by the VOLTAGE MEASURING SECTION 126 of the battery cell 111 exceeding a predetermined level ("battery voltage or current are outside the specified range") (col. 6, line 64 to col. 7, line 4; col. 7, lines 45-46). Kaite et al. discloses computational circuit 124 stops charging (SWITCHING DEVICE OFF) (Fig. 3) when the rechargeable batteries 111 have reached full charge based on the charging voltage of the battery cell exceeding a predetermined level measured by voltage measuring section 126 (Fig. 2).

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify the constant voltage/constant current supplier disclosed by Chung-Sik by adding computational circuit disclosed by Kaite et al to stop charging when the rechargeable

batteries have reached full charge based on the charging voltage of the battery cell exceeding a predetermined level measured by voltage measuring section.

Claim 40 (New, amended): The battery charging set according to claim 21,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses battery charging set according to claim 21 as set forth above.

wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Chung-Sik discloses wherein the constant voltage/constant current supplier 52 includes circuitry controlled by at least one microprocessor (48, 56) (Fig. 2).

To the extent that Chung-Sik may not specifically disclose wherein the constant voltage/constant current supplier and the overvoltage monitoring unit include circuitry controlled by at least one microprocessor, it would have been obvious over Kaite et al.

In analogous art Kaite et al. discloses constant voltage/constant current supplier (122, 123) and the overvoltage monitoring unit 126 include circuitry controlled by at least one microprocessor 120 (CONTROL CIRCUIT). Kaite et al. discloses that the control circuit 120 may be a microprocessor (col. 7, lines 28-36) (Fig. 2).

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify the constant voltage/constant current supplier disclosed by Chung-Sik by adding microprocessor disclosed by Kaite et al. for controlling the battery charging switching device (Fig. 3).

Claim 41 (New, amended): The battery charging set according to claim 21,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses battery charging set according to claim 21 as set forth above.

wherein the overvoltage monitoring unit controls, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing a change of intensity of the magnetic field.

Chung-Sik discloses overvoltage monitoring unit 54 controls, through wireless feedback by (RADIO UNIT 34), the charging of the battery cell 32, by switching on and off transistor 64, inducing the change of intensity of the magnetic field in coil 77 of the induced voltage generating unit 46 to control the voltages at both ends of the constant voltage/constant current supplier 52. (Fig. 2).

Claim 42 (New): The battery charging set according to claim 21,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses battery charging set according to claim 21 as set forth above.

wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Chung-Sik disclosed constant voltage/constant current supplier 52 receives the DC current at the front end from the rectifier 80 and supplies the charging power at the rear end to the battery cell 32 (The other end of the battery 32 is grounded) (Fig. 2).

Additionally, Kaite et al. disclosed constant voltage/constant current supplier 123 has a front end and a rear end, wherein the constant voltage/constant current supplier 123 receives the

DC current at the front end from the rectifier 122 and supplies the charging power at the rear end to the battery cell 111 (col. 6, lines 25-36) (Fig. 2).

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify the contact-less charging circuit of Chung-Sik and Matsuki by adding the constant voltage/constant current supplier disclosed by Kaite et al. to supply the charging power in a constant current mode at an initial charging stage and then supply the charging power in a constant voltage mode at a later charging stage for efficient charging of the battery.

Claim 43 (New): The battery charging set according to claim 21,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses battery charging set according to claim 21, as set forth above.

wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Chung-Sik discloses constant voltage/constant current supplier 52 supplies the charging power in a constant current mode at an initial charging stage by limiting the current drawn by the battery 32 by a resistor 84 ("the resistor 84 is a current limiter resistor") (Chung-Sik, English Translation, page 8-4, last paragraph 2nd last line) connected in series with diode 86 and when the battery begins to get charged the current drawn by the battery reduces (current is no longer constant) and supplies the charging power at a constant voltage until the battery is fully charged. (Fig. 2).

In this case, the rectified voltage IDC is input to a first voltage splitter 89, simultaneously limited to a predetermined level through the resistor 84 and the diode 86, then applied to the battery 32. That is, the battery 32 is charged. In the above case, the resistor 84 is a current limiter resistor, and the diode 86 is a diode for preventing countercurrent when the voltage IDC is lower than a voltage of the battery 32.

terminal (+) of the comparator 96. In this case, the reference voltage V1 is constant and the charge level detection voltage V2

To the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage it would have been obvious over Kaite et al. (US 6,016,046).

In analogous art Kaite et al. discloses constant voltage/constant current supplier (122, 123) supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage (col. 6, lines 61-65) (Fig. 2).

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify the contact-less charging circuit of Chung-Sik and Matsuki by adding the constant voltage/constant current supplier disclosed by Kaite et al. to supply the charging power in a constant current mode at an initial charging stage and then supply the charging power in a constant voltage mode at a later charging stage for efficient charging of the battery.

Claim 44 (New): The battery charging set according to claim 21,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses battery charging set according to claim 21, as set forth above.

wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Chung-Sik discloses constant voltage/constant current supplier 52 charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level 120 (charge voltage normal?) (Fig. 3B).

To the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level, it would have been obvious over Kaite et al.

In analogous art Kaite et al. discloses constant voltage/constant current supplier (122, 123) charges the battery cell (batteries 111) (Fig. 2) in a constant voltage mode based on a charging voltage measured by the VOLTAGE MEASURING SECTION 126 of the battery cell 111 exceeding a predetermined level ("battery voltage or current are outside the specified range") (col. 6, line 64 to col. 7, line 4; col. 7, lines 45-46). Kaite et al. discloses computational circuit 124 stops charging (SWITCHING DEVICE OFF) (Fig. 3) when the rechargeable batteries 111 have reached full charge based on the charging voltage of the battery cell exceeding a predetermined level measured by voltage measuring section 126 (Fig. 2).

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify the constant voltage/constant current supplier disclosed by Chung-Sik by adding computational circuit disclosed by Kaite et al to stop charging when the rechargeable batteries have reached full charge based on the charging voltage of the battery cell exceeding a predetermined level measured by voltage measuring section.

Claim 45 (New): The method of claim 23, further comprising:

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses the method of claim 23, as set forth above.

receiving, by the constant voltage/constant current supplier, the DC current at a front end of the constant voltage/constant current supplier; and

supplying, by the constant voltage/constant current supplier, the DC current at a rear end of the constant voltage/constant current supplier to the battery cell.

Chung-Sik disclosed constant voltage/constant current supplier 52 receives the DC current at the front end from the rectifier 80 and supplies the charging power at the rear end to the battery cell 32 (The other end of the battery 32 is grounded) (Fig. 2).

Additionally, Kaite et al. disclosed constant voltage/constant current supplier 123 has a front end and a rear end, wherein the constant voltage/constant current supplier 123 receives the DC current at the front end from the rectifier 122 and supplies the charging power at the rear end to the battery cell 111 (col. 6, lines 25-36) (Fig. 2).

Claim 46 (New): The method of claim 23, further comprising:

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses the method of claim 23, as set forth above.

supplying, by the constant voltage/constant current supplier, the DC current to the battery cell in a constant current mode during an initial charging stage and then in a constant voltage mode at a later charging stage.

Chung-Sik discloses constant voltage/constant current supplier 52 supplies the charging power in a constant current mode at an initial charging stage by limiting the current drawn by the battery 32 by a resistor 84 ("the resistor 84 is a current limiter resistor") (Chung-Sik, English Translation, page 8-4, last paragraph 2nd last line) connected in series with diode 86 and when the battery begins to get charged the current drawn by the battery reduces (current is no longer

constant) and supplies the charging power at a constant voltage until the battery is fully charged. (Fig. 2).

In this case, the rectified voltage IDC is input to a first voltage splitter 89, simultaneously limited to a predetermined level through the resistor 84 and the diode 86, then applied to the battery 32. That is, the battery 32 is charged. In the above case, the resistor 84 is a current limiter resistor, and the diode 86 is a diode for preventing countercurrent when the voltage IDC is lower than a voltage of the battery 32.

terminal (+) of the comparator 96. In this case, the reference voltage V1 is constant and the charge level detection voltage V2

To the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage it would have been obvious over Kaite et al. (US 6,016,046).

In analogous art Kaite et al. discloses constant voltage/constant current supplier (122, 123) supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage (col. 6, lines 61-65) (Fig. 2).

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify the contact-less charging circuit of Chung-Sik and Matsuki by adding the constant voltage/constant current supplier disclosed by Kaite et al. to supply the charging power in a constant current mode at an initial charging stage and then supply the charging power in a constant voltage mode at a later charging stage for efficient charging of the battery.

Claim 47 (New): The method of claim 23, further comprising:

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses the method of claim 23, as set forth above.

charging, by the constant voltage/constant current supplier, the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Chung-Sik discloses constant voltage/constant current supplier 52 charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level 120 (charge voltage normal?) (Fig. 3B).

To the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level, it would have been obvious over Kaite et al.

In analogous art Kaite et al. discloses constant voltage/constant current supplier (122, 123) charges the battery cell (batteries 111) (Fig. 2) in a constant voltage mode based on a charging voltage measured by the VOLTAGE MEASURING SECTION 126 of the battery cell 111 exceeding a predetermined level ("battery voltage or current are outside the specified range") (col. 6, line 64 to col. 7, line 4; col. 7, lines 45-46). Kaite et al. discloses computational circuit 124 stops charging (SWITCHING DEVICE OFF) (Fig. 3) when the rechargeable batteries 111 have reached full charge based on the charging voltage of the battery cell exceeding a predetermined level measured by voltage measuring section 126 (Fig. 2).

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify the constant voltage/constant current supplier disclosed by Chung-Sik by adding computational circuit disclosed by Kaite et al to stop charging when the rechargeable batteries have reached full charge based on the charging voltage of the battery cell exceeding a predetermined level measured by voltage measuring section.

Claim 48 (New): The method of claim 23, further comprising:

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses the method of claim 23, as set forth above.

controlling, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing a change of intensity of the magnetic field.

Chung-Sik discloses controlling (by microprocessor 48, 56), through wireless feedback by (RADIO UNIT 34), switching on and off transistor 64, inducing the change of intensity of the magnetic field in coil 77 of the induced voltage generating unit 46, to control the voltages at both ends of the constant voltage/constant current supplier 52 for charging battery 32. (Fig. 2).

Claim 49 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

Chung-Sik discloses contact-less charging circuit module electrically connected to a battery cell 32 and used for charging an electric energy to the battery cell 32 in a contact-less method (Fig. 1).

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;

Chung-Sik disclosed high frequency AC current inducing unit 38 (CONTACTLESS CHARGING UNIT) to which a high frequency AC current (10 KHZ) is induced by means of a magnetic field generated from an external contact-less charging device (induced voltage generating unit) (page 8-2, lines 17-18, and page 8-4, lines 47-51).

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

Chung-Sik discloses rectifier 80 for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current (page 8-2, lines 17-19) (Fig. 2).

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode,

Chung-Sik discloses constant voltage/current supplier 52 for receiving DC current (DC voltage IDC) from the rectifier 80 and supplying a charging power to the battery cell 32 in a constant voltage/constant current charge mode (Fig. 2). (See "constant voltage unit", page 8-3, lines 24-27). Chung-Sik further discloses rectifier 80 supplies DC current at a constant voltage IDC. Chung-Sik specifically discloses a constant reference voltage V1 (reference voltage) is obtained by using resistors 88 and 90 for splitting the DC voltage IDC (See "voltage V1 is constant", page 8-5 line 5). Since voltage V1 is constant, therefore the voltage IDC is constant, and the constant voltage/current supplier 52 is receiving a constant DC voltage from rectifier 80 for supplying a charging power to the battery cell in a constant voltage/constant current mode.

Additionally, Chung-Sik discloses constant voltage/constant current supplier 52 supplies the charging power in a constant current mode at an initial charging stage by limiting the current drawn by the battery 32 by a resistor 84 ("the resistor 84 is a current limiter resistor") (Chung-Sik, English Translation, page 8-4, last paragraph 2nd last line) connected in series with diode 86 and when the battery begins to get charged the current drawn by the battery reduces (current

is no longer constant) and supplies the charging power at a constant voltage until the battery is fully charged. (Fig. 2).

In this case, the rectified voltage IDC is input to a first voltage splitter 89, simultaneously limited to a predetermined level through the resistor 84 and the diode 86, then applied to the battery 32. That is, the battery 32 is charged. In the above case, the resistor 84 is a current limiter resistor, and the diode 86 is a diode for preventing countercurrent when the voltage IDC is lower than a voltage of the battery 32.

terminal (+) of the comparator 96. In this case, the reference voltage V1 is constant and the charge level detection voltage V2

To the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode it would have been obvious over Kaite et al.

Kaite et al. specifically disclosed constant voltage constant current supplier 123 for receiving DC current from rectifier 122 and supplying a charging power to the battery cell 111 in a constant voltage/constant current mode (col. 6, lines 41-44) (Fig. 2).

charge. Therefore, the charging control section 123 is provided with a constant current constant voltage circuit to stabilize output from the rectifying circuit 122, and a switching device to stop charging when the rechargeable batteries 111 reach full charge under control of the computation circuit 124. The constant current constant voltage circuit measures charging current and battery voltage to control the output to a constant current and constant voltage. The

At the time the invention was made it would have been obvious to one of ordinary skill in the to modify the constant voltage supplier disclosed by Chung-Sik by adding the constant current constant voltage circuit disclosed by Kaite et al. to stabilize output from the rectifying circuit.

wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage; and

Chung-Sik discloses constant voltage/constant current supplier 52 supplies the charging power in a constant current mode at an initial charging stage by limiting the current drawn by the battery 32 by a resistor 84 ("the resistor 84 is a current limiter resistor") (Chung-Sik, English Translation, page 8-4, last paragraph 2nd last line) connected in series with diode 86 and when the battery begins to get charged the current drawn by the battery reduces (current is no longer constant) and supplies the charging power at a constant voltage until the battery is fully charged. (Fig. 2).

In this case, the rectified voltage IDC is input to a first voltage splitter 89, simultaneously limited to a predetermined level through the resistor 84 and the diode 86, then applied to the battery 32. That is, the battery 32 is charged. In the above case, the resistor 84 is a current limiter resistor, and the diode 86 is a diode for preventing countercurrent when the voltage IDC is lower than a voltage of the battery 32.

terminal (+) of the comparator 96. In this case, the reference voltage V1 is constant and the charge level detection voltage V2

To the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage it would have been obvious over Kaite et al. (US 6,016,046).

In analogous art Kaite et al. discloses constant voltage/constant current supplier (122, 123) supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage for efficient charging of the battery(col. 6, lines 61-65) (Fig. 2).

an overvoltage monitoring unit that includes a wireless transmitting unit, first and second voltage detectors respectively detecting voltages at both ends of the constant voltage/constant current supplier, and

Chung-Sik discloses overvoltage monitoring unit 54 includes a wireless transmitting unit (RADIO UNIT 34), first and second voltage detectors (V1, V2) respectively detecting voltages at both ends of the constant voltage/constant current supplier (84, 86).

a microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication through the wireless transmitting unit so as to induce a change of intensity of the magnetic field,

Chung-Sik discloses a microprocessor 56 (second microcomputer) monitoring the detected voltages (V1, V2) at both ends of the constant voltage/constant current supplier (84, 86) and transmitting 34 (RADIO UNIT) (Fig. 1) a monitoring result to the external contact-less charging device 12 by means of wireless communication through the wireless transmitting unit (RADIO UNIT 34) so as to induce a change of intensity of the magnetic field,

Additionally Kaite et al. discloses constant voltage/constant current supplier (122, 123) and the overvoltage monitoring unit 126 include circuitry controlled by at least one microprocessor 120 (CONTROL CIRCUIT). Kaite et al. discloses that the control circuit 120 may be a microprocessor (col. 7, lines 28-36) (Fig. 2).

wherein the change of intensity of the magnetic field is based on relative positions of the primary coil and the secondary coil.

While Chung-Sik discloses to adjust the power of the high frequency AC current applied to the magnetic field generating unit is based on the voltage of the contact-less chargeable battery, Chung-Sik did not specifically disclose the change of intensity of the magnetic field is based on relative positions of the primary coil and the secondary coil.

Shigefumi Matsuki (JP H0145230 Y2), DATE PUBLISHED 1989-12-27 disclosed wireless battery charging device wherein charging current (power of the high frequency AC current applied to the magnetic field generating unit) can be adjusted based on the distance of output coil 7 of charging equipment 1 and input coil 6 of battery 2' ("storage battery") (Matsuki, Figs. 2-4 and English Translation, "Detailed explanation of the device" "Charging current can be adjusted by [which control a high frequency output or changes the distance of output coil 7 of charging equipment 1', and input coil 6 of storage battery 2']"). Thus Matsuki discloses the change of intensity of the magnetic field generated by primary coil 77 is based on relative positions of the primary coil and the secondary coil (distance between primary and secondary coil).

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify contact-less wireless charging of battery disclosed by Chung-Sik by changing the intensity of the magnetic field generated by primary coil based on relative positions of the contact-less chargeable battery and the external contact-less charging device disclosed by Matsuki for contact-less charging a battery.

Claim 50 (New): The contact-less charging circuit module according to claim 49, wherein a magnetic flux of the magnetic field generated from the external contact-less

charging device is linked to the secondary coil of the high frequency AC current inducing unit.

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less charging circuit module according to claim 49 as set forth above.

Chung-Sik discloses wherein magnetic flux of the magnetic field generated by coil 77 of the induced voltage generating unit 46 (Fig. 2) from the external contact-less charging device 12 (Fig. 1) is linked to the secondary coil 79 of the high frequency AC current inducing unit (induced voltage detecting unit 81) (Fig. 2, page 8-4).

> control signal (SCTL), and the signal is applied to a base of the transistor 64. Thus, when the control signal (SCTL) having a period of about 10 KHZ is output from the output port P1 of the first microcomputer 48, AC power having a period of about 10 KHZ is generated from a collector of the transistor 64. The AC voltage of 10 KHZ generated from the collector of the transistor 64 is applied to the coil 77 wound in the induced voltage generating unit 46 through the alternating current line (AVL). When current of an AC voltage that alternates with a period of 10 KHZ flows in the coil 77, an electromagnetic field is generated around the coil 77, and a portion of a magnetic line of force is linked with the coil 79 wound around the core 78 in the induced voltage detecting unit 81.

Claim 51 (New): The contact-less charging circuit module according to claim 49,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less charging circuit module according to claim 49 as set forth above.

wherein the wireless transmitting unit wirelessly propagates the monitoring result through an antenna,

Chung-Sik discloses wireless transmitting unit (RADIO UNIT 34) for wirelessly propagating the monitoring result through an antenna (Fig. 1, and Fig. 2, page 8-5).

> In this case, the data input to the line 49 is input as data that is wirelessly transmitted from the portable device 18 when the battery 32 is completely charged. If analysis of input data in operation 110 indicates the portable device is abnormal (i.e. charge is incomplete), the first microcomputer 48 jumps to the aforementioned step 106 to continuously generate a charge voltage, and when the portable device is normal, the first microcomputer 48 jumps to operation 112 to stop charging.
>
> When a charge level of the battery 32 is increased through the aforementioned operation, the charge level detection voltage V2 of a second voltage splitter 93 increases, and when the detection voltage V2 becomes higher than the reference voltage V1, the output VDL of the comparator 96 is transitioned to logic "high" from logic "low" and is input to the second microcomputer 56.

wherein the overvoltage monitoring unit includes a voltage comparator comparing first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and wherein the microprocessor outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Chung-Sik discloses overvoltage monitoring unit includes voltage comparator 96 for comparing first and second voltages (V1, V2) detected by the first and second voltage detectors (V1, V2) and outputs a voltage comparison result (charge state VDL). Chung-Sik further disclosed microprocessor 56 for outputting a monitoring result according to the voltage comparison result to the wireless transmitting unit (Fig. 2, page 8-4, 8-5).

> Here, in the aforementioned operation 120 of FIG. 3B, the second microcomputer 56 that scans the output VDL of the comparator 96 and searches for whether or not the charge voltage is normal determines that the charge voltage of the battery 32 is normal. That is, a voltage of the battery 32 is determined to be completely charged to a set voltage level, and a charge completion alarm signal is output through line 37 in operation 122. The charge completion alarm signal through line 37 is transmitted to the base unit 12 through the audio and logic unit 36 and the radio unit 34, and the radio unit 25 and the audio and logic unit 24 of the base unit 12 receive and demodulate the signal and input the signal to the first microcomputer 48 through the line 49. The first microcomputer 48 that receives a data signal through the line 49 determines that the charge completion signal is received from the portable device 18 in the aforementioned operation 110 of FIG. 3A (the portable device is normal), and performs operation 112.

Claim 52 (New): The contact-less charging circuit module according to claim 51,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less charging circuit module according to claim 51 as set forth above.

wherein the magnetic field generated by the contact-less charging device is generated intermittently,

Chung-Sik discloses magnetic field generated by the contact-less charging device is generated intermittently (switches on/off transistor 70) (Fig. 2, page 8-4).

wherein the overvoltage monitoring unit further includes a charging pause detecting unit receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, and

Chung-Sik also discloses contactless charge system for detecting a voltage of a rechargeable battery 32 including charging pause detection unit comprising microprocessor 56 that receives clock and power information 104 (Fig. 1)(page 8-4, lines 32-39) to control the charge between the charger 12 and the portable device 18 (page 8-2, lines 8-9) (Fig. 1).

Chung-Sik discloses overvoltage monitoring unit 38 (included in CONTACTLESS CHARGING UNIT) receiving the high frequency AC current output from the high frequency AC current inducing unit 28 (POWER TRANSMITTER) (Fig. 1). Chung-Sik discloses a control signal (SCTL) output from the output port Pl of FIRST MICRO COMPUTER 48 is applied to a base of the transistor 70 through a resistor 72 and switches "on/off' the transistor 70 around ten thousand times per second. In this case, a potential of a collector terminal of the transistor 70 is switched between "low" and "high" depending on a period of the control signal (SCTL) and the signal is applied to a base of the transistor 64." (Chung-Sik, page 8-4, Fig. 2).

Regarding detecting a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, Chung-Sik discloses that the charging of battery continues until the detection voltage V2 becomes higher than V1 and the output signal VDL of comparator 96 is transitioned to logic “high” from logic “low” and is input to second microcomputer 56 to produce charging completion alarm (Fig. 2, page 8-5, lines 31-43). The transition to logic “high” from logic “low” is considered a time point when the

induction of high frequency AC current ends, and then outputting the end time point (charge completion) to the microprocessor 56. The microcomputer 56 is broadly considered the same as charging pause detecting unit that produces charging completion alarm when the voltage of battery is determined to be normal and completely charged.

Additionally, Chung-Sik specifically disclosed a "time point" when the charge operation may be automatically stopped by communication between contact less charging unit 38 and power transmitter 28 (Chung-Sik, English Translation, page 8-5, lines 44-46 and Fig. 1).

Thus, in the present invention according to the above embodiments, a battery begins to be charged from a time point when the portable device 18 operated at an operating voltage of the battery is installed on the base unit 12, and the charge operation may be automatically stopped either by communication between devices or overheating of the devices.

To the extent that Chung-Sik may not specifically disclose a charging pause detecting unit it would have been obvious to modify the overvoltage monitoring unit disclosed by Chung-Sik by adding a charging pause detecting unit because Chung-Sik specifically disclosed battery begins to be charged from a "time point" and the charge operation may be automatically stopped by communication between devices.

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Chung-Sik discloses wherein the monitoring result (VDL) output to second microprocessor 56 is transmitted to the external contact-less charging device by means of

wireless communication by an antenna connected to radio unit 34. (Fig. 2, page 8-5).

> Here, in the aforementioned operation 120 of FIG. 3B, the second microcomputer 56 that scans the output VDL of the comparator 96 and searches for whether or not the charge voltage is normal determines that the charge voltage of the battery 32 is normal. That is, a voltage of the battery 32 is determined to be completely charged to a set voltage level, and a charge completion alarm signal is output through line 37 in operation 122. The charge completion alarm signal through line 37 is transmitted to the base unit 12 through the audio and logic unit 36 and the radio unit 34, and the radio unit 25 and the audio and logic unit 24 of the base unit 12 receive and demodulate the signal and input the signal to the first microcomputer 48 through the line 49. The first microcomputer 48 that receives a data signal through the line 49 determines that the charge completion signal is received from the portable device 18 in the aforementioned operation 110 of FIG. 3A (the portable device is normal), and performs operation 112.

To the extent that Chung-Sik may not specifically disclose monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input, it would have been obvious for charging of the battery when voltage of the battery is determined to be less than normal (Fig. 2).

At the time the invention was made it would have been obvious for the charging power adjusting unit disclosed by Chung-Sik to transmit a monitoring result to the charging device by means of wireless communication while a high frequency AC current is not induced in the secondary coil for starting charging of the battery when voltage of the battery is determined to be less than normal.

Claim 53 (New): The contact-less charging circuit module according to claim 49,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less charging circuit module according to claim 49 as set forth above.

wherein the monitoring result is a charging power adjustment request signal.

Chung-Sik discloses outputting a charge state signal (VDL) which is input to second microcomputer 56 for controlling the portable device 18 (battery) (Fig. 2, page 8-3). Chung-Sik

discloses battery voltage detector circuit 54 that includes first and second voltage splitters 89 and 93 for comparing a voltage V1 of an input terminal of the charging unit 52 with a voltage V2 of an output terminal and clocking the result, and a comparator 96 for comparing outputs of the first and second voltage splitters 89 and 93 (V1, V2) and outputting a charge state signal (VDL) to second microcomputer 56 based on the difference of voltage (V1-V2) at both ends of the constant voltage/constant current supplier. The second microcomputer 56 searches for whether or not a charge voltage of the battery 32 is normal in an operation (120 of FIG. 3B) based on the result of the difference of voltage (V1-V2). Additionally, Chung-Sik discloses outputting code (NO) indicating (overvoltage state) if charge voltage is not normal (see (120 of FIG. 3B) (Fig. 2, page 8-4, lines 40-42).

Claim 54 (New): The contact-less charging circuit module according to claim 49,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less charging circuit module according to claim 49 as set forth above.

wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Chung-Sik discloses wherein the monitoring result is a difference of voltages (V1-V2) at front and rear ends of the constant voltage/constant current supplier (84, 86) (Fig. 2). Additionally, Chung-Sik discloses outputting code (NO) indicating (overvoltage state) and transmit alarm to base unit (step 122) (Fig. 3B) if charge voltage is not normal (see step 120 of FIG. 3B, page 8-4, lines 40-42).

Claim 56 (New): The contact-less charging circuit module according to claim 55,

Chung-Sik alone or Chung-Sik and Kaite discloses contact-less charging circuit module according to claim 55 as set forth above.

wherein at least one of the first charging power adjustment request signal and the second charging power adjustment request signal is based on relative positions of the primary coil and the secondary coil.

While Chung-Sik discloses to adjust the power of the high frequency AC current applied to the magnetic field generating unit is based on the voltage of the contact-less chargeable battery, Chung-Sik did not specifically disclose the change of intensity of the magnetic field is based on relative positions of the primary coil and the secondary coil.

Shigefumi Matsuki (JP H0145230 Y2), DATE PUBLISHED 1989-12-27 disclosed wireless battery charging device wherein charging current (power of the high frequency AC current applied to the magnetic field generating unit) can be adjusted based on the distance of output coil 7 of charging equipment 1 and input coil 6 of battery 2' ("storage battery") (Matsuki, Figs. 2-4 and English Translation, "Detailed explanation of the device" "Charging current can be adjusted by [which control a high frequency output or changes the distance of output coil 7 of charging equipment 1', and input coil 6 of storage battery 2']"). Thus Matsuki discloses the change of intensity of the magnetic field generated by primary coil 77 is based on relative positions of the primary coil and the secondary coil (distance between primary and secondary coil).

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify contact-less wireless charging of battery disclosed by Chung-Sik by changing the intensity of the magnetic field generated by primary coil based on relative positions of the contact-less chargeable battery and the external contact-less charging device disclosed by Matsuki for contact-less charging a battery.

Claim 61 (New): The contact-less charging circuit module according to claim 60,

Chung-Sik alone or Chung-Sik and Kaite discloses contact-less charging circuit module according to claim 60 as set forth above.

wherein at least one of the first charging power adjustment request signal and the second charging power adjustment request signal is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Chung-Sik disclosed transmitting a charging power adjustment signal when the battery voltage is less than a predetermined level.

Chung-Sik did not disclose charging power adjustment request signal is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Shigefumi Matsuki (JP H0145230 Y2), DATE PUBLISHED 1989-12-27 disclosed wireless battery charging wherein charging current can be adjusted based on the distance of output coil 7 of charging equipment 1 and input coil 6 of battery 2'(Figs. 2-4).

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify contact-less wireless charging of battery disclosed by Chung-Sik by adding charging power adjustment request signal based on relative positions of the contact-less charging circuit module and the external contact-less charging device disclosed by Matsuki for charging a battery.

Claim 65 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

Chung-Sik discloses contact-less charging circuit module electrically connected to a battery cell 32 and used for charging an electric energy to the battery cell 32 in a contact-less method (page 8-2, lines 6-7) (Fig. 1).

The present invention relates to a charge system of a radio-telephone. More specifically, the present invention relates to a contactless charge system of a radio-telephone for charging a battery in a portable device without contact between a charger of a radio-telephone and a voltage terminal of the portable device.

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

Chung-Sik disclosed high frequency AC current inducing unit 38 (CONTACTLESS CHARGING UNIT) to which a high frequency AC current (10 KHZ) is induced by means of a magnetic field generated from an external contact-less charging device (induced voltage generating unit) (page 8-2, lines 17-18, and page 8-4, lines 47-51).

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

Chung-Sik discloses rectifier 80 for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current (page 8-2, lines 17-19) (Fig. 2).

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

Chung-Sik discloses constant voltage/current supplier for receiving DC current from the rectifier 80 and supplying a charging power to the battery cell 32 in a constant voltage/constant current charge mode (Fig. 2). (See "constant voltage unit", page 8-3, lines 24-27). Chung-Sik further discloses rectifier 80 supplies DC current at a constant voltage V1 (reference voltage) (See "voltage V1 is constant", page 8-5 line 5). Since voltage V1 is constant it is supplying a charging power to the battery cell in a constant voltage/constant current mode.

Chung-Sik further discloses constant voltage/constant current supplier 52 supplies the charging power in a constant current mode at an initial charging stage by limiting the current drawn by the battery 32 by a resistor 84 ("the resistor 84 is a current limiter resistor") (Chung-Sik, English Translation, page 8-4, last paragraph 2nd last line) connected in series with diode 86 and when the battery begins to get charged the current drawn by the battery reduces (current is no longer constant) and supplies the charging power at a constant voltage until the battery is fully charged. (Fig. 2).

In this case, the rectified voltage IDC is input to a first voltage splitter 89, simultaneously limited to a predetermined level through the resistor 84 and the diode 86, then applied to the battery 32. That is, the battery 32 is charged. In the above case, the resistor 84 is a current limiter resistor, and the diode 86 is a diode for preventing countercurrent when the voltage IDC is lower than a voltage of the battery 32.

terminal (+) of the comparator 96. In this case, the reference voltage V1 is constant and the charge level detection voltage V2

To the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode it would have been obvious over Kaite et al.

Kaite et al. specifically disclosed constant voltage constant current supplier 123 for receiving DC current from rectifier 122 and supplying a charging power to the battery cell 111 in a constant voltage/constant current mode (col. 6, lines 41-44) (Fig. 2).

charge. Therefore, the charging control section **123** is provided with a constant current constant voltage circuit to stabilize output from the rectifying circuit **122**, and a switching device to stop charging when the rechargeable batteries **111** reach full charge under control of the computation circuit **124**. The constant current constant voltage circuit measures charging current and battery voltage to control the output to a constant current and constant voltage. The

At the time the invention was made it would have been obvious to one of ordinary skill in the to modify the constant voltage supplier disclosed by Chung-Sik by adding the constant current constant voltage circuit disclosed by Kaite et al. to stabilize output from the rectifying circuit.

an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting

unit transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

Chung-Sik also discloses contact-less charging circuit module detecting a voltage of a rechargeable battery 32 to control the charge between the charger 12 and the portable device 18 (page 8-2, lines 8-9) (Fig. 1) and specifically disclosed an over voltage monitoring unit 54 for monitoring voltages (V1, V2) at both ends of the constant voltage/current supplier 52 and microprocessor 56 scans the output VDL of the comparator 96 and searches for whether or not the charge voltage of battery 32 is normal. Microprocessor 56 transmits a monitoring result to the external contactless charging device 12 by means of wireless communication (RADIO UNIT 34) through line 37 so as to induce a change of intensity of the magnetic field of the induced voltage generating unit 46 (Fig. 1, 2) (page 8-2, lines 31-34, 40-55; page 8-3, lines 36-40; page 8-5, lines 35-43) (Fig. 2).

wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

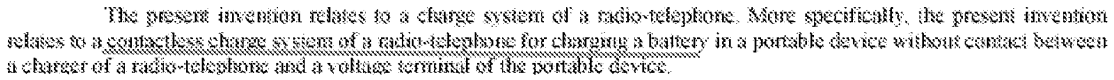
While Chung-Sik discloses to induce the change of intensity of the magnetic field based on battery voltage monitoring it did not specifically disclose to induce the change of intensity of the magnetic field based on relative positions of the contact-less chargeable battery and the external contact-less charging device.

Shigefumi Matsuki (JP H0145230 Y2), DATE PUBLISHED 1989-12-27 disclosed wireless battery charging wherein charging current can be adjusted based on the distance of output coil 7 of charging equipment 1 and input coil 6 of battery 2'(Figs. 2-4).

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify contact-less wireless charging of battery disclosed by Chung-Sik by adding wireless feedback control signal to induce the change of intensity of the magnetic field based on relative positions of the contact-less chargeable battery and the external contact-less charging device disclosed by Matsuki for charging a battery.

Claim 66 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

Chung-Sik discloses contact-less charging circuit module electrically connected to a battery cell 32 of portable device 18 and used for receiving a charging power from an external contact-less charging device (charger) and charging an electric energy to the battery cell 32 in a contact-less method (Fig. 1, page 8-1).


The present invention relates to a charge system of a radio-telephone. More specifically, the present invention relates to a contactless charge system of a radio-telephone for charging a battery in a portable device without contact between a charger of a radio-telephone and a voltage terminal of the portable device.

a high frequency AC current inducing unit including a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil in an external contact-less charging device;

Chung-Sik disclosed high frequency AC current inducing unit 38 (CONTACTLESS CHARGING UNIT) to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil 77 (Fig. 2) in an external contact-less charging device 12 (Fig. 1) (page 8-2, lines 17-18).

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

Chung-Sik disclosed rectifier 80 for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current (page 8-2, lines 17-19) (Fig. 2).

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

Chung-Sik discloses constant voltage/current supplier for receiving DC current from the rectifier 80 and supplying a charging power to the battery cell 32 in a constant voltage/constant current charge mode (Fig. 2). (See "constant voltage unit", page 8-3, lines 24-27). Chung-Sik further discloses rectifier 80 supplies DC current at a constant voltage V1 (reference voltage) (See "voltage V1 is constant", page 8-5 line 5). Since voltage V1 is constant it is supplying a charging power to the battery cell in a constant voltage/constant current mode.

Additionally, Chung-Sik discloses constant voltage/constant current supplier 52 supplies the charging power in a constant current mode at an initial charging stage by limiting the current drawn by the battery 32 by a resistor 84 ("the resistor 84 is a current limiter resistor") (Chung-Sik, English Translation, page 8-4, last paragraph 2nd last line) connected in series with diode 86 and when the battery begins to get charged the current drawn by the battery reduces (current is no longer constant) and supplies the charging power at a constant voltage until the battery is fully charged. (Fig. 2).

In this case, the rectified voltage IDC is input to a first voltage splitter 89, simultaneously limited to a predetermined level through the resistor 84 and the diode 86, then applied to the battery 32. That is, the battery 32 is charged. In the above case, the resistor 84 is a current limiter resistor, and the diode 86 is a diode for preventing countercurrent when the voltage IDC is lower than a voltage of the battery 32.

terminal (+) of the comparator 96. In this case, the reference voltage V1 is constant and the charge level detection voltage V2

To the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode it would have been obvious over Kaite et al.

Kaite et al. specifically disclosed constant voltage constant current supplier 123 for receiving DC current from rectifier 122 and supplying a charging power to the battery cell 111 in a constant voltage/constant current mode (col. 6, lines 41-44) (Fig. 2).

charge. Therefore, the charging control section 123 is provided with a constant current constant voltage circuit to stabilize output from the rectifying circuit 122, and a switching device to stop charging when the rechargeable batteries 111 reach full charge under control of the computation circuit 124. The constant current constant voltage circuit measures charging current and battery voltage to control the output to a constant current and constant voltage. The

At the time the invention was made it would have been obvious to one of ordinary skill in the to modify the constant voltage supplier disclosed by Chung-Sik by adding the constant current constant voltage circuit disclosed by Kaite et al. to stabilize output from the rectifying circuit.

an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting

unit transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

Chung-Sik also discloses contactless charge system for detecting a voltage of a rechargeable battery 32 including charge pause detection unit comprising microprocessor 56 that receives clock and power information 104 (Fig. 1)(page 8-4, lines 32-39) to control the charge between the charger 12 and the portable device 18 (page 8-2, lines 8-9) (Fig. 1) and specifically disclosed over voltage monitoring unit 54 and microprocessor 56 for monitoring voltages (V1, V2) at both ends of the constant voltage/current supplier 52 and microprocessor 56 scans the output VDL of the comparator 96 and searches for whether or not the charge voltage of battery 32 is normal. Microprocessor 56 transmits a monitoring result to the external contactless charging device 12 by means of wireless communication (RADIO UNIT 34) through line 37 so as to induce a change of intensity of the magnetic field of the induced voltage generating unit 46 (Fig. 1, 2) (page 8-2, lines 31-34, 40-55; page 8-3, lines 36-40; page 8-5, lines 35-43) (Fig. 2).

wherein the secondary coil is movable relative to the primary coil during the charging of the battery cell by the contact-less charging circuit module.

Chung-Sik did not specifically disclose wherein the secondary coil 79 (Fig. 2) is movable relative to the primary coil 77 (Fig. 2) during the charging of the battery cell 32 by the contact-less charging circuit module 12 (Fig. 1).

Shigefumi Matsuki (JP H0145230 Y2), DATE PUBLISHED 1989-12-27 disclosed wireless battery charging wherein charging current can be adjusted based on the distance of output coil 7 of charging equipment 1 and input coil 6 of battery 2'(Figs. 2-4). Since Matsuki

discloses adjusting the charging current based on the distance between output and input coil means that the secondary coil is movable relative to the primary coil.

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify contact-less wireless charging of battery disclosed by Chung-Sik by adding wireless feedback control signal to induce the change of intensity of the magnetic field based on relative positions of the contact-less chargeable battery and the external contact-less charging device (secondary coil is movable relative to the primary coil) disclosed by Matsuki for charging a battery.

Claim 67 (New): The contact-less charging circuit module according to claim 66,

Chung-Sik and Matsuki or Chung-Sik, Kaite and Matsuki discloses contact-less charging circuit module according to claim 66 as set forth above.

wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting the intensity of the magnetic field.

Chung-Sik discloses adjusting battery charging operation according to flowchart (Fig. 3A, 3B). It is obvious that the charge adjustment request signal is sent repeatedly depending upon whether or not the charge voltage of battery 32 is normal (Chung-Sik, English Translation, page, 8-5).

Claim 68 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

Chung-Sik discloses contact-less charging circuit module electrically connected to a battery cell 32 of portable device 18 and used for receiving a charging power from an external contact-less charging device (charger) and charging an electric energy to the battery cell 32 in a contact-less method (Fig. 1, page 8-1).

The present invention relates to a charge system of a radio-telephone. More specifically, the present invention relates to a contactless charge system of a radio-telephone for charging a battery in a portable device without contact between a charger of a radio-telephone and a voltage terminal of the portable device.

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

Chung-Sik disclosed high frequency AC current inducing unit 38 (CONTACTLESS CHARGING UNIT) to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil 77 (Fig. 2) in an external contact-less charging device 12 (Fig. 1) (page 8-2, lines 17-18).

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

Chung-Sik disclosed rectifier 80 for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current (page 8-2, lines 17-19) (Fig. 2).

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

Chung-Sik discloses constant voltage/current supplier for receiving DC current from the rectifier 80 and supplying a charging power to the battery cell 32 in a constant voltage/constant current charge mode (Fig. 2). (See "constant voltage unit", page 8-3, lines 24-27). Chung-Sik further discloses rectifier 80 supplies DC current at a constant voltage V1 (reference voltage) (See "voltage V1 is constant", page 8-5 line 5). Since voltage V1 is constant it is supplying a charging power to the battery cell in a constant voltage/constant current mode.

Additionally, Chung-Sik discloses constant voltage/constant current supplier 52 supplies the charging power in a constant current mode at an initial charging stage by limiting the current drawn by the battery 32 by a resistor 84 ("the resistor 84 is a current limiter resistor") (Chung-Sik, English Translation, page 8-4, last paragraph 2nd last line) connected in series with diode 86 and when the battery begins to get charged the current drawn by the battery reduces (current is no longer constant) and supplies the charging power at a constant voltage until the battery is fully charged. (Fig. 2).

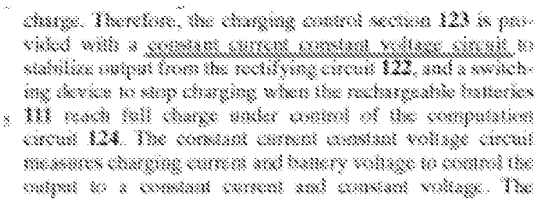
In this case, the rectified voltage IDC is input to a first voltage splitter 89, simultaneously limited to a predetermined level through the resistor 84 and the diode 86, then applied to the battery 32. That is, the battery 32 is charged. In the above case, the resistor 84 is a current limiter resistor, and the diode 86 is a diode for preventing countercurrent when the voltage IDC is lower than a voltage of the battery 32.

terminal (+) of the comparator 96. In this case, the reference voltage V1 is constant and the charge level detection voltage V2

To the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power

to the battery cell in a constant voltage/constant current mode it would have been obvious over Kaite et al.

Kaite et al. specifically disclosed constant voltage constant current supplier 123 for receiving DC current from rectifier 122 and supplying a charging power to the battery cell 111 in a constant voltage/constant current mode (col. 6, lines 41-44) (Fig. 2).


charge. Therefore, the charging control section 123 is provided with a constant current constant voltage circuit to stabilize output from the rectifying circuit 122, and a switching device to stop charging when the rechargeable batteries 111 reach full charge under control of the computation circuit 124. The constant current constant voltage circuit measures charging current and battery voltage to control the output to a constant current and constant voltage. The

At the time the invention was made it would have been obvious to one of ordinary skill in the to modify the constant voltage supplier disclosed by Chung-Sik by adding the constant current constant voltage circuit disclosed by Kaite et al. to stabilize output from the rectifying circuit.

an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting unit transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

Chung-Sik also discloses contactless charge system for detecting a voltage of a rechargeable battery 32 including charge pause detection unit comprising microprocessor 56 that receives clock and power information 104 (Fig. 1)(page 8-4, lines 32-39) to control the charge between the charger 12 and the portable device 18 (page 8-2, lines 8-9) (Fig. 1) and specifically disclosed over voltage monitoring unit 54 and microprocessor 56 for monitoring voltages (V1,

V2) at both ends of the constant voltage/current supplier 52 and microprocessor 56 scans the output VDL of the comparator 96 and searches for whether or not the charge voltage of battery 32 is normal. Microprocessor 56 transmits a monitoring result to the external contactless charging device 12 by means of wireless communication (RADIO UNIT 34) through line 37 so as to induce a change of intensity of the magnetic field of the induced voltage generating unit 46 (Fig. 1, 2) (page 8-2, lines 31-34, 40-55; page 8-3, lines 36-40; page 8-5, lines 35-43) (Fig. 2).

wherein the contact-less charging circuit module is movable relative to the external contact-less charging device during the charging of the battery cell by the contact-less charging circuit module.

While Chung-Sik discloses the contact-less charging circuit module 38 (part of portable device 18) is movable relative to the external contact-less charging device 12 (base unit) (Fig. 1), Chung-Sik requires contact-less charging circuit module 38 (part of portable device 18) to be installed on the base unit 12 (external contact-less charging device) for contact-less charging of battery 32 (Fig. 1). Thus, Chung-Sik fails to disclose contact-less charging circuit module is movable relative to the external contact-less charging device during the charging of the battery cell by the contact-less charging circuit module.

Inventor Shigefumi Matsuki (JP H0145230 Y2), DATE PUBLISHED 1989-12-27 disclosed wireless battery charging wherein charging current can be adjusted based on the distance of output coil 7 of charging equipment 1 (external contact-less charging device) and input coil 6 of battery 2' (contact-less charging circuit module) (Figs. 2-4). Since Matsuki discloses adjusting the charging current based on the distance between output and input coil means that the secondary coil is movable relative to the primary coil.

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify contact-less wireless charging of battery disclosed by Chung-Sik by adding wireless feedback control signal to induce the change of intensity of the magnetic field based on relative positions of the contact-less chargeable battery and the external contact-less charging device (secondary coil is movable relative to the primary coil) disclosed by Matsuki for charging a battery.

Claim 73 (New): The contact-less charging circuit module according to claim 69,

Chung-Sik and Matsuki or discloses contact-less charging circuit module according to claim 69 as set forth above.

wherein the charging power adjustment request signal is based on relative positions of the contactless charging circuit module and the external contact-less charging device.

While Chung-Sik discloses charging power adjustment request signal (communication between devices) to induce the change of intensity of the magnetic field based on battery voltage (Fig. 3B), Chung-Sik did not specifically disclose charging power adjustment request signal is based on relative positions of the contactless charging circuit module and the external contact-less charging device.

Shigefumi Matsuki (JP H0145230 Y2), DATE PUBLISHED 1989-12-27 disclosed wireless battery charging wherein charging current can be adjusted based on the distance of output coil 7 of charging equipment 1 and input coil 6 of battery 2' (Figs. 2-4).

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify contact-less wireless charging of battery disclosed by Chung-Sik by adding charging power adjustment request signal based on relative positions of the contactless charging circuit module and the external contact-less charging device disclosed by Matsuki for charging a battery.

Claim 74 (New): A contact-less charging device for transmitting a charging power by means of electromagnetic induction phenomenon to a contact-less chargeable battery that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode and wirelessly transmits a monitoring result for voltages at both ends of the constant voltage/constant current supplier, the contact-less charging device comprising:

Chung-Sik discloses contact-less charging device for transmitting a charging power by means of electromagnetic induction phenomenon to a contact-less chargeable battery 32 that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode (page 8-2, lines 6-7) (Fig. 1).

> The present invention relates to a charge system of a radio-telephone. More specifically, the present invention relates to a contactless charge system of a radio-telephone for charging a battery in a portable device without contact between a charger of a radio-telephone and a voltage terminal of the portable device.

Chung-Sik discloses constant voltage/current supplier 42 for receiving DC current from the rectifier 80 and supplying a charging power to the battery cell 32 in a constant voltage/constant current charge mode (Fig. 2). (See “constant voltage unit”, page 8-3, lines 24-27). Chung-Sik further discloses rectifier 80 supplies DC current at a constant voltage V1 (reference voltage). (See “voltage V1 is constant”, page 8-5 line 5).

Chung-Sik discloses wirelessly transmitting a monitoring result for voltages at both ends of the constant voltage/constant current supplier (Chung-Sik, English Translation, pages 8-5, Fig. 2).

Here, in the aforementioned operation 120 of FIG. 3B, the second microcomputer 56 that scans the output VDL of the comparator 96 and searches for whether or not the charge voltage is normal determines that the charge voltage of the battery 32 is normal. That is, a voltage of the battery 32 is determined to be completely charged to a set voltage level, and a charge completion alarm signal is output through line 37 in operation 122. The charge completion alarm signal through line 37 is transmitted to the base unit 12 through the audio and logic unit 36 and the radio unit 34, and the radio unit 25 and the audio and logic unit 24 of the base unit 12 receive and demodulate the signal and input the signal to the first microcomputer 48 through the line 49. The first microcomputer 48 that receives a data signal through the line 49 determines that the charge completion signal is received from the portable device 18 in the aforementioned operation 110 of FIG. 3A (the portable device is normal), and performs operation 112.

a magnetic field generating unit for receiving an AC current and forming a magnetic field in an outer space;

Chung-Sik discloses magnetic field generating unit 46 (induced voltage generating unit) for receiving an AC current and forming a magnetic field in an outer space (space around coil 77). (Chung-Sik, English Translation, page 8-4 lines 47-51; and Fig. 2).

10 KHZ is generated from a collector of the transistor 64. The AC voltage of 10 KHZ generated from the collector of the transistor 64 is applied to the coil 77 wound in the induced voltage generating unit 46 through the alternating current line (AVL). When current of an AC voltage that alternates with a period of 10 KHZ flows in the coil 77, an electromagnetic field is generated around the coil 77, and a portion of a magnetic line of force is linked with the coil 79 wound around the core 78 in the induced voltage detecting unit 81.

a high frequency power driving unit for applying a high frequency AC current to the magnetic field generating unit; and

Chung-Sik discloses a high frequency power driving unit (transistor 64) for applying a high frequency AC current to the magnetic field generating unit 46 (Fig. 2, page 8-4).

control signal (SCTL), and the signal is applied to a base of the transistor 64. Thus, when the control signal (SCTL) having a period of about 10 KHZ is output from the output port P1 of the first microcomputer 48, AC power having a period of about 10 KHZ is generated from a collector of the transistor 64. The AC voltage of 10 KHZ generated from the collector of the transistor 64 is applied to the coil 77 wound in the induced voltage generating unit 46 through the alternating current line (AVL). When current of an AC voltage that alternates with a period of 10 KHZ flows in the coil 77, an electromagnetic field is generated around the coil 77, and a portion of a magnetic line of force is linked with the coil 79 wound around the core 78 in the induced voltage detecting unit 81.

a charging power adjusting unit that includes: a wireless receiving unit receiving the monitoring result from the contact-less chargeable battery by means of wireless communication, and a microprocessor controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that the charging power transmitted to the contact-less chargeable battery is adjusted,

Chung-Sik disclosed charging power adjusting unit including first microcomputer 48 receiving the monitoring result from the contact-less chargeable battery 32 by means of wireless communication (RADIO UNIT 26 connected to antenna) and controlling the high frequency power driving unit 44 including transistor 64 to adjust a power of the high frequency AC current applied to the magnetic field generating unit 46 so that the charging power transmitted to the contact-less chargeable battery 32 is adjusted. (Chung-Sik, English Translation, page 8-5 and Figs. 1, 2 & 3A, 3B).

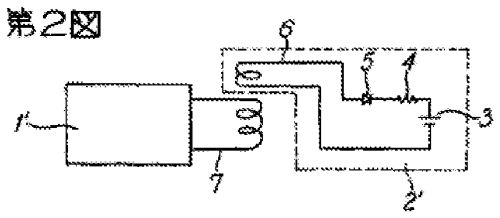
> Here, in the aforementioned operation 120 of FIG. 3B, the second microcomputer 56 that scans the output VDL of the comparator 96 and searches for whether or not the charge voltage is normal determines that the charge voltage of the battery 32 is normal. That is, a voltage of the battery 32 is determined to be completely charged to a set voltage level, and a charge completion alarm signal is output through line 37 in operation 122. The charge completion alarm signal through line 37 is transmitted to the base unit 12 through the audio and logic unit 36 and the radio unit 34, and the radio unit 25 and the audio and logic unit 24 of the base unit 12 receive and demodulate the signal and input the signal to the first microcomputer 48 through the line 49. The first microcomputer 48 that receives a data signal through the line 49 determines that the charge completion signal is received from the portable device 18 in the aforementioned operation 110 of FIG. 3A (the portable device is normal), and performs operation 112.

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

While Chung-Sik discloses adjustment to the power of the high frequency AC current applied to the magnetic field generating unit 46 having coil 77 (Fig. 2) is based on battery

voltage (Fig. 3B), Chung-Sik did not specifically disclose adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery (portable device 18 having chargeable battery 32) and the contact-less charging device (charger, base unit 12).

Shigefumi Matsuki (JP H0145230 Y2), DATE PUBLISHED 1989-12-27 disclosed wireless battery charging wherein charging current can be adjusted based on the distance of output coil 7 of charging equipment 1 (contact-less charging device) and input coil 6 of battery 2' (contact-less chargeable battery) (Figs. 2-4) (Example .Fig. 2 is reproduced below).



Matsuki. Fig. 2.

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify contact-less wireless charging of battery disclosed by Chung-Sik by adding adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device disclosed by Matsuki for charging a battery.

Claim 75 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

Chung-Sik discloses contact-less charging circuit module electrically connected to a battery cell 32 and used for charging an electric energy to the battery cell 32 in a contact-less method (Fig. 1, page 8-1).

The present invention relates to a charge system of a radio-telephone. More specifically, the present invention relates to a contactless charge system of a radio-telephone for charging a battery in a portable device without contact between a charger of a radio-telephone and a voltage terminal of the portable device.

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

Chung-Sik disclosed high frequency AC current inducing unit 38 (CONTACTLESS CHARGING UNIT) to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device (induced voltage generating unit) (page 8-2, lines 17-18).

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

Chung-Sik discloses rectifier 80 for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current (page 8-2, lines 17-19).(Fig. 2).

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

Chung-Sik discloses constant voltage/current supplier 42 for receiving DC current from the rectifier 80 and supplying a charging power to the battery cell 32 in a constant voltage/constant current charge mode (Fig. 2). (See "constant voltage unit", page 8-3, lines 28-33). Chung-Sik further discloses rectifier 80 supplies DC current at a constant voltage V1 (reference voltage). (See "voltage V1 is constant", page 8-5 line 5).

terminal (+) of the comparator 96. In this case, the reference voltage V1 is constant and the charge level detection voltage V2 varies depending on a charge voltage level of the battery 32. Thus, when the first microcomputer 48 outputs the control signal

Additionally, Chung-Sik discloses constant voltage/constant current supplier 52 supplies the charging power in a constant current mode at an initial charging stage by limiting the current drawn by the battery 32 by a resistor 84 ("the resistor 84 is a current limiter resistor") (Chung-Sik, English Translation, page 8-4, last paragraph 2nd last line) connected in series with diode 86 and when the battery begins to get charged the current drawn by the battery reduces (current is no longer constant) and supplies the charging power at a constant voltage until the battery is fully charged. (Fig. 2).

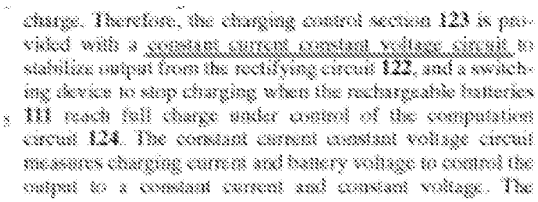
In this case, the rectified voltage IDC is input to a first voltage splitter 89, simultaneously limited to a predetermined level through the resistor 84 and the diode 86, then applied to the battery 32. That is, the battery 32 is charged. In the above case, the resistor 84 is a current limiter resistor, and the diode 86 is a diode for preventing countercurrent when the voltage IDC is lower than a voltage of the battery 32.

terminal (+) of the comparator 96. In this case, the reference voltage V1 is constant and the charge level detection voltage V2

To the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power

to the battery cell in a constant voltage/constant current mode it would have been obvious over Kaite et al.

Kaite et al. specifically disclosed constant voltage constant current supplier 123 for receiving DC current from rectifier 122 and supplying a charging power to the battery cell 111 in a constant voltage/constant current mode (col. 6, lines 41-44) (Fig. 2).


charge. Therefore, the charging control section 123 is provided with a constant current constant voltage circuit to stabilize output from the rectifying circuit 122, and a switching device to stop charging when the rechargeable batteries 111 reach full charge under control of the computation circuit 124. The constant current constant voltage circuit measures charging current and battery voltage to control the output to a constant current and constant voltage. The

At the time the invention was made it would have been obvious to one of ordinary skill in the to modify the constant voltage supplier disclosed by Chung-Sik by adding the constant current constant voltage circuit disclosed by Kaite et al. to stabilize output from the rectifying circuit.

an overvoltage monitoring unit that includes a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

Chung-Sik also discloses contactless charge system for detecting a voltage of a rechargeable battery 32 including charge pause detection unit comprising microprocessor 56 that receives clock and power information 104 (Fig. 1)(page 8-4, lines 32-39) to control the charge between the charger 12 and the portable device 18 (page 8-2, lines 8-9) (Fig. 1) and specifically disclosed over voltage monitoring unit 54 and microprocessor 56 for monitoring voltages (V1,

V2) at both ends of the constant voltage/current supplier 52 and microprocessor 56 scans the output VDL of the comparator 96 and searches for whether or not the charge voltage of battery 32 is normal. Microprocessor 56 transmits a monitoring result to the external contactless charging device 12 by means of wireless communication (RADIO UNIT 34) through line 37 so as to induce a change of intensity of the magnetic field of the induced voltage generating unit 46 (Fig. 1, 2) (page 8-2, lines 31-34, 40-55; page 8-3, lines 36-40; page 8-5, lines 35-43) (Fig. 2).

wherein the change of intensity of the magnetic field includes a change of intensity of the magnetic field based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

While Chung-Sik discloses the change of intensity of the magnetic field is based on battery voltage monitoring it did not specifically disclose change of intensity of the magnetic field based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Shigefumi Matsuki (JP H0145230 Y2), DATE PUBLISHED 1989-12-27 disclosed wireless battery charging device wherein charging current can be adjusted based on the distance of output coil 7 of charging equipment 1 and input coil 6 of battery 2' (“storage battery”) (Matsuki, Figs. 2-4 and English Translation: “Detailed explanation of the device” “Charging current can be adjusted by [which control a high frequency output or changes the distance of output coil 7 of charging equipment 1', and input coil 6 of storage battery 2']”).

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify contact-less wireless charging of battery disclosed by Chung-Sik by adding change of intensity of the magnetic field based on relative positions of contact-less charging

circuit module and the external contact-less charging device disclosed by Matsuki for charging a battery.

8.2 Chung-Sik, Matsuki, Cho (cl. 16-18)

Claims 16-18 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Chung-Sik and Matsuki as applied to claim 15 above, and further in view of Cho Gyu Hyeong et al. (KR 100451606 B1) (Hereafter Cho et al).

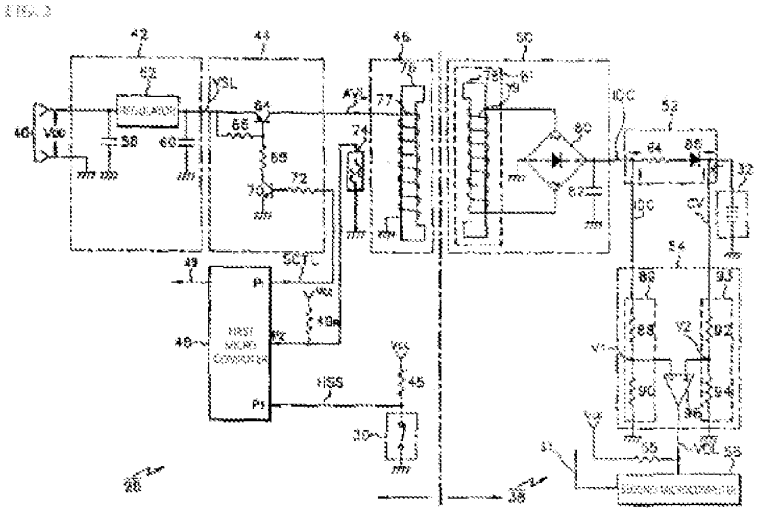
16. The contact-less charging device according to claim 15,

Chung-Sik and Matsuki discloses contact-less charging device according to claim 15 as set forth above.

further comprising a power supply receiving a common AC current, converting the common AC current into a DC current, and then supplying a constant-voltage current to the high frequency power driving unit,

Chung-Sik discloses constant voltage supplier 42 (constant voltage unit) that regulates the voltage input to power line 40 and outputting the voltage as a constant voltage, and then supplying a constant-voltage current to the high frequency power driving unit 44. Specifically, Chung-Sik discloses AC power having a period of about 10 KHZ is generated from a collector of the transistor 64 in the high frequency power driving unit 44. (Fig. 2, page 8-3, lines 24-27, page 8-4, lines 40-51).

control signal (SCTL), and the signal is applied to a base of the transistor 64. Thus, when the control signal (SCTL) having a period of about 10 KHZ is output from the output port P1 of the first microcomputer 48, AC power having a period of about 10 KHZ is generated from a collector of the transistor 64. The AC voltage of 10 KHZ generated from the collector of the transistor 64 is applied to the coil 77 wound in the induced voltage generating unit 46 through the alternating current line (AVL). When current of an AC voltage that alternates with a period of 10 KHZ flows in the coil 77, an electromagnetic field is generated around the coil 77, and a portion of a magnetic line of force is linked with the coil 79 wound around the core 78 in the induced voltage detecting unit 81.



Chung-Sik. Fig. 2

Chung-Sik did not disclose constant voltage supplier for converting a common AC current, converting the common AC current into a DC current, because Chung-Sik receives 12 VDC directly from the power line 40 (Fig. 1, page 8-4, lines 4-5). However, if a DC power supply is not available it would have been obvious to one of ordinary skill in the art to add a rectifier for the conversion of power line AC voltage to DC.

In analogous art Cho et al. (KR 100451606 B1) disclosed AC / DC rectifier 11 receives a low frequency AC input voltage, such as 110V or 220V, and converts it into direct current Vdc (Fig. 1). Cho et al. (KR 100451606 B1) further discloses a constant voltage supplying part (DC/DC converter 12) for receiving the converted DC current Vdc and outputs a constant voltage current (Vdc). (Fig. 2).

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify the contact-less charging device disclosed by Chung-Sik by adding a rectifier for rectifying the AC current received from AC power line to convert the AC current into a DC current disclosed by Cho et a. (KR 100451606 B1) and adding a constant voltage supplying part for receiving the converted DC current disclosed by Cho et a. (KR 100451606 B1) to output a constant voltage current.

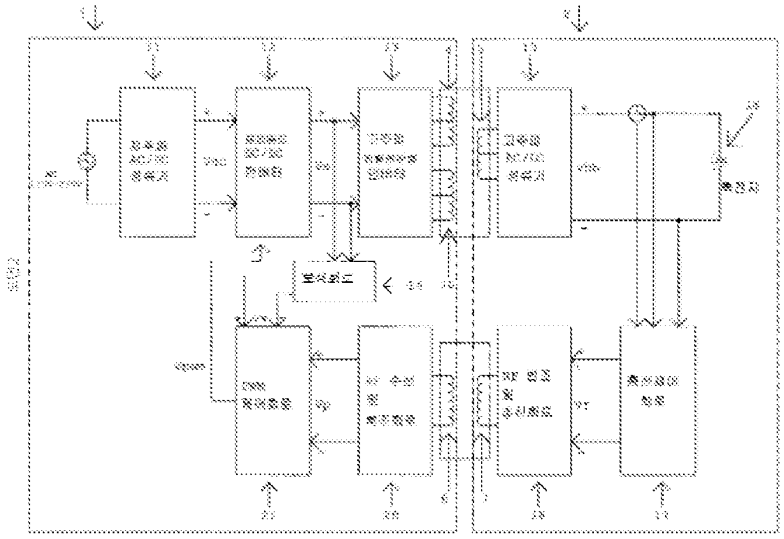


Fig. 2. Cho et al. (KR 100451606 B1)

wherein the high frequency power driving unit includes: a pulse signal generator for receiving a pulse driving signal from the microprocessor and outputting a pulse signal; and

Chung-Sik discloses high frequency power driving unit (voltage switching unit 44) receives driving signal SCTL (control signal) of predetermined period is output from first

microprocessor 48 and applied to voltage switching unit 44 (charge voltage generating unit 28 shown in Fig. 1) comprising transistors 72 and 64 (Fig. 2, page 8-3, lines 28-35. Chung-Sik specifically disclosed the charge voltage generating device includes a charge control pulse generator which generates a pulse sequence with a predetermined period. (Fig. 2, page 8-6, lines 21-24).

a charge voltage generating device including a charge control pulse generator which generates a pulse sequence with a predetermined period in response to input of a charge initiation signal, a voltage switch which converts and outputs a DC voltage at a predetermined level into an AC voltage in response to input of the generated pulse sequence, and a voltage

In an analogous art, Cho et al. disclosed contact-less chargeable battery comprising control circuit (PWM 21) configured to receive a control signal and generate a pulse width modulated signal (Vpwm) to be applied to the DC / DC converter to adjust the DC voltage (Fig. 2, Cho et al. English Translation, page 3, 2nd paragraph).

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify Chung-Sik by adding pulse signal generator for generating a pulse width modulated signal (PWM) disclosed by Cho et al. for adjusting charging power for charging a contact-less chargeable battery.

a power driving part for receiving the pulse signal to rapidly switch the constant-voltage current input from the constant voltage supplier, thereby generating a high frequency AC current in a pulse pattern.

Chung-Sik discloses power driving part (voltage switching unit 44) for receiving the pulse signal (SCTL) from the first microprocessor 48 to rapidly switch the constant-voltage current input from the constant voltage supplier 42, thereby generating a high frequency AC current in a pulse pattern (Fig. 2). Chung-Sik specifically discloses charge control pulse

generator which generates a pulse sequence (pulse pattern) with a predetermined period. (Fig. 2, page 8-6, lines 21-24).

a charge voltage generating device including a charge control pulse generator which generates a pulse sequence with a predetermined period in response to input of a charge initiation signal, a voltage switch which converts and outputs a DC voltage at a predetermined level into an AC voltage in response to input of the generated pulse sequence, and a voltage

Additionally, Cho et al. disclosed power driving part (DC / DC converter 12) for receiving the pulse signal (Vpwm) to rapidly switch the constant-voltage current input from the constant voltage supplier Vdc, thereby generating a high frequency AC current in a pulse pattern input to winding 4 of transformer (Fig. 2).

17. The contact-less charging device according to claim 16,

Chung-Sik, Matsuki and Cho et al. discloses contact-less charging device according to claim 16 as set forth above.

wherein the charging power adjusting unit adjusts the charging power by modulating a width of a pulse current, a frequency of the pulse current, an amplitude of a pulse, or a number of pulses.

Chung-Sik discloses the charging power adjustment unit (first microprocessor 48) receives the monitoring result from the contact-less chargeable battery by means of wireless communication (RADIO UNIT 26 connected to antenna) (Fig. 1). Chung-Sik discloses controlling the high frequency power driving unit (switching unit 44) to adjust a power of the high frequency AC current applied to the magnetic field generating unit by the switching unit 44 switching a power voltage at a predetermined level in response to an input of a control signal SCTL with a predetermined period and converting and outputting an AC voltage. When the

control signal (SCTL) is blocked, both the transistors 64 and 70 with respect to the voltage switching unit 44 are switched "off" to block a voltage of the AC line (AVL). Thus voltage switching unit 44 adjusts the charging power by switching on transistor 64 in response to the control signal SCTL with a predetermined period (Fig. 2, page 8-3, lines 28-33). Chung-Sik further discloses that the charging of battery continues until the detection voltage V2 becomes higher than V1 and the output signal VDL of comparator 96 is transitioned to logic "high" from logic "low" and is input to second microcomputer 56 to produce charging completion alarm (Fig. 2, page 8-5, lines 31-43). Thus Chung-Sik discloses adjusting the charging power by providing a number of pulses until charge completion. Chung-Sik also discloses charge voltage generating device includes a charge control pulse generator which generates a pulse sequence with a predetermined period. (Fig. 2, page 8-6, lines 21-24).

a charge voltage generating device including a charge control pulse generator which generates a pulse sequence with a predetermined period in response to input of a charge initiation signal, a voltage switch which converts and outputs a DC voltage at a predetermined level into an AC voltage in response to input of the generated pulse sequence, and a voltage

To the extent that Chung-Sik may not disclose adjusting unit adjusts the charging power by modulating a width of a pulse current, a frequency of the pulse current, an amplitude of a pulse, or a number of pulses it would have been obvious over Cho et al.

In and analogous art, Cho et al. disclosed control circuit (PWM 21) configured to receive a control signal and generates a pulse width modulated signal (Vpwm) to be applied to the DC / DC converter to adjust the DC voltage (Fig. 2, Cho et al. English Translation, page 3, 2nd paragraph).

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify Chung-Sik by adding PWM that receives a control signal to generate a pulse

width modulated signal (Vpwm) disclosed by Cho et al. for adjusting charging power for charging a battery.

18. The contact-less charging device according to claim 16,

Chung-Sik, Matsuki and Cho et al. discloses contact-less charging device according to claim 16 as set forth above.

wherein the power supply includes: an overvoltage filter for receiving a common AC current and intercepting an overvoltage current.

Chung-Sik discloses power supply includes an overvoltage filter 58 (capacitor 58) for receiving the power supply 20 current and intercepting an overvoltage current (Fig. 2, page 8-4, lines 6-7).

power transmitter 28 inputs a power voltage through the line 40. The power of the line 40 may be filtered by a capacitor 58 in the constant voltage unit 42 and is input to the regulator 62. The regulator 62 (which is a model No. 78×8 regulator series according to the present invention) regulates the input voltage of 12 VDC and outputs the voltage to the power supplying line (VSL).

a rectifier for rectifying the AC current passing through the filter to convert the AC current into a DC current; and a constant voltage supplier that receives the converted DC current and outputs a constant voltage current.

Chung-Sik discloses current passing through the filter is input to regulator 62 that provides regulated 12 VDC. (Fig. 2).

Chung-Sik did not disclose rectifying an AC current because Chung-Sik receives 12 VDC directly from the power line 40 (Fig. 1, page 8-4, lines 4-5). However, if a DC power

supply is not available it would have been obvious to one of ordinary skill in the art to add a rectifier for the conversion of power line AC voltage to DC.

In analogous art Cho et al. (KR 100451606 B1) disclosed AC / DC rectifier 11 receives a low frequency AC input voltage, such as 110V or 220V, and converts it into direct current Vdc (Fig. 1). Cho et al. (KR 100451606 B1) further discloses a constant voltage supplying part (DC/DC converter 12) for receiving the converted DC current Vdc and outputs a constant voltage current (Vdc).

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify the contact-less charging device disclosed by Chung-Sik by adding a rectifier for rectifying the AC current received from AC power line to convert the AC current into a DC current disclosed by Cho et a. (KR 100451606 B1) and adding a constant voltage supplying part for receiving the converted DC current disclosed by Cho et a. (KR 100451606 B1) to output a constant voltage current.

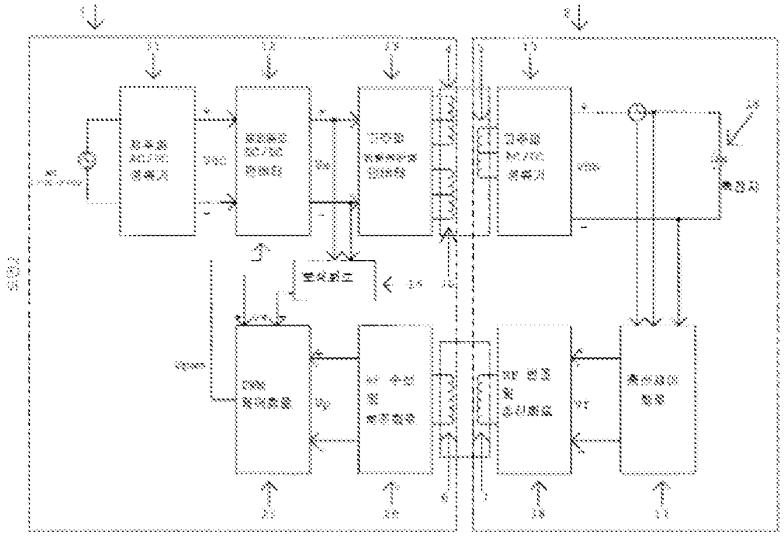


Fig. 2. Cho et al. (KR 100451606 B1)

9.0 REJECTION - 35 USC § 102/103

The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9.1 Chung-Sik/Kaite (cl. 55, 57-60, 62-64, 69-72)

Claim(s) 55, 57-60, 62-64, and 69-72 is/are rejected under pre-AIA 35 U.S.C. 102 (b) as anticipated by Chung-Sik (KR 950005819Bl) or, in the alternative, under pre-AIA 35 U.S.C. 103(a) as obvious over Chung-Sik (KR 950005819Bl) and Kaite et al. (US 6,016,046).

Claim 55 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

Chung-Sik discloses contact-less charging circuit module 38 (CONTACTLESS CHARGING UNIT) electrically connected to a battery cell 32 and used for charging an electric energy to the battery cell 32 in a contact-less method (Fig. 1)

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil in an external contact-less charging device;

Chung-Sik discloses a high frequency AC current inducing unit that includes a secondary coil 79 to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil 77 in an external contact-less charging device (Fig. 2).

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

Chung-Sik discloses rectifier 80 for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current (page 8-2, lines 17-19) (Fig. 2).

a constant voltage/constant current supplier that includes circuitry controlled by at least one microprocessor, the constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode,

Chung-Sik discloses constant voltage/constant current supplier 52 includes circuitry controlled by at least one microprocessor (48, 56) (Fig. 2). Chung-Sik discloses constant voltage/current supplier 52 for receiving DC current (DC voltage IDC) from the rectifier 80 and supplying a charging power to the battery cell 32 in a constant voltage/constant current charge mode (Fig. 2). (See "constant voltage unit", page 8-3, lines 24-27). Chung-Sik further discloses rectifier 80 supplies DC current at a constant voltage IDC. Chung-Sik specifically discloses a constant reference voltage V1 (reference voltage) is obtained by using resistors 88 and 90 for splitting the DC voltage IDC (See "voltage V1 is constant", page 8-5 line 5). Since voltage V1 is constant, therefore the voltage IDC is constant, and the constant voltage/current supplier 52 is receiving a constant DC voltage from rectifier 80 for supplying a charging power to the battery cell in a constant voltage/constant current mode.

Additionally, Chung-Sik discloses constant voltage/constant current supplier 52 supplies the charging power in a constant current mode at an initial charging stage by limiting the current drawn by the battery 32 by a resistor 84 ("the resistor 84 is a current limiter resistor") (Chung-Sik, English Translation, page 8-4, last paragraph 2nd last line) connected in series with diode

86 and when the battery begins to get charged the current drawn by the battery reduces (current is no longer constant) and supplies the charging power at a constant voltage until the battery is fully charged. (Fig. 2).

In this case, the rectified voltage IDC is input to a first voltage splitter 89, simultaneously limited to a predetermined level through the resistor 84 and the diode 86, then applied to the battery 32. That is, the battery 32 is charged. In the above case, the resistor 84 is a current limiter resistor, and the diode 86 is a diode for preventing countercurrent when the voltage IDC is lower than a voltage of the battery 32.

terminal (+) of the comparator 96. In this case, the reference voltage V1 is constant and the charge level detection voltage V2

To the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode it would have been obvious over Kaite et al.

Kaite et al. specifically disclosed constant voltage constant current supplier 123 for receiving DC current from rectifier 122 and supplying a charging power to the battery cell 111 in a constant voltage/constant current mode (col. 6, lines 41-44) (Fig. 2).

charge. Therefore, the charging control section **123** is provided with a constant current constant voltage circuit to stabilize output from the rectifying circuit **122**, and a switching device to stop charging when the rechargeable batteries **111** reach full charge under control of the computation circuit **124**. The constant current constant voltage circuit measures charging current and battery voltage to control the output to a constant current and constant voltage. The

At the time the invention was made it would have been obvious to one of ordinary skill in the to modify the constant voltage supplier disclosed by Chung-Sik by adding the constant current constant voltage circuit disclosed by Kaite et al. to stabilize output from the rectifying circuit.

wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage; and

Chung-Sik discloses constant voltage/constant current supplier 52 supplies the charging power in a constant current mode at an initial charging stage by limiting the current drawn by the battery 32 by a resistor 84 ("the resistor 84 is a current limiter resistor") (Chung-Sik, English Translation, page 8-4, last paragraph 2nd last line) connected in series with diode 86 and when the battery begins to get charged the current drawn by the battery reduces (current is no longer constant) and supplies the charging power at a constant voltage until the battery is fully charged. (Fig. 2).

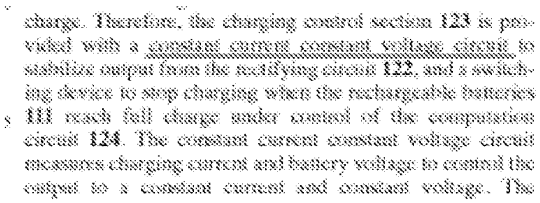
Additionally, Chung-Sik discloses constant voltage/constant current supplier 52 supplies the charging power in a constant current mode at an initial charging stage by limiting the current drawn by the battery 32 by a resistor 84 ("the resistor 84 is a current limiter resistor") (Chung-Sik, English Translation, page 8-4, last paragraph 2nd last line) connected in series with diode 86 and when the battery begins to get charged the current drawn by the battery reduces (current is no longer constant) and supplies the charging power at a constant voltage until the battery is fully charged. (Fig. 2).

In this case, the rectified voltage IDC is input to a first voltage splitter 89, simultaneously limited to a predetermined level through the resistor 84 and the diode 86, then applied to the battery 32. That is, the battery 32 is charged. In the above case, the resistor 84 is a current limiter resistor, and the diode 86 is a diode for preventing countercurrent when the voltage IDC is lower than a voltage of the battery 32.

terminal (+) of the comparator 96. In this case, the reference voltage V1 is constant and the charge level detection voltage V2

To the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode it would have been obvious over Kaite et al.

Kaite et al. specifically disclosed constant voltage constant current supplier 123 for receiving DC current from rectifier 122 and supplying a charging power to the battery cell 111 in a constant voltage/constant current mode (col. 6, lines 41-44) (Fig. 2).

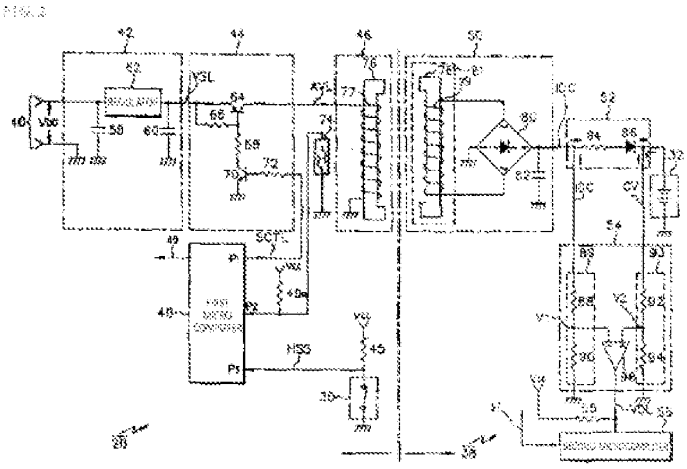

charge. Therefore, the charging control section 123 is provided with a constant current constant voltage circuit to stabilize output from the rectifying circuit 122, and a switching device to stop charging when the rechargeable batteries 111 reach full charge under control of the computation circuit 124. The constant current constant voltage circuit measures charging current and battery voltage to control the output to a constant current and constant voltage. The

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify the contact-less charging circuit of Chung-Sik and Matsuki by adding the constant voltage/constant current supplier disclosed by Kaite et al. to supply the charging power in a constant current mode at an initial charging stage and then supply the charging power in a constant voltage mode at a later charging stage for efficient charging of the battery.

an overvoltage monitoring unit that includes a wireless transmitting unit, first and second voltage detectors respectively detecting voltages at both ends of the constant voltage/constant current supplier, and the at least one microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of

wireless communication through the wireless transmitting unit so as to induce a change of intensity of the magnetic field,

Chung-Sik also discloses contactless charge system for detecting a voltage of a rechargeable battery 32 including charge pause detection unit comprising microprocessor 56 that receives clock and power information 104 (Fig. 1)(page 8-4, lines 32-39) to control the charge between the charger 12 and the portable device 18 (page 8-2, lines 8-9) (Fig. 1) and specifically disclosed over voltage monitoring unit 54 and microprocessor 56 for monitoring voltages (V1, V2) at both ends of the constant voltage/current supplier 52 and microprocessor 56 scans the output VDL of the comparator 96 and searches for whether or not the charge voltage of battery 32 is normal. Microprocessor 56 transmits a monitoring result to the external contactless charging device 12 by means of wireless communication (RADIO UNIT 34) through line 37 so as to induce a change of intensity of the magnetic field of the induced voltage generating unit 46 (Fig. 1, 2) (page 8-2, lines 31-34, 40-55; page 8-3, lines 36-40; page 8-5, lines 35-43) (Fig. 2).



Chung-Sik. Fig. 2

wherein the at least one microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting a power applied to the primary coil from a first level to a second level,

Regarding the above limitation, as best understood by the Examiner, Chung-Sik discloses wherein the at least one microprocessor 56 (MICROCOMPUTER) transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting a power applied to the primary coil from a first level to a second level. Specifically, Chung-Sik discloses to charge the battery to a predetermined level. (Chung-Sik, English Translation, page 8-5).

wherein the at least one microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the power applied to the primary coil from the second level to a third level.

Regarding the above limitation, as best understood by the Examiner, Chung-Sik discloses to charge the battery to a predetermined level. Therefore, adjusting a power applied to the primary coil from a second level to a third level is inherently disclosed as required to maintain the charging of the battery to a predetermined level.

Claim 57 (New): The contact-less charging circuit module according to claim 55,

Chung-Sik alone or Chung-Sik and Kaite et al. discloses contact-less charging circuit module according to claim 55 as set forth above.

wherein the wireless transmitting unit wirelessly propagates the monitoring result through an antenna, wherein the overvoltage monitoring unit includes a voltage comparator comparing first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

Chung-Sik discloses over voltage monitoring unit 54 for monitoring first and second voltages (V1, V2) at front and rear ends of the constant voltage/current supplier 52 and transmitting a monitoring result to the external contactless charging device 12 by means of wireless communication (RADIO UNIT 34) through an antenna so as to induce a change of intensity of the magnetic field (page 8-2, paragraphs 7-8) of the induced voltage generating unit 46 (Fig. 2) (page 8-3, lines 31-34; page 8-5, lines 31-34) (Fig. 2).

wherein the at least one microprocessor outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Chung-Sik further disclosed microprocessor 56 for outputting a monitoring result according to the voltage comparison result to the wireless transmitting unit (RADIO UNIT 34) (Chung-Sik, Fig. 2, and English Translation, pages 8-4, 8-5).

> Here, in the aforementioned operation 120 of FIG. 3B, the second microcomputer 56 that scans the output VDL of the comparator 96 and searches for whether or not the charge voltage is normal determines that the charge voltage of the battery 32 is normal. That is, a voltage of the battery 32 is determined to be completely charged to a set voltage level, and a charge completion alarm signal is output through line 37 in operation 122. The charge completion alarm signal through line 37 is transmitted to the base unit 12 through the audio and logic unit 36 and the radio unit 34, and the radio unit 25 and the audio and logic unit 24 of the base unit 12 receive and demodulate the signal and input the signal to the first microcomputer 48 through the line 49. The first microcomputer 48 that receives a data signal through the line 49 determines that the charge completion signal is received from the portable device 18 in the aforementioned operation 110 of FIG. 3A (the portable device is normal), and performs operation 112.

Claim 58 (New): The contact-less charging circuit module according to claim 55,

Chung-Sik alone or Chung-Sik and Kaite et al. discloses contact-less charging circuit module according to claim 55 as set forth above.

wherein the magnetic field generated by the contact-less charging device is generated intermittently,

Chung-Sik discloses magnetic field generated by the contact-less charging device is generated intermittently (switches on/off transistor 64, 70) (Fig. 2, page 8-4).

wherein the overvoltage monitoring unit further includes a charging pause detecting unit receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the at least one microprocessor, and

Chung-Sik also discloses contactless charge system for detecting a voltage of a rechargeable battery 32 including charging pause detection unit comprising microprocessor 56 that receives clock and power information 104 (Fig. 1)(page 8-4, lines 32-39) to control the charge between the charger 12 and the portable device 18 (page 8-2, lines 8-9) (Fig. 1).

Chung-Sik discloses a control signal (SCTL) output from the output port Pl of FIRST MICRO COMPUTER 48 is applied to a base of the transistor 70 through a resistor 72 and switches "on/off' the transistor 70 around ten thousand times per second. In this case, a potential of a collector terminal of the transistor 70 is switched between "low" and "high" depending on a period of the control signal (SCT) and the signal is applied to a base of the transistor 64." (Chung-Sik, English Translation, page 8-4 and Fig. 2).

Regarding charge pause detection unit and detecting a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, Chung-Sik discloses that the charging of battery continues until the detection voltage V2 in the overvoltage detection unit 54 becomes higher than V1 and the output signal VDL of comparator 96 is transitioned to logic "high" from logic "low" and is input to second microcomputer 56 to produce charging completion alarm (Fig. 2, page 8-5, lines 31-43). The transition to logic "high" from logic "low" is considered a time point when the induction of high frequency AC current ends, and then outputting the end time point (charge completion) to the microprocessor. The microcomputer 56 is broadly considered the same as charging pause detecting unit that produces charging completion alarm 122 (Fig. 3) when the voltage of battery is determined to be normal and completely charged. Thus the microprocessor 56 determines the ON/OFF period of charging the battery.

Additionally, Chung-Sik specifically disclosed a "time point" when the charge operation may be automatically stopped by communication between contact less charging unit 38 and power transmitter 28 (Chung-Sik, English Translation, page 8-5, lines 44-46 and Fig. 1).

> "Thus, in the present invention according to the above embodiments, a battery begins to be charged from a time point when the portable device 18 operated at an operating voltage of the battery is installed on the base unit 12, and the charge operation may be automatically stopped either by communication between devices or overheating of the devices.

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Chung-Sik discloses wherein the monitoring result is transmitted to the external contact-less charging device 12 by means of wireless communication by RADIO UNIT 34. (Chung-Sik,

page 8-5, lines 35-43, Fig. 1, 2).

> Here, in the aforementioned operation 120 of FIG. 3B, the second microcomputer 56 that scans the output VDL of the comparator 96 and searches for whether or not the charge voltage is normal determines that the charge voltage of the battery 32 is normal. That is, a voltage of the battery 32 is determined to be completely charged to a set voltage level, and a charge completion alarm signal is output through line 37 in operation 122. The charge completion alarm signal through line 37 is transmitted to the base unit 12 through the audio and logic unit 36 and the radio unit 34, and the radio unit 25 and the audio and logic unit 24 of the base unit 12 receive and demodulate the signal and input the signal to the first microcomputer 48 through the line 49. The first microcomputer 48 that receives a data signal through the line 49 determines that the charge completion signal is received from the portable device 18 in the aforementioned operation 110 of FIG. 3A (the portable device is normal), and performs operation 112.

To the extent that Chung-Sik may not specifically disclose transmitting a monitoring result to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced it would have been obvious for charging the battery when a voltage of the battery is determined to be less than normal (Fig. 2).

At the time the invention was made it would have been obvious to modify the overvoltage monitoring unit disclosed by Chung-Sik to transmit the monitoring result while a high frequency AC current is not applied to the magnetic field generating unit for starting charging of the battery when voltage of the battery is determined to be less than normal.

Claim 59 (New): The contact-less charging circuit module according to claim 55,

Chung-Sik alone or Chung-Sik and Kaite et al. discloses contact-less charging circuit module according to claim 55 as set forth above.

wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Chung-Sik discloses battery voltage detector circuit 54 that includes first and second voltage splitters 89 and 93 for comparing a voltage V1 of an input terminal of the charging unit

52 with a voltage V2 of an output terminal and clocking the result, and a comparator 96 for comparing outputs of the first and second voltage splitters 89 and 93 (V1, V2) and outputting a charge state signal (VDL) to second microcomputer 56 based on the difference of voltage (V1-V2) at both ends of the constant voltage/constant current supplier. The second microcomputer 56 searches for whether or not a charge voltage of the battery 32 is normal in an operation (120 of FIG. 3B) based on the result of the difference of voltage (V1-V2). Additionally, Chung-Sik discloses outputting code (NO) indicating (overvoltage state) if charge voltage is not normal (see (120 of FIG. 3B) (Fig. 2, page 8-4, lines 40-42).

Claim 60 (New): A contact-less charging circuit module electrically connected to a battery cell and used for receiving a charging power from an external contact-less charging device and charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

Chung-Sik disclosed contact-less charging circuit module electrically connected to a battery cell 32 of portable device 18 and used for receiving a charging power from an external contact-less charging device (charger) and charging an electric energy to the battery cell 32 in a contact-less method (Fig. 1, page 8-1).

The present invention relates to a charge system of a radio-telephone. More specifically, the present invention relates to a contactless charge system of a radio-telephone for charging a battery in a portable device without contact between a charger of a radio-telephone and a voltage terminal of the portable device.

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from the external contact-less charging device;

Chung-Sik disclosed high frequency AC current inducing unit 38 (CONTACTLESS CHARGING UNIT) to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device (induced voltage generating unit in charger) (page 8-2, lines 17-18).

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

Chung-Sik discloses rectifier 80 for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current (page 8-2, lines 17-19).(Fig. 2).

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

Chung-Sik discloses constant voltage/current supplier 42 for receiving DC current from the rectifier 80 and supplying a charging power to the battery cell 32 in a constant voltage/constant current charge mode (Fig. 2). (See "constant voltage unit", page 8-3, lines 28-33). Chung-Sik further discloses rectifier 80 supplies DC current at a constant voltage V1 (reference voltage). (See "voltage V1 is constant", page 8-5 line 5).

terminal (+) of the comparator 96. In this case, the reference voltage V1 is constant and the charge level detection voltage V2 varies depending on a charge voltage level of the battery 32. Thus, when the first microcomputer 48 outputs the control signal

Additionally, Chung-Sik discloses constant voltage/constant current supplier 52 supplies the charging power in a constant current mode at an initial charging stage by limiting the current drawn by the battery 32 by a resistor 84 ("the resistor 84 is a current limiter resistor") (Chung-

Sik, English Translation, page 8-4, last paragraph 2nd last line) connected in series with diode 86 and when the battery begins to get charged the current drawn by the battery reduces (current is no longer constant) and supplies the charging power at a constant voltage until the battery is fully charged. (Fig. 2).

In this case, the rectified voltage IDC is input to a first voltage splitter 89, simultaneously limited to a predetermined level through the resistor 84 and the diode 86, then applied to the battery 32. That is, the battery 32 is charged. In the above case, the resistor 84 is a current limiter resistor, and the diode 86 is a diode for preventing countercurrent when the voltage IDC is lower than a voltage of the battery 32.

terminal (+) of the comparator 96. In this case, the reference voltage V1 is constant and the charge level detection voltage V2

To the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode it would have been obvious over Kaite et al.

Kaite et al. specifically disclosed constant voltage constant current supplier 123 for receiving DC current from rectifier 122 and supplying a charging power to the battery cell 111 in a constant voltage/constant current mode (col. 6, lines 41-44) (Fig. 2).

charge. Therefore, the charging control section **123** is provided with a constant current constant voltage circuit to stabilize output from the rectifying circuit **122**, and a switching device to stop charging when the rechargeable batteries **111** reach full charge under control of the computation circuit **124**. The constant current constant voltage circuit measures charging current and battery voltage to control the output to a constant current and constant voltage. The

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify the contact-less charging circuit of Chung-Sik and Matsuki by adding the constant voltage/constant current supplier disclosed by Kaite et al. to supply the charging power

in a constant current mode at an initial charging stage and then supply the charging power in a constant voltage mode at a later charging stage for efficient charging of the battery.

an overvoltage monitoring unit that includes a microprocessor monitoring the voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

Chung-Sik discloses overvoltage monitoring unit 54 that includes a microprocessor 56 monitoring voltages (V1, V2) at both ends of the constant voltage/constant current supplier 52 and transmitting a monitoring result VDL (Fig. 2) to the external contactless charging device 12 by means of wireless communication (RADIO UNIT 34) so as to induce a change of intensity of the magnetic field of the induced voltage generating unit 46 (page 8-2, lines 31-34, 49-55; page 8-3, lines 36-40; page 8-5, lines 1-8) (Fig. 2).

wherein the microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contactless charging device from a first level to a second level,

Regarding the above limitation, as best understood by the Examiner, Chung-Sik also discloses wherein the at least one microprocessor 56 (MICROCOMPUTER) transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting a power applied to the primary coil from a first level to a second level. Specifically, Chung-Sik discloses to charge the battery to a predetermined level. (Chung-Sik, English Translation, page 8-5).

wherein the microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device from the second level to a third level.

Regarding the above limitation, as best understood by the Examiner, Chung-Sik discloses to charge the battery to a predetermined level. Therefore, adjusting a power applied to the primary coil from a second level to a third level is inherently disclosed as required to maintain the charging of the battery to the predetermined level.

Claim 62 (New): The contact-less charging circuit module according to claim 60, wherein the overvoltage monitoring unit includes:

Chung-Sik alone or Chung-Sik and Kaite et al. discloses contact-less charging circuit module according to claim 60 as set forth above.

a wireless transmitting unit wirelessly propagating the monitoring result through an antenna;

Chung-Sik discloses over voltage monitoring unit 54 for monitoring first and second voltages (V1, V2) at front and rear ends of the constant voltage/current supplier 52 and transmitting a monitoring result to the external contactless charging device 12 by means of wireless communication (RADIO UNIT 34) through an antenna (Fig. 1) so as to induce a change of intensity of the magnetic field (page 8-2, paragraphs 7-8) of the induced voltage generating unit 46 (Fig. 2) (page 8-3, lines 31-34; page 8-5, lines 31-34) (Fig. 2).

first and second voltage detectors respectively detecting first and second voltages at front and rear ends of the constant voltage/constant current supplier; and a voltage comparator comparing the first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

Chung-Sik discloses voltage comparator 96 for comparing first and second voltages (V1, V2) detected by the first and second voltage detectors and outputs a voltage comparison result (charge state VDL) (Fig. 2, page 8-4, 8-5).

wherein the microprocessor outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Chung-Sik further disclosed microprocessor 56 for outputting a monitoring result according to the voltage comparison result to the wireless transmitting unit (radio unit 34) (Chung-Sik, Fig. 2, and English Translation, pages 8-4, 8-5).

> Here, in the aforementioned operation 120 of FIG. 3B, the second microcomputer 56 that scans the output VDL of the comparator 96 and searches for whether or not the charge voltage is normal determines that the charge voltage of the battery 32 is normal. That is, a voltage of the battery 32 is determined to be completely charged to a set voltage level, and a charge completion alarm signal is output through line 37 in operation 122. The charge completion alarm signal through line 37 is transmitted to the base unit 12 through the audio and logic unit 36 and the radio unit 34, and the radio unit 25 and the audio and logic unit 24 of the base unit 12 receive and demodulate the signal and input the signal to the first microcomputer 48 through the line 49. The first microcomputer 48 that receives a data signal through the line 49 determines that the charge completion signal is received from the portable device 18 in the aforementioned operation 110 of FIG. 3A (the portable device is normal), and performs operation 112.

Claim 63 (New): The contact-less charging circuit module according to claim 60,

Chung-Sik alone or Chung-Sik and Kaite et al. discloses contact-less charging circuit module according to claim 60 as set forth above.

wherein the magnetic field generated by the contact-less charging device is generated intermittently,

Chung-Sik discloses magnetic field generated by the external contact-less charging device is generated intermittently (switches on/off transistor 64, 70) (Fig. 2, page 8-4).

wherein the overvoltage monitoring unit further includes a charging pause detecting unit receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, and

Chung-Sik also discloses contactless charge system for detecting a voltage of a rechargeable battery 32 including charging pause detection unit comprising microprocessor 56 that receives clock and power information 104 (Fig. 1)(page 8-4, lines 32-39) to control the charge between the charger 12 and the portable device 18 (page 8-2, lines 8-9) (Fig. 1).

Chung-Sik discloses a control signal (SCTL) output from the output port Pl of FIRST MICRO COMPUTER 48 is applied to a base of the transistor 70 through a resistor 72 and switches "on/off' the transistor 70 around ten thousand times per second. In this case, a potential of a collector terminal of the transistor 70 is switched between "low" and "high" depending on a period of the control signal (SCT) and the signal is applied to a base of the transistor 64." (Chung-Sik, English Translation, page 8-4 and Fig. 2).

Regarding charge pause detection unit and detecting a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, Chung-Sik discloses that the charging of battery continues until the detection voltage V2 in the

overvoltage detection unit 54 becomes higher than V1 and the output signal VDL of comparator 96 is transitioned to logic "high" from logic "low" and is input to second microcomputer 56 to produce charging completion alarm (Fig. 2, page 8-5, lines 31-43). The transition to logic "high" from logic "low" is considered a time point when the induction of high frequency AC current ends, and then outputting the end time point (charge completion) to the microprocessor. The microcomputer 56 is broadly considered the same as charging pause detecting unit that produces charging completion alarm when the voltage of battery is determined to be normal and completely charged. Thus the microprocessor 56 determines the ON/OFF period of charging the battery.

Additionally, Chung-Sik specifically disclosed a "time point" when the charge operation may be automatically stopped by communication between contact less charging unit 38 and power transmitter 28 (Chung-Sik, English Translation, page 8-5, lines 44-46 and Fig. 1).

> Thus, in the present invention according to the above embodiments, a battery begins to be charged from a time point when the portable device 18 operated at an operating voltage of the battery is installed on the base unit 12, and the charge operation may be automatically stopped either by communication between devices or overheating of the devices.

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Chung-Sik discloses wherein the monitoring result is transmitted to the external contact-less charging device 12 by means of wireless communication by RADIO UNIT 34. (Chung-Sik,

page 8-5, lines 35-43, Fig. 1, 2).

> Here, in the aforementioned operation 120 of FIG. 3B, the second microcomputer 56 that scans the output VDL of the comparator 96 and searches for whether or not the charge voltage is normal determines that the charge voltage of the battery 32 is normal. That is, a voltage of the battery 32 is determined to be completely charged to a set voltage level, and a charge completion alarm signal is output through line 37 in operation 122. The charge completion alarm signal through line 37 is transmitted to the base unit 12 through the audio and logic unit 36 and the radio unit 34, and the radio unit 25 and the audio and logic unit 24 of the base unit 12 receive and demodulate the signal and input the signal to the first microcomputer 48 through the line 49. The first microcomputer 48 that receives a data signal through the line 49 determines that the charge completion signal is received from the portable device 18 in the aforementioned operation 110 of FIG. 3A (the portable device is normal), and performs operation 112.

To the extent that Chung-Sik may not specifically disclose transmitting a monitoring result to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced it would have been obvious for charging the battery when a voltage of the battery is determined to be less than normal (Fig. 2).

At the time the invention was made it would have been obvious to modify the overvoltage monitoring unit disclosed by Chung-Sik to transmit the monitoring result while a high frequency AC current is not applied to the magnetic field generating unit for starting charging of the battery when voltage of the battery is determined to be less than normal.

Claim 64 (New): The contact-less charging circuit module according to claim 60,

Chung-Sik alone or Chung-Sik and Kaite et al. discloses contact-less charging circuit module according to claim 60 as set forth above.

wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Chung-Sik discloses battery voltage detector circuit 54 that includes first and second voltage splitters 89 and 93 for comparing a voltage V1 of an input terminal of the charging unit

52 with a voltage V2 of an output terminal and clocking the result, and a comparator 96 for comparing outputs of the first and second voltage splitters 89 and 93 (V1, V2) and outputting a charge state signal (VDL) to second microcomputer 56 based on the difference of voltage (V1-V2) at both ends of the constant voltage/constant current supplier. The second microcomputer 56 searches for whether or not a charge voltage of the battery 32 is normal in an operation (120 of FIG. 3B) based on the result of the difference of voltage (V1-V2). Additionally, Chung-Sik discloses outputting code (NO) indicating (overvoltage state) if charge voltage is not normal (see (120 of FIG. 3B) (Fig. 2, page 8-4, lines 40-42).

Claim 69 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

Chung-Sik discloses contact-less charging circuit module electrically connected to a battery cell 32 of portable device 18 and used for receiving a charging power from an external contact-less charging device (charger) and charging an electric energy to the battery cell 32 in a contact-less method (Fig. 1, page 8-1).

The present invention relates to a charge system of a radio-telephone. More specifically, the present invention relates to a contactless charge system of a radio-telephone for charging a battery in a portable device without contact between a charger of a radio-telephone and a voltage terminal of the portable device.

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

Chung-Sik disclosed high frequency AC current inducing unit 38 (CONTACTLESS CHARGING UNIT) to which a high frequency AC current is induced by means of a magnetic

field generated from a primary coil 77 (Fig. 2) in an external contact-less charging device 12 (Fig. 1) (page 8-2, lines 17-18).

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

Chung-Sik disclosed rectifier 80 for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current (page 8-2, lines 17-19) (Fig. 2).

a constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

Chung-Sik discloses constant voltage/current supplier for receiving DC current from the rectifier 80 and supplying a charging power to the battery cell 32 in a constant voltage/constant current charge mode (Fig. 2). (See "constant voltage unit", page 8-3, lines 24-27). Chung-Sik further discloses rectifier 80 supplies DC current at a constant voltage V1 (reference voltage) (See "voltage V1 is constant", page 8-5 line 5). Since voltage V1 is constant it is supplying a charging power to the battery cell in a constant voltage/constant current mode.

Additionally, Chung-Sik discloses constant voltage/constant current supplier 52 supplies the charging power in a constant current mode at an initial charging stage by limiting the current drawn by the battery 32 by a resistor 84 ("the resistor 84 is a current limiter resistor") (Chung-Sik, English Translation, page 8-4, last paragraph 2nd last line) connected in series with diode 86 and when the battery begins to get charged the current drawn by the battery reduces (current

is no longer constant) and supplies the charging power at a constant voltage until the battery is fully charged. (Fig. 2).

In this case, the rectified voltage IDC is input to a first voltage splitter 89, simultaneously limited to a predetermined level through the resistor 84 and the diode 86, then applied to the battery 32. That is, the battery 32 is charged. In the above case, the resistor 84 is a current limiter resistor, and the diode 86 is a diode for preventing countercurrent when the voltage IDC is lower than a voltage of the battery 32.

terminal (+) of the comparator 96. In this case, the reference voltage V1 is constant and the charge level detection voltage V2

To the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode it would have been obvious over Kaite et al.

Kaite et al. specifically disclosed constant voltage constant current supplier 123 for receiving DC current from rectifier 122 and supplying a charging power to the battery cell 111 in a constant voltage/constant current mode (col. 6, lines 41-44) (Fig. 2).

charge. Therefore, the charging control section 123 is provided with a constant current constant voltage circuit to stabilize output from the rectifying circuit 122, and a switching device to stop charging when the rechargeable batteries 111 reach full charge under control of the computation circuit 124. The constant current constant voltage circuit measures charging current and battery voltage to control the output to a constant current and constant voltage. The

At the time the invention was made it would have been obvious to one of ordinary skill in the art to modify the contact-less charging circuit of Chung-Sik and Matsuki by adding the constant voltage/constant current supplier disclosed by Kaite et al. to supply the charging power in a constant current mode at an initial charging stage and then supply the charging power in a constant voltage mode at a later charging stage for efficient charging of the battery.

an overvoltage monitoring unit for monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

Chung-Sik also discloses contactless charge system for detecting a voltage of a rechargeable battery 32 to control the charge between the charger 12 and the portable device 18 (page 8-2, lines 8-9) (Fig. 1) and specifically disclosed an over voltage monitoring unit 54 for monitoring voltages (V1, V2) at both ends of the constant voltage/current supplier 52 and microprocessor 56 scans the output VDL of the comparator 96 and searches for whether or not the charge voltage of battery 32 is normal. Microprocessor 56 transmits a monitoring result to the external contactless charging device 12 by means of wireless communication (RADIO UNIT 34) through line 37 so as to induce a change of intensity of the magnetic field of the induced voltage generating unit 46 (Fig. 1, 2) (page 8-2, lines 31-34, 40-55; page 8-3, lines 36-40; page 8-5, lines 35-43) (Fig. 2).

wherein the monitoring result is a charging power adjustment request signal.

Chung-Sik also discloses Microprocessor 56 transmits a monitoring result to the external contactless charging device 12 by means of wireless communication (RADIO UNIT 34) through line 37 so as to induce a change of intensity of the magnetic field (**charging power adjustment**) of the induced voltage generating unit 46 (Fig. 1, 2) (page 8-2, lines 31-34, 40-55; page 8-3, lines 36-40; page 8-5, lines 35-43) (Fig. 2).

Claim 70 (New): The contact-less charging circuit module according to claim 69,

Chung-Sik alone or Chung-Sik and Kaite et al. discloses contact-less charging circuit module according to claim 69 as set forth above.

wherein the high frequency AC current inducing unit is a coil to which a magnetic flux of the magnetic field generated from the external contact-less charging device is linked.

Chung-Sik discloses wherein the high frequency AC current inducing unit is a coil 79 to which a magnetic flux of the magnetic field generated from the coil 77 of the external contact-less charging device (charger) is linked (Chung-Sik , English Translation, page 8-3)(Fig. 2).

Claim 71 (New): The contact-less charging circuit module according to claim 69, wherein the overvoltage monitoring unit includes:

Chung-Sik alone or Chung-Sik and Kaite et al. discloses contact-less charging circuit module according to claim 69 as set forth above.

a wireless transmitting unit for wirelessly propagating the monitoring result through an antenna;

Chung-Sik discloses microprocessor 56 transmits a monitoring result to the external contactless charging device 12 by means of wireless communication (RADIO UNIT 34) through line 37 so as to induce a change of intensity of the magnetic field of the induced voltage generating unit 46 (Fig. 1, 2) (page 8-2, lines 31-34, 40-55; page 8-3, lines 36-40; page 8-5, lines 35-43) (Fig. 2).

first and second voltage detectors for respectively detecting voltages at front and rear ends of the constant voltage/constant current supplier;

Chung-Sik discloses battery voltage detector circuit 54 that includes first and second voltage detectors (V1, V2) formed by voltage splitters 89 and 93 (Fig. 2).

a voltage comparator for comparing first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result; and

Chung-Sik discloses a voltage comparator 96 for comparing first and second voltages (V1, V2) detected by the first and second voltage detectors formed by voltage splitters 89 and 93 and outputting a voltage comparison result VDL (Fig. 2).

a microprocessor for outputting the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Chung-Sik discloses a microprocessor 56 for outputting the monitoring result according to the voltage comparison result VDL (Fig. 2) to the wireless transmitting unit 34 (radio unit)(Fig. 1) (Chung-Sik , English Translation, page 8-5, paragraphs 5 and 6 copied below).

> When a charge level of the battery 32 is increased through the aforementioned operation, the charge level detection voltage V2 of a second voltage splitter 93 increases, and when the detection voltage V2 becomes higher than the reference voltage V1, the output VDL of the comparator 96 is transitioned to logic "high" from logic "low" and is input to the second microcomputer 56.
>
> Here, in the aforementioned operation 120 of FIG. 3B, the second microcomputer 56 that scans the output VDL of the comparator 96 and searches for whether or not the charge voltage is normal determines that the charge voltage of the battery 32 is normal. That is, a voltage of the battery 32 is determined to be completely charged to a set voltage level, and a charge completion alarm signal is output through line 37 in operation 122. The charge completion alarm signal through line 37 is transmitted to the base unit 12 through the audio and logic unit 36 and the radio unit 34, and the radio unit 23 and the audio and logic unit 24 of the base unit 12 receive and demodulate the signal and input the signal to the first microcomputer 48 through the line 49. The first microcomputer 48 that receives a data signal through the line 49 determines that the charge

Claim 72 (New): The contact-less charging circuit module according to claim 71,

Chung-Sik alone or Chung-Sik and Kaite et al. discloses contact-less charging circuit module according to claim 71 as set forth above.

wherein the magnetic field generated by the contact-less charging device is generated intermittently,

Chung-Sik discloses when the first microprocessor 48 receives charge completion data signal from the portable device 18 decides to supply current (Fig. 3A, operation 112) and the charge operation may be automatically stopped by communication between devices or overheating of the battery (Chung-Sik , English Translation, page 8-5). Thus Chung-Sik discloses magnetic field generated by the contact-less charging device is generated intermittently depending upon the charge state of the battery or overheating of the battery.

wherein the overvoltage monitoring unit further includes a charging pause detecting unit for receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, and

Chung-Sik also discloses overvoltage monitoring unit further includes charge pause detection unit comprising microprocessor 56 that receives clock and power information 104 (Fig. 1)(page 8-4, lines 32-39) to control the charge between the charger 12 and the portable device 18 (page 8-2, lines 8-9) (Fig. 1).

Chung-Sik discloses a control signal (SCTL) output from the output port Pl of FIRST MICRO COMPUTER 48 is applied to a base of the transistor 70 through a resistor 72 and switches "on/off' the transistor 70 around ten thousand times per second. In this case, a potential of a collector terminal of the transistor 70 is switched between "low" and "high" depending on a

period of the control signal (SCT) and the signal is applied to a base of the transistor 64." (Chung-Sik, English Translation, page 8-4 and Fig. 2).

Regarding charge pause detection unit and detecting a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, Chung-Sik discloses that the charging of battery continues until the detection voltage V2 in the overvoltage detection unit 54 becomes higher than V1 and the output signal VDL of comparator 96 is transitioned to logic "high" from logic "low" and is input to second microcomputer 56 to produce charging completion alarm (Fig. 2, page 8-5, lines 31-43). The transition to logic "high" from logic "low" is considered a time point when the induction of high frequency AC current ends, and then outputting the end time point (charge completion) to the microprocessor. The microcomputer 56 is broadly considered the same as charging pause detecting unit that produces charging completion alarm when the voltage of battery is determined to be normal and completely charged. Thus the microprocessor 56 determines the ON/OFF period of charging the battery.

Additionally, Chung-Sik specifically disclosed a "time point" when the charge operation may be automatically stopped by communication between contact less charging unit 38 and power transmitter 28 (Chung-Sik, English Translation, page 8-5, lines 44-46 and Fig. 1).

Thus, in the present invention according to the above embodiments, a battery begins to be charged from a time point when the portable device 18 operated at an operating voltage of the battery is installed on the base unit 12, and the charge operation may be automatically stopped either by communication between devices or overheating of the devices.

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Chung-Sik discloses wherein the monitoring result is transmitted to the external contact-less charging device 12 by means of wireless communication by RADIO UNIT 34. (Chung-Sik, page 8-5, lines 35-43, Fig. 1, 2).

> Here, in the aforementioned operation 120 of FIG. 3B, the second microcomputer 56 that scans the output VDL of the comparator 96 and searches for whether or not the charge voltage is normal determines that the charge voltage of the battery 32 is normal. That is, a voltage of the battery 32 is determined to be completely charged to a set voltage level, and a charge completion alarm signal is output through line 37 in operation 122. The charge completion alarm signal through line 37 is transmitted to the base unit 12 through the audio and logic unit 36 and the radio unit 34, and the radio unit 25 and the audio and logic unit 24 of the base unit 12 receive and demodulate the signal and input the signal to the first microcomputer 48 through the line 49. The first microcomputer 48 that receives a data signal through the line 49 determines that the charge completion signal is received from the portable device 18 in the aforementioned operation 110 of FIG. 3A (the portable device is normal), and performs operation 112.

To the extent that Chung-Sik may not specifically disclose transmitting a monitoring result to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced it would have been obvious for charging the battery when a voltage of the battery is determined to be less than normal (Fig. 2).

At the time the invention was made it would have been obvious to modify the overvoltage monitoring unit disclosed by Chung-Sik to transmit the monitoring result while a high frequency AC current is not applied to the magnetic field generating unit for starting charging of the battery when voltage of the battery is determined to be less than normal.

10.0 CONCLUSION

10.1 ACTION IS MADE FINAL

Patent owner's amendment filed 11/29/2021 necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

A shortened statutory period for response to this action is set to expire 2 from the mailing date of this action.

Extensions of time under 37 CFR 1.136(a) do not apply in reexamination proceedings. The provisions of 37 CFR 1.136 apply only to "an applicant" and not to parties in a reexamination proceeding. Further, in 35 U.S.C. 305 and in 37 CFR 1.550(a), it is required that reexamination proceedings "will be conducted with special dispatch within the Office."

Extensions of time in reexamination proceedings are provided for in 37 CFR 1.550(c). A request for extension of time must specify the requested period of extension and it must be accompanied by the petition fee set forth in 37 CFR 1.17(g). Any request for an extension in a third party requested ex parte reexamination must be filed on or before the day on which action by the patent owner is due, and the mere filing of a request will not affect any extension of time. A request for an extension of time in a third party requested ex parte reexamination will be granted only for sufficient cause, and for a reasonable time specified. Any request for extension in a patent owner requested ex parte reexamination (including reexamination ordered under 35 U.S.C. 257) for up to two months from the time period set in the Office action must be filed no later than two months from the expiration of the time period set in the Office action. A request for an extension in a patent owner requested ex parte reexamination for more than two months from the time period set in the Office action must be filed on or before the day on which action by the patent owner is due, and the mere filing of a request for an extension for more than two months will not affect the extension. The time for taking action in a patent owner requested ex parte reexamination will not be extended for more than two months from the time period set in the Office action in the absence of sufficient cause or for more than a reasonable time.

The filing of a timely first response to this final rejection will be construed as including a request to extend the shortened statutory period for an additional two months. In no event,

however, will the statutory period for response expire later than SIX MONTHS from the mailing date of the final action. See MPEP § 2265.

10.2 Pertinent Art

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Giannopoulos et al. (US 2003/0214821 A1) discloses METHOD AND APPARATUS FOR CONTACT-LESS BATTERY CHARGING WITH DYNAMIC CONTROL uses signal Vb to control the gates G1 140 and G2 141 of the power switches S1 130 and S2 131 respectively for controlling the charging current for charging battery (Fig. 2). Signal Vb is related to the current suppled to battery measured by voltage Va across resistor Rsec and capacitance C1 and C2 given by [0018],

Vb = Rpr * [C1*C2/(C1+C2)]*[dVa/dt]

As known in the art capacitance C1 and C2 depends upon the distance between charger 102 and portable device 102 (Fig. 1).

Jo Kyu-Hyung (KR 100451606 B1) DATE PUBLISHED 2004-10-08 discloses feedback control of contactless battery charging by monitoring 17 the state of charge of battery 14 and wirelessly transmitting 18 the state of charge of battery 14 which is received by RF reception and demodulation circuit 20 in the charging matrix 1 (charger) and pulse width modulation (PWM) control circuit 21 receives a demodulated signal from the RF reception and demodulation circuit 20 and receives a pulse width modulated signal to control the DC / DC converter 12 voltage applied to the coil 4 of charging unit and inducing current in coil 5 of battery charging circuit to increase battery charging current. (Fig. 2).

Kitamura et al. (CN 101507091 B), published on 2012-03-07, disclosed wireless charging battery 21 comprising adjusting the charging current to battery 21 (adjusting charging current flows to the diode D2) by feedback (feedback coil L3) as a function of changing distance between the load coil L2 and power supply coil L1 (resonant coil) (Fig. 16). See CN 101507091 B paragraphs [0116] and [0118] and Fig. 16.

Fernandez et al (US 6,184,651 B1) published 2001-02-06, disclosed contactless charging system, charging energy is transferred across an inductive coupler to charge a battery (21) of a portable device, such as a two-way radio, cellular phone, paging device, or wireless communicator (Abstract, Fig. 1). The secondary charging device 19 is electrically coupled to a sensing device 38 which provides to a radio transceiver 35 a feedback signal indicative of a charging parameter of the secondary charging device 19, such as indicative of a charging voltage. The radio transceiver 35 preferably comprises an encoder/decoder to encode a signal for radio transmission through antenna 37 of radio transceiver 35. The radio signal from antenna 37 is received wirelessly by antenna 52 of transceiver 39 providing feedback to primary controller 11. The primary controller 11 then uses the feedback control signal, such as to regulate a parameter of the charging process, a charging signal voltage, and/or a cycling rate, and thereby improving the efficiency of the overall charging process and the energy transfer to the battery 21 (Fig. 3).

Kubota et al. (US 7208915) published 2007-04-24, foreign priority date 2004-09-30 disclosed constant current battery charger includes voltage monitor (Fig. 1).

Extensions of Time

Extensions of time under 37 CFR 1.136(a) will not be permitted in these proceedings because the provisions of 37 CFR 1.136 apply only to "an applicant" and not to parties in a reexamination proceeding. Additionally, 35 U.S.C. 305 requires that *ex parte* reexamination proceedings "will be conducted with special dispatch" (37 CFR 1.550(a)). Extensions of time in ex parte reexamination proceedings are provided for in 37 CFR 1.550(c).

Waiver of Right to File Patent Owner Statement

In a reexamination proceeding, Patent Owner may waive the right under 37 C.F.R. 1.530 to file a Patent Owner Statement. The document needs to contain a statement that Patent Owner waives the right under 37 C.F.R. 1.530 to file a Patent Owner Statement and proof of service in the manner provided by 37 C.F.R. 1.248, if the request for reexamination was made by a third party requester, see 37 C.F.R 1.550(f). The Patent Owner may consider using the following statement in a document waiving the right to file a Patent Owner Statement:

Patent Owner waives the right under 37 C.F.R. 1.530 to file a Patent Owner Statement.

Amendment in Reexamination Proceedings

Patent owner is notified that any proposed amendment to the specification and/or claims in this reexamination proceeding must comply with 37 CFR 1.530(d)-(j), must be formally presented pursuant to 37 CFR § 1.52(a) and (b), and must contain any fees required by 37 CFR § 1.20(c). See MPEP § 2250(IV) for examples to assist in the preparation of proper proposed amendments in reexamination proceedings.

Submissions

If the patent owner fails to file a timely and appropriate response to any Office action or any written statement of an interview required under 37 CFR § 1.560(b), the *ex parte* reexamination proceeding will be terminated, and the Director will proceed to issue a certificate under 37 CFR §1.570 in accordance with the last Office action.

Service of Papers

After the filing of a request for reexamination by a third party requester, any document filed by either the patent owner or the third party requester must be served on the other party (or parties where two or more third party requester proceedings are merged) in the reexamination proceeding in the manner provided in 37 CFR 1.248. See 37 CFR 1.550(f).

Notification of Concurrent Proceedings

The patent owner is reminded of the continuing responsibility under 37 CFR 1.565(a) to apprise the Office of any litigation activity, or other prior or concurrent proceeding, involving Patent No. US 8,013,568B2 throughout the course of this reexamination proceeding. The third party requester is also reminded of the ability to similarly apprise the Office of any such activity or proceeding throughout the course of this reexamination proceeding. See MPEP §§ 2207, 2282 and 2286.

All correspondence relating to this ex parte reexamination proceeding should be directed:

By Mail to: Mail Stop *Ex Parte* Reexam
Central Reexamination Unit
Commissioner for Patents
United States Patent & Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

By FAX to: (571) 273-9900
Central Reexamination Unit

By hand: Customer Service Window
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Any inquiry concerning this communication should be directed to the Central Reexamination Unit at telephone number (571) 272-7705.

/ANJAN K DEB/
Primary Examiner, Art Unit 3992

Conferees:

/FRED O FERRIS III/
Reexamination Specialist, Art Unit 3992

/HBP/

Office Action in Ex Parte Reexamination	**Control No.** 96/000,355	**Patent Under Reexamination** 8013568	
	Examiner ANJAN K DEB	**Art Unit** 3992	**AIA (FITF) Status** No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

a. ☑ Responsive to the communication(s) filed on 29 November 2021.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

b. ☑ This action is made FINAL.

c. ☐ A statement under 37 CFR 1.530 has not been received from the patent owner.

A shortened statutory period for response to this action is set to expire _____ month(s) from the mailing date of this letter. Failure to respond within the period for response will result in termination of the proceeding and issuance of an *ex parte* reexamination certificate in accordance with this action. 37 CFR 1.550(d). **EXTENSIONS OF TIME ARE GOVERNED BY 37 CFR 1.550(c).** If the period for response specified above is less than thirty (30) days, a response within the statutory minimum of thirty (30) days will be considered timely.

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

1. ☐ Notice of References Cited by Examiner, PTO-892.
2. ☐ Information Disclosure Statement, PTO/SB/08.
3. ☐ Interview Summary, PTO-474.
4. ☐ _____.

Part II SUMMARY OF ACTION

1a. ☑ Claims 1-35 and 37-75 are subject to reexamination.
1b. ☐ Claims _____ are not subject to reexamination.
2. ☐ Claims _____ have been canceled in the present reexamination proceeding.
3. ☐ Claims _____ are patentable and/or confirmed.
4. ☑ Claims 1-35 and 37-75 are rejected.
5. ☐ Claims _____ are objected to.
6. ☐ The drawings, filed on _____ are acceptable.
7. ☐ The proposed drawing correction, filed on _____ has been (7a) ☐ approved (7b) ☐ disapproved.
8. ☐ Acknowledgment is made of the priority claim under 35 U.S.C. 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the certified copies have
   1 ☐ been received.
   2 ☐ not been received.
   3 ☐ been filed in Application No. _____.
   4 ☐ been filed in reexamination Control No. _____.
   5 ☐ been received by the International Bureau in PCT application No. _____.
   * See the attached detailed Office action for a list of the certified copies not received.
9. ☐ Since the proceeding appears to be in condition for issuance of an *ex parte* reexamination certificate except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte* Quayle, 1935 C.D. 11, 453 O.G. 213.
10. ☑ Other: Interview summary and agenda

cc: Requester (if third party requester)

CONTACTLESS BATTERY CHARGING SYSTEM USING INDUCTION COUPLING METHOD

DOCUMENT ID	DATE PUBLISHED
KR-100451606-B1	2004-10-08

INVENTOR INFORMATION

NAME	CITY	STATE	ZIP CODE	COUNTRY
	N/A	N/A	N/A	KR
	N/A	N/A	N/A	KR

DATE FILED
2002-09-30

CPC CURRENT

TYPE	CPC	DATE
CPCI	H04B5/0037	2013-01-01
CPCI	H02J50/40	2016-02-01
CPCI	H02J50/12	2016-02-01
CPCI	H04B5/0075	2013-01-01

Abstract

The present invention relates to a system for charging a battery of a portable device through inductive coupling by generating a high frequency magnetic field, the primary side of the high frequency transformer for inductive coupling is configured by winding the winding using a concentric ferrite core, The secondary side is made by installing a thin flat winding on a thin and flat ferrite sheet with a certain gap between the primary side so that it is easy to install in a device that is small in volume and weight and light like a mobile phone. Is transmitted in a non-contact manner by electromagnetic inductive coupling without an electrical contact point from the primary side to the secondary side. In addition, the state of charge of the battery uses a method of transmitting wirelessly from the secondary side to the primary side, but also by wrapping the primary and secondary windings of the planar shape and facing each other with a slight gap therebetween to transmit and receive. This was done.

Description

INVENTION-TITLE
BACKGROUND-ART
The present invention relates to a compact and lightweight charging system for non-contact charging of a battery used in a portable device, and more particularly, to generate a high frequency magnetic field from the charging mother to the battery side to induce a thin planar separated space therebetween. The present invention relates to a contactless charging system for charging a storage battery in a portable device without using a contact terminal by using a method of transferring energy through coupling.

In general, portable devices are equipped with a storage battery so that a user can use it while moving. In order to charge such a battery, a charging matrix for supplying energy to a battery of a portable device in connection with a general power source is required. Typically, the charging base and the storage battery are provided with separate contact terminals, respectively, so that the two contact terminals are connected to each other to selectively charge the storage battery as necessary.
However, when the contact terminals are formed in the battery and the charging matrix, the contact terminals protrude from the outside, which is not aesthetically pleasing, and the contact terminals may be contaminated with foreign substances, resulting in a poor contact state. In addition, charging energy may be lost when the battery is short-circuited or exposed to moisture due to carelessness of the user.
Conventionally, in order to solve this problem, a method has been developed in which the battery and the charging matrix can be charged in a non-contact manner without configuring contact terminals, and are used in some application fields (for example, electric toothbrushes and electric shavers). It is becoming. The conventional non-contact charging method also includes a method of providing a storage battery of a portable device by magnetic coupling of a primary circuit of a transformer operating at a high frequency in a charging matrix and a secondary circuit in a portable device by magnetic coupling. In this respect, there is a common point with the present invention.
However, the non-contact charging method is generally used a ferrite core with a weight and volume in the secondary circuit as well as the primary circuit of the transformer, and because of the weight and volume of the ferrite core is not suitable for small devices such as mobile phones. There was a problem.
TECHNICAL-FIELD
In order to solve the above problems, the present invention provides a charging system for charging a storage battery in a portable device using an inductive coupling of a high frequency converted magnetic field with a small gap between the charging mother and the portable device. It is an object of the present invention to provide a non-contact charging system of a compact and lightweight by manufacturing the coupling portion to be installed in a flat type.
In addition, it is an object of the present invention to provide a non-contact type charging device that checks the state of charge and discharge of the battery and controls it in real time.
DISCLOSURE
TECH-SOLUTION

In order to solve the above object, the present invention provides a non-contact charging system for charging a battery mounted in a portable device from a charging matrix by using an inductive coupling method, wherein the charging matrix receives a low frequency AC input voltage and converts the voltage into a DC voltage. Low frequency AC / DC rectifier output; A pre-volt DC / DC converter which generates and outputs a constant DC voltage regardless of the magnitude of the DC voltage; A high frequency parallel resonant inverter configured to receive the constant DC voltage and convert it into high frequency AC power; A ferrite core connected to the high frequency parallel resonant inverter; And a primary winding installed between the central protrusion and the outer protrusion of the ferrite core and receiving the high frequency alternating current power and transferring the inductive coupling to the portable device. The portable device includes: a thin ferrite sheet; A thin-film secondary winding installed on the ferrite sheet so as to face the primary winding to receive the AC power from the primary winding; And a high frequency AC / DC rectifier for converting the AC power received by the secondary winding into DC power and providing the battery to a storage battery.

The portable apparatus may further include a charge control circuit configured to inspect a state of charge of the battery and generate and output a control signal; And an RF modulation and transmission circuit for receiving the control signal and modulating the RF signal into an RF signal and wirelessly transmitting the RF signal, wherein the charging mother receives and demodulates the RF signal to detect and output the control signal. As your inquiry; And a PWM control circuit configured to receive the control signal and generate a pulse width modulated signal to be applied to the prevolt DC / DC converter to adjust the DC voltage.

Hereinafter, embodiments of the present invention will be described with reference to the accompanying

drawings.

FIG. 1A simultaneously shows a cross-sectional view 102 and a plan view 101, 103 of a core portion for transferring energy in a non-contact manner via magnetic lines of force, which is the principle of a transformer in a charging system according to the invention.

The charging system proposed in the present invention can be thought of as being divided into the charging matrix 1 side and the portable device 2 side as shown in the sectional view 102. The charging matrix 1 is provided with a primary winding of a split type transformer for transmitting energy, and includes a main winding 4 for forming a magnetic field and an auxiliary winding 10 for inducing AC power from a magnetic field formed by the main winding. . In addition, a fourth winding 6 for receiving an RF (high frequency) signal is provided at a predetermined interval from the first winding 4. On the other hand, the portable device 2 is provided with a secondary winding 5 of a transformer for energy transfer and a tertiary winding 7 for transmitting an RF signal at regular intervals.

The plan view 101 shows the shape of each transformer winding 5, 7 installed in the portable device 2, and the cross-sectional view 102 shows the transformer with the portable device 2 placed on the charging matrix 1. The cutaway is shown in the center, and the plan view 103 shows the respective transformer windings 4 and 6 installed in the charging matrix 1.

The primary side of the transformer for energy delivery is implemented with a cylindrical ferrite core 3 consisting of a central projection 3-1 and an outer projection 3-2 on the charging matrix. Control between the main winding 4 on the primary side of the transformer and the power circuit for transferring energy to the secondary side of the transformer is provided between the central protrusion 3-1 and the outer protrusion 3-2 of the ferrite core 3. The auxiliary winding 10 as a means for winding is wound up.

The corresponding transformer secondary winding 5 for energy transfer is configured on the ferrite sheet 8 under the portable device. The secondary windings 5 are formed at a slight interval perpendicular to the position opposite to the primary winding 4 for energy transmission transformer of the charging matrix 1. The smaller the vertical gap is, the better, but the ferrite sheet 8 is mounted inside the portable device 2, so that the space is about 1 mm due to the space inevitably generated by the thickness of the outer wall of the case of the portable device.

The position on which the secondary winding 5 of the energy-receiving transformer is wound on the ferrite sheet 8 is located at a position corresponding between the central protrusion 3-1 and the outer protrusion 3-2 of the cylindrical ferrite core 3. Is installed. For this reason, it is preferable to use a thin film winding as the secondary winding 5.

The tertiary winding 7 for transmitting the RF signal is separately installed at a horizontal distance from the secondary winding 5 of the energy receiving transformer on the ferrite sheet 8 of the portable device 2. Alternatively, it should be possible to minimize the magnetic coupling with the secondary winding as much as possible. On the other hand, the fourth winding (6) for receiving the RF signal should be installed on the charging matrix (1) side so that it can be magnetically coupled with the third winding (7), the ordinary PCB board (9) Can be installed on These two windings (6, 7) are installed for the purpose of transmitting and receiving the information about the state of charge of the battery to the RF signal, and because it is not intended for the transmission of power, using a small winding using a small winding Or it can be implemented as a polygon.

FIG. 1B is a view for implementing the secondary winding 5 as a thin film-type winding, using both sides on a thin flexible substrate. In particular, it is helpful to obtain one desirable characteristic if formed at regular intervals between the winding and the winding of the secondary winding (5) as shown. In a practical situation, when a user places a portable device 2 on the charging matrix 1 to charge a battery in the portable device 2, the portable device on the position of the primary winding 4 of the charging matrix 1 It is not easy

to put the secondary windings (5) in (2) exactly in position. If the two windings are out of position, the efficiency of energy transfer from the primary side to the secondary side becomes worse. In the present invention, in consideration of such a case in advance by forming a predetermined interval between the winding and the winding of the secondary winding (5), even if there is a significant position error when the user puts the portable device on the charging matrix And to minimize the impact on charging.

1C shows the primary winding 5 of the portable device 2 with the distance (horizontal axis: d2) from the primary winding 4 of the charging matrix 1 shifted from 0 mm to 6 mm, respectively. 4) is a graph showing the terminal voltage Vo appearing at both ends of the secondary winding 5 when a high frequency AC voltage of a certain magnitude is applied. In addition, a, b, c, and d show the cases where the spacing between the windings of the secondary windings 5 and the windings is changed to several values, respectively. As shown, the smallest change with respect to the change of d2 is in the case of c, which means that it is most preferable to set the distance between the winding of the secondary winding 5 and the winding to about 4 mm.

2 is a block diagram of a structure and a control circuit of a non-contact charging system according to the present invention. Hereinafter, the configuration and function of each block will be described in detail.

The low frequency AC / DC rectifier 11 receives a low frequency AC input voltage, such as 110V or 220V, and converts it into direct current. The converted DC voltage Vdc varies according to a change in the input voltage.

The Free Volt DC / DC converter 12 outputs a constant DC voltage Vs despite the change in the DC voltage Vdc obtained from the low frequency AC / DC rectifier 11.

The high frequency parallel resonant inverter 13 receives the DC voltage Vs input from the prevolt DC / DC converter 12 and converts the DC voltage into high frequency AC power.

The converted high frequency AC output belongs to the charging matrix 1, and in order to transfer this energy to the spatially separated portable device 2, the distance existing between the two devices must be overcome. This is possible through magnetic coupling, and for this purpose, the primary winding 4 wound around the primary core 3 is installed on the charging matrix 1 side to form a magnetic field by the high frequency alternating current power. The secondary winding 5 of the portable device 2 for receiving the AC power from the primary winding 4 at the position is provided above the ferrite sheet 8.

The high frequency AC / DC rectifier 15 serves to convert high frequency AC power received through the secondary winding 5 into DC power and provide the same to the storage battery 16 in the portable device 2.

The charging control circuit 17 detects information indicating the state of charge of the battery 16 and controls the current flowing through the high frequency AC / DC rectifier 15 and the voltage across the battery 16 for the purpose of controlling the charging mode. It detects and decides whether to control in either current mode or voltage mode to make and output a control signal.

The RF modulation and transmission circuit 18 is for wireless transmission of the state of charge received from the charge control circuit 17. The RF modulation and transmission circuit 18 modulates the input data into a radio signal and applies the modulated signal to the tertiary winding 7. . The tertiary winding 7 is for forming a high frequency magnetic field at a predetermined position on the ferrite sheet 8.

The RF reception and demodulation circuit 20 is separated from the tertiary winding 7 and receives a signal through the quaternary winding 6 for receiving an RF signal from the high frequency magnetic field formed by the tertiary winding. Demodulate

A pulse width modulation (PWM) control circuit 21 receives a demodulated signal from the RF reception and

demodulation circuit 20 and receives a pulse width modulated signal to control the prevolt DC / DC converter 12. Make.

Finally, the compensation circuit 14 removes the ripple component by directly returning only the ripple component from the output voltage Vs of the prevolt DC / DC converter 12 to the PWM control circuit 21. For example, when the low-frequency AC input power frequency is 60 Hz in the output waveform of the low-frequency AC / DC rectifier 11, a ripple component corresponding to 120 Hz is mainly generated, and the compensation circuit 14 charges the battery 16. In order to prevent the phenomenon affecting the current, it is removed beforehand.

3 illustrates a circuit of a low frequency AC / DC rectifier 11. This is a conventionally used circuit, the AC input power is rectified through the four diodes (D1-D4) is converted into a direct current power supply (Vdc) across the capacitor (C1).

4 illustrates a specific circuit of a prevolt DC / DC converter 12 implemented using a power MOSFET (Metal-Oxide-Semiconductor Field-Effect-Transistor: M1). Such a circuit is also commonly used as a flyback converter. In the flyback converter, when the MOSFET M1 conducts, Vdc is applied to the primary N11 side of the transformer 22 so that current is increased, and energy is stored in the excitation inductance of the transformer 22. When the MOSFET M1 is turned off, current flows through the diode D6 on the secondary N12 side and the voltage of the capacitor C2 rises. In this way, the energy stored in the excitation inductance in the primary circuit is released to the secondary circuit to generate a DC voltage (Vs) across C2. The magnitude of the DC voltage Vs can be controlled by adjusting the conduction time of the MOSFET M1 by the PWM control circuit 21.

5 shows a specific structure of the high frequency parallel resonance inverter 13. The role of this circuit is to receive the DC output voltage (Vs) of the prevolt DC / DC converter 12 and convert it into high frequency AC power. The parallel resonant inverter has two MOS transistors M2 and M3, and the L-C resonant circuit composed of the magnetizing inductance of the primary side 4 of the separate transformer and the capacitor C3 is connected to the two transistors. The center point of the primary winding 4 of the separate transformer is connected to the inductor L1, and the other terminal of the inductor L1 is connected to the output voltage Vs of the prevolt DC / DC converter 12.

The operation of the parallel resonant inverter 13 is as follows. The two transistors M1 and M2 are alternately turned on and off, and when the inductor L1 connected to the power supply side is large enough, a current close to the square wave flows to the primary winding 4 of the transformer. The L-C resonant circuit ensures that only the voltage of the fundamental wave component included in such square wave current appears well across the transformer. Therefore, the voltage waveform appearing on both ends of the primary winding 4 becomes a sine wave, and switching losses of the two transistors M1 and M2 coincide with the resonance period can minimize the switching loss and greatly increase the switching frequency. Considering the operating frequency of the existing power MOS switch, it can be said that this operating frequency ranges from about several hundred kHz to several MHz.

If the parallel resonant inverter 13 is composed of a bipolar transistor, it can be operated by the auxiliary winding 10 of the separate transformer. However, in the case of using the MOS transistor as in the present invention, self-operation does not work well. The reason for this is, firstly, in such a parallel resonant inverter, a very high voltage appears at both ends of the primary winding 4, but the MOS transistor is weak in high voltage as compared to the bipolar transistor. Second, since the MOS transistor has a high threshold voltage between the gate sources, it is difficult to easily drive only the voltage waveform appearing across the auxiliary winding 10. For this reason, it can be said that the bipolar transistor has been mainly used in the parallel resonant inverter.

One of the characteristics of the present invention is implemented to be operable using a MOS transistor in a parallel resonant inverter, the reason for doing so is as follows. First, since the power to be implemented in

the present invention is only a few W, the MOS transistor is suitable because the power to be delivered is not large. Secondly, by adopting the method in front of the pre-volt DC / DC converter 12, it is possible not only to obtain a constant DC output voltage Vs despite the change of the AC input power, but also to control the DC voltage Vs low. This is because control is possible to operate in the breakdown voltage range of the MOS transistors M1 and M2. Finally, and most importantly, MOS transistors have a faster switching speed than bipolar transistors, allowing them to operate at higher frequencies. In other words, MOS transistors are advantageous for operating at several MHz, because higher frequencies of high-frequency magnetic fields are more effective for delivering energy at high density with low weight and volume for portable devices that are spatially separated.

However, in order for the circuit using the MOS transistor to operate autonomously, additional gate amplifiers A1 and A2 associated with the auxiliary winding 10 are additionally required. There are two main roles of gate amplifiers here. One is that since the voltage waveform generated in the primary winding 4 is a sinusoidal waveform, the signal appearing in the auxiliary winding 10 is also in the form of a sinusoidal waveform. The circuit does not operate well because the threshold voltage, which is the threshold voltage of the gate, is determined. Thus, the role of the gate amplifier in this circuit is to reliably switch the MOS transistor on and off by changing the sinusoidal wave to a square wave at high speed. Second, in normal operation, the maximum voltage applied to the gate of the MOS transistor is applied to an appropriate value to ensure safe operation below the maximum rating that the gate can withstand.

FIG. 6 illustrates the structure of the gate amplifiers A1 and A2 that may be used in the parallel resonant inverter of FIG. 5, and may be implemented using a conventional high speed analog comparator chip. One example is a form constructed using a transistor. Transistor Q1 is responsible for amplification, and Q2 and Q3 are output transistors for current amplification. Two resistors R2 and R3 are connected in series between the auxiliary winding 10 of the separate transformer and the base of the transistor Q1, the middle of which is a diode D7 connected between the ground and one across the resistor R2. Capacitors C4 are connected in parallel. In addition, the center point of the auxiliary winding 10 is connected to the power supply Vcc of the control circuit through the resistor R1. Therefore, initially, the oscillation starts as charging of the parallel resonant circuit starts due to a current flowing from Vcc through the path formed by the bases of the resistors R1, R2, R3 and Q1. In the steady state switching operation, the high-speed operation is possible since the turn-on or turn-off of Q1 is possible at a high speed by the role of C4.

7A to 7C illustrate three structures of the high frequency AC / DC rectifier 15 installed in connection with the secondary winding 5 of the portable device side split type transformer. These circuits are also characteristic circuits of the present invention. FIG. 7A is a structure in which full-wave rectification is performed using two diodes D8 and D9 using the center point of the secondary winding 5 of the split-type transformer. Secondary winding (5) having no center point is used, but the structure is full-wave rectified using four diodes (D81, D82, D91, D92). On the other hand, Figure 7c is a slightly different form from the previous two structures by using the two diodes (D81, D91) and two capacitors (C61, C62) to obtain the output voltage waveform in the form of full-wave rectification while doubling at the same time It is a structure back rectified.

The structure of the full-wave rectification or back-pressure rectification circuit as described above is well known in the art, but the present invention is characterized by using a form consisting of passive elements. That is, there is a feature of the present invention in the configuration of a filter section formed of C6 (or C61, C62) and L2 as a filter connected after being converted into direct current, including R5 and C5 connected between both ends of the secondary winding 5. This configuration appears when operating in conjunction with the high frequency parallel resonance type inverter unit 13. In general, the structure of the filter is that the inductor is connected immediately after the diode rectifier, and then the capacitor is connected, but the reason why the order is reversed in the present invention is in this way in connection with the high frequency parallel resonance inverter unit 13 In operation, the voltage across C6 (or C61, C62) is much lower than in the conventional structure, and the capacitance is also smaller, which is effective in reducing the ripple of the current flowing in the inductor L2. to be. Lowering the voltage across the capacitors C6 (or C61, C62) also has the effect of lowering the voltage between the primary windings 4 on the side of the high frequency

parallel resonance inverter 13, which is also the MOS switch (M2, M3). This will reduce the maximum voltage stress at both ends.

In addition, R5 and C5 connected to both ends of the secondary winding 5 in FIGS. 7A to 7C are blocked by reverse recovery current flowing when the rectifying diodes are turned from on to off. It acts as a snubber to reduce the voltage and at the same time reduce the turn-off losses of the diodes. Finally, the role of the capacitors C61 and C62 in the back pressure rectifier circuit is different in that it doubles the DC voltage of the output, but the remaining role is the same as that of C6. If the back pressure rectification circuit is adopted, there is an advantage that the number of secondary windings 5 can be minimized.

The last issue to be mentioned in FIGS. 7A to 7C is for the structure of the inductor L2. That is, since the inductance of the inductor L2 must act as a filter, a large value of inductance is required. However, since the charging current must flow through the inductor L2, the inductor L2 must not be saturated even when a large charging current flows. In implementing the charging circuit, if the inductor L2 that satisfies these conditions is to be implemented by using a separate element, it becomes a big obstacle in pursuing light and small size of the portable device due to the size problem. Therefore, in the present invention, as illustrated in FIG. 1B, the inductor L2 is solved by a planar shape in which the inductor L2 is separated from the secondary winding 5 of the split type transformer at a predetermined distance by a flat shape. By implementing in this manner, the inductor L2 is not saturated even when a large DC current for charging flows, so that it is possible to maintain a considerable inductance and perform a good role as a filter.

FIG. 8 illustrates the charging control circuit 17 in detail, and may be regarded as an implementation of a concept generally used in a circuit for charging an existing battery.

That is, if the voltage Vbb of the battery is lower than the reference voltage Vr, the output of the voltage comparator 31 is in a 'high' state, and thus the output signal Vf of the gate 33 is the current comparator 32. Follow the output of). In this case, it is charged in the form of a constant current source by the role of the current comparator 32, the charging current (Ibb) is constantly controlled to the value of the reference current source (Ir).

On the other hand, when the voltage Vbb of the battery increases and tries to be higher than the reference voltage Vr, the charging mode is changed in the form of a constant voltage source while the role of the voltage comparator 31 appears. In this case, since the magnitude of the charging current Ibb becomes smaller than the value of the reference current source Ir and the output of the current comparator 32 remains in a high state, the output signal Vf of the gate 33 in this case is maintained. Is followed by the output of the voltage comparator 31 as it is.

9 illustrates an RF modulation and transmission circuit 18, in which a gate for modulating the high frequency signal of the RF generator 36 and sending it to the buffer 35 in accordance with the output signal Vf of the charge control circuit 17 is shown. 34 are connected. The output of the buffer 35 is applied to the tertiary winding 7 provided on the ferrite sheet 8 of the portable device 2.

FIG. 10 illustrates an RF reception and demodulation circuit unit 20, which receives and demodulates an RF signal through a fourth winding 6 installed on a PCB substrate 9 of a charging matrix 1, and outputs a final output signal. The signal Vp is such that the control signal Vf sent from the charging control circuit 17 is restored. The circuit for signal processing includes a high pass filter (HPF), a peak detector (PD), and a comparator 36. Each operation is as follows. First, the reason why the high pass filter (HPF) is required is that the RF signal received through the 4th winding (6) contains low frequency band noise, especially the high frequency parallel resonance type inverter (13) to receive a large switching frequency Therefore, it is necessary to remove this component. That is, even if the inverter 13 operates at a high frequency, it corresponds to a low frequency compared to the RF signal, and thus a high pass filter is required to separate and receive the RF signal. After this, the peak detector PD and the comparator 36 are used to restore the control signal Vf of the charge control circuit 17 at the output Vp.

11A and 11B illustrate a block diagram and a circuit diagram of a pulse width modulation (PWM) control circuit 21, respectively, and receive a demodulated signal Vp from the RF reception and demodulation circuit 20 to receive a pre-volt DC / DC. Produce a pulse width modulated (PWM) signal for controlling the converter 12. This circuit consists of an integrator 41, a triangle wave generator 42, and a comparator 43. The integrator 41 receives and demodulates the demodulated signal Vp, and the output of the integrator 41 is compared with the output of the triangular wave generator 42 in the comparator 43 to generate a PWM signal. The PWM signal generated in this way is applied to the MOSFET (M1) gate of the pre-volt DC / DC converter 12 to control the DC output voltage (Vs).
ADVANTAGEOUS-EFFECTS

In the non-contact charging system according to the present invention, the secondary side of the split-type transformer forming an inductive coupling for the compact and light weight of the charging device is easy to be mounted on the battery of the portable device, and the state of charge of the battery is wirelessly charged. It can be transferred to the parent and controlled. Therefore, the charging system according to the present invention can be said to have a great effect of providing a variety of designs for convenience, safety and aesthetics for portable devices such as mobile phones, MP3 players, etc. to be further miniaturized and lightweight.

Claims

In a non-contact charging system for charging a battery mounted in a portable device from a charging mother using an inductive coupling method,
The charging matrix may include a low frequency AC / DC rectifier that receives a low frequency AC voltage and converts the DC voltage into a DC voltage;
A pre-volt DC / DC converter which generates and outputs a constant DC voltage regardless of the magnitude of the DC voltage;
A high frequency parallel resonant inverter for receiving the constant DC voltage and converting the same into high frequency AC power;
A ferrite core connected to the high frequency parallel resonant inverter; And
And a primary winding installed between the center protrusion and the outer protrusion of the ferrite core and receiving the high frequency AC power and transferring the inductive coupling to the portable device.
The portable device includes a thin ferrite sheet;
A thin-film secondary winding installed on the ferrite sheet so as to face the primary winding to receive the AC power from the primary winding; And
And a high frequency AC / DC rectifier for converting the AC power received by the secondary winding into DC power and providing the battery to a storage battery.
The method of claim 1,
The portable device may include a charge control circuit configured to inspect a state of charge of the battery and generate and output a control signal; And
And an RF modulation and transmission circuit for receiving the control signal and modulating it into an RF signal for wireless transmission.
The charging matrix may include: an RF reception and demodulation circuit configured to receive and demodulate the RF signal to detect and output the control signal; And
And a PWM control circuit configured to receive the control signal and generate a pulse width modulated signal to be applied to the prevolt DC / DC converter to adjust the DC voltage.
The method of claim 2,
The portable device may further include a tertiary winding installed on the ferrite sheet at a predetermined distance from the secondary winding and connected to the RF modulation and transmission circuit to form a high frequency magnetic field by the RF signal.
The charging matrix, the fourth winding is installed in a position opposite to the third winding and connected to the RF receiving and demodulation circuit to wirelessly receive the high frequency magnetic field and to

transmit to the RF receiving and demodulation circuit; Non-contact charging system characterized in that it comprises.
The method of claim 2,
The charging matrix further comprises a compensation circuit for detecting the ripple component from the output voltage of the pre-volt DC / DC converter and fed back to the PWM control circuit.
The method of claim 2,
The RF receiving and demodulation circuit includes a high-pass filter for removing a driving frequency component of the high frequency parallel resonance inverter input together with the RF signal before demodulating a control signal from the RF signal. system.
The method according to claim 1 or 2,
The high frequency parallel resonant inverter includes an inductor (L1); Capacitor C3; Two MOS transistors M2 and M3; And two gate amplifiers A1 and A2;
DC power supply (Vs) is connected to the middle terminal of the three terminals of the primary winding through the inductor, and the capacitor and the drain of the two MOS transistors to form a resonance at both ends of the primary winding Connected,
The sources of both MOS transistors are grounded,
And the two gate amplifiers are respectively connected to gates of the two MOS transistors to amplify and apply signals received from the primary winding and the auxiliary winding of the primary winding.
The method of claim 6,
And the gate amplifier converts a sinusoidal voltage waveform generated from the auxiliary winding into a square wave shape.
The method of claim 1,
The secondary winding has a center point, and the high frequency AC / DC rectifier uses the center point to perform full-wave rectification using two diodes (D8 and D9).
The method of claim 1,
The secondary winding has no center point, and the high frequency AC / DC rectifier is full-wave rectified using four diodes (D81, D82, D91, D92).
The method according to claim 8 or 9,
The high frequency AC / DC rectifier further comprises a filter comprising a capacitor (C6) connected behind the rectifier of the diode and an inductor (L2) connected behind the capacitor.
The method of claim 10,
The inductor (L2) is a non-contact charging system, characterized in that the planar structure of the shape separated by a certain distance on the same plane as the secondary winding.
The method according to claim 8 or 9,
The high frequency AC / DC rectifier further comprises a resistor (R5) and a capacitor (C5) connected in series.
The method of claim 1,
The high frequency AC / DC rectifier is provided with two diodes (D81, D91) and two capacitors (C61, C62), to obtain a form of full-wave rectification of the output voltage waveform, and at the same time to increase the voltage back to double rectification, characterized in that Contactless charging system.
The method of claim 13,
And the high frequency AC / DC rectifier further comprises a filter comprising two capacitors (C61, C62) connected behind the rectifier of the diode and an inductor (L2) connected behind the capacitor.
The method of claim 14,
The inductor (L2) is a non-contact charging system, characterized in that the planar structure of the shape separated by a certain distance on the same plane as the secondary winding.
The method of claim 15,
The high frequency AC / DC rectifier further comprises a resistor (R5) and a capacitor (C5) connected in series.

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(19)대한민국특허청(KR)
(12) 등록특허공보(B1)

(51) 。Int. Cl.[7]
H02J 7/00

(45) 공고일자 2004년10월08일
(11) 등록번호 10-0451606
(24) 등록일자 2004년09월23일

(21) 출원번호 10-2002-0059462
(22) 출원일자 2002년09월30일

(65) 공개번호 10-2004-0028312
(43) 공개일자 2004년04월03일

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심사관 : 이창용

(54) 유도 결합에 의한 비접촉식 충전 시스템

요약

본 발명은 고주파 자계를 발생시켜 유도 결합을 통하여 휴대형 장치의 축전지를 충전하기 위한 시스템에 관한 것으로, 유도 결합을 위한 고주파 변압기의 1차 측은 동심원 형태의 페라이트 코어를 사용하여 권선을 감아서 구성하고, 2차 측은 1차측과는 일정한 간극을 사이에 두고 얇고 편평한 페라이트 시트 상에 역시 얇은 평면형으로 권선을 설치해서 구성하여 휴대폰과 같이 부피와 무게가 작고 가벼운 장치에 설치가 용이하도록 하였으며, 충전을 위한 에너지는 1차 측으로부터 2차측으로 전기적 접촉점이 없이 전자 유도결합에 의해 비접촉 방식에 의하여 전달된다. 또한, 축전지의 충전상태는 2차 측으로부터 1차 측으로 무선으로 전달하는 방식을 사용하되 역시 평면형의 1차 및 2차권선을 각각 감아서 서로 약간의 간극을 사이에 두고 대향시켜 배치함으로써 송신과 수신이 이루어지도록 하였다.

대표도

도 2

색인어

충전기, 유도 결합, 비접촉식, 고주파 병렬공진형 인버터, 무선통신

명세서

도면의 간단한 설명

도 1a는 본 발명에 따른 비접촉식 충전 시스템의 충전 모체 위에 휴대형 장치를 올려놓은 상태에서 변압기를 중심으로 하여 도시한 단면도(102) 및 각각의 평면도(101, 103),

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도 1b는 휴대형 장치내의 분리형 변압기 2차권선을 얇은 박막형태의 권선으로 구현하기 위한 방안으로 얇은 플렉시블(flexible) 기판 상에 양면을 이용하여 구현한 모습을 예시한 도면,
도1c는 휴대형 장치내의 2차권선을 충전 모체의 1차권선으로부터의 거리(d2)가 어긋나게 하면서, 1차권선에 일정 크기의 고주파 교류전압을 인가할 때 2차권선 양단에 나타나는 단자전압을 도시한 그래프,
도 2는 본 발명에 따른 비접촉식 충전 시스템의 구성 및 제어방식을 보여주는 블록도,
도 3은 저주파 AC/DC 정류기의 회로를 예시한 도면,
도 4는 파워 MOSFET을 사용하여 구성한 프리볼트 DC/DC 컨버터의 회로를 예시한 도면,
도 5는 고주파 병렬공진형 인버터의 회로를 도시한 도면,
도 6은 도 5의 게이트증폭기의 구조를 예시한 도면,
도 7a 내지 도 7c는 휴대형 장치 내의 분리형 변압기 2차권선에 연결하여 설치한 고주파 AC/DC 정류기의 세가지 다른 구조를 예시한 도면,
도 8은 전류모드와 전압모드 중에서 하나를 선택하여 충전하도록 하기 위한 제어회로를 도시한 도면,
도 9는 본 발명에 따른 RF 변조 및 송신회로를 예시한 도면,
도 10은 본 발명의 RF 수신 및 복조회로를 예시한 도면,
도 11a 및 도 11b는 각각 PWM 제어회로의 구성 및 회로를 예시한 도면.

발명의 상세한 설명

발명의 목적

발명이 속하는 기술 및 그 분야의 종래기술

본 발명은 휴대형 장치에 사용되는 축전지를 비접촉식으로 충전하기 위한 소형경량화된 충전 시스템에 관한 것으로, 더욱 상세하게는 충전 모체로부터 축전지측에 고주파 자계를 발생시켜 얇은 평면형의 분리된 공간을 사이에 두고 유도 결합을 통하여 에너지를 전달하는 방식을 사용함으로써 휴대형 장치내의 축전지에 접촉단자를 통하지 않고 충전하기 위한 비접촉식 충전 시스템에 관한 것이다.
일반적인 휴대형 장치에는 축전지가 장착되어 있어서 사용자가 이동하면서 사용할 수 있도록 되어 있다. 이러한 축전지를 충전하기 위해서는 일반 전원과 연 결하여 휴대형 장치의 축전지에 에너지를 제공하기 위한 충전 모체가 필요하다. 통상적으로 충전 모체와 축전지에는 외부에 각각 별도의 접촉 단자가 구성되어 있어서, 두 접촉 단자를 서로 접속시킴으로써 필요에 따라 선택적으로 축전지를 충전할 수 있도록 되어 있다.
그러나, 축전지와 충전 모체에 접촉 단자를 구성하면 접촉 단자가 외부에 돌출됨에 따라 미관상 좋지 않고, 접촉 단자가 외부의 이물질에 오염되어 접촉 상태가 불량해질 수 있는 단점이 있다. 또한, 사용자의 부주의로 인해 축전지에 단락이 발생하거나 습기에 노출되면 충전 에너지가 소실될 수 있다.
종래에도 이러한 문제를 해결하기 위하여, 축전지와 충전 모체에 각각 접촉 단자를 구성하지 않고 비접촉식으로 충전할 수 있는 방식이 개발되어 있으며, 일부 응용 분야 (예를 들어, 전동 칫솔, 전기 면도기 등)에서 이용되고 있다. 이러한 종래의 비접촉식 충전 방법도 역시 고주파로 동작하는 변압기의 1차 회로를 충전 모체에 구성하고, 2차 회로를 휴대형 장치 내에 구성함으로써 충전 모체로부터 에너지를 자기 결합에 의하여 휴대형 장치의 축전지에 제공하는 방식이라는 점에서는 본 발명과 공통되는 점이 있다.
그러나 상기의 비접촉식 충전 방식은 통상적으로 변압기의 1차 회로뿐만 아니라 2차 회로에도 무게와 부피가 있는 페라이트 코어가 이용되며, 페라이트 코어의 무게와 부피 때문에 휴대폰과 같이 초소형 기기에 적용하기에는 적합하지 못하다는 문제가 있었다.

발명이 이루고자 하는 기술적 과제

본 발명은 상기 문제점의 해결을 위해, 충전 모체와 휴대형 장치 사이에 약간의 간극을 두고 고주파로 변환시킨 자기장의 유도 결합을 이용하여 휴대형 장치 내의 축전지를 충전하기 위한 충전 시스템에 있어서, 휴대형 장치 측에 설치되는 결합부를 평면형으로 제작하여 소형경량화한 비접촉식 충전 시스템을 제공함을 목적으로 한다.
또한, 축전지의 충방전 상태를 체크하여 실시간으로 제어하는 비접촉식 방식의 충전 장치를 제공함을 목적으로 한다.

발명의 구성 및 작용

본 발명은 상기 목적의 해결을 위해, 유도 결합 방식을 사용하여 충전 모체로부터 휴대형 장치에 장착된 축전지를 충전하는 비접촉식 충전 시스템에 있어서, 상기 충전 모체는, 저주파 교류입력 전압을 받아 직류전압으로 변환하여 출력하는 저주파 AC/DC 정류기; 상기 직류전압의 크기에 관계없이 일정한 직류전압을 만들어 출력하는 프리볼트 DC/DC 컨버터; 상기 일정한 직류전압을 받아 고주파 교류 전력으로 변환하여 출력하는 고주파 병렬공진형 인버터; 상기 고주파 병렬공진형 인버터에 연결되는 페라이트 코어; 및 상기 페라이트 코어의 중앙돌출부와 외곽돌출부 사이에 설

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치되고, 상기 고주파 교류 전력을 받아 유도결합에 의해 상기 휴대형 장치 측으로 전달하는 1차권선;을 구비하고, 상기 휴대형 장치는, 얇은 페라이트 시트; 상기 1차권선으로부터 상기 교류 전력을 수수하기 위하여 상기 1차권선에 대향 하도록 상기 페라이트 시트 상에 설치되는 얇은 박막형의 2차권선; 및 상기 2차권선이 수수한 교류 전력을 직류 전력으로 변환하여 축전지에 제공하는 고주파 AC/DC 정류기;를 구비하는 것을 특징으로 하는 비접촉식 충전 시스템을 제공한다.

또한, 상기 휴대형 장치는, 상기 축전지의 충전상태를 검사하여 제어신호를 생성하고 출력하는 충전제어회로; 및 상기 제어신호를 받아 RF 신호로 변조하여 무선 송출하는 RF 변조 및 송신회로;를 더 구비하고, 상기 충전 모체는, 상기 RF 신호를 수신하고 복조하여 상기 제어신호를 검출하여 출력하는 RF 수신 및 복조회로; 및 상기 제어신호를 받아 펄스폭 변조 신호를 만들어 상기 프리볼트 DC/DC 컨버터에 인가함으로써 직류전압을 조정하도록 하는 PWM 제어회로;를 더 구비하는 것을 특징으로 하는 비접촉식 충전 시스템을 제공한다.

이하에서 첨부된 도면을 참조하여 본 발명의 실시예들을 설명한다.

도 1a는 본 발명에 따른 충전 시스템에 있어서 변압기의 원리인 자력선을 매개로 하여 비접촉 방법으로 에너지를 전달하기 위한 코어 부분에 대한 단면도(102)와 평면도(101, 103)를 동시에 도시하고 있다.

본 발명에서 제안하는 충전 시스템은 단면도(102)에 도시된 바와 같이 충전 모체(1) 측과 휴대형 장치(2) 측으로 나누어서 생각할 수 있다. 충전 모체(1)에는 에너지 송출을 위한 분리형 변압기의 1차권선이 설치되는데, 자계를 형성하는 주권선(4)과 주권선에 의해 형성된 자계로부터 교류 전력을 유도하는 보조권선(10)으로 구성된다. 또한, RF(고주파)신호 수신을 위한 4차권선(6)이 1차권선(4)과 일정한 간격을 두고 설치된다. 한편, 휴대형 장치(2)에는 에너지 수수를 위한 변압기의 2차권선(5)이 설치되며 RF신호 송출을 위한 3차권선(7)이 일정한 간격을 두고 설치된다.

평면도(101)는 휴대형 장치(2)에 설치된 각각의 변압기 권선(5, 7)의 형태를 도시한 것이고, 단면도(102)는 충전 모체(1) 위에 휴대형 장치(2)를 올려놓은 상태에서 변압기를 중심으로 하여 절단한 모습을 도시한 것이며, 평면도(103)는 충전 모체(1)에 설치된 각각의 변압기 권선(4, 6)을 도시한 것이다.

에너지 송출을 위한 변압기의 1차 측은 충전 모체에 중앙 돌출부(3-1)와 외곽 돌출부(3-2)로 구성되는 원통형의 페라이트 코어(3)로 구현된다. 페라이트 코어(3)의 중앙 돌출부(3-1)와 외곽 돌출부(3-2) 사이에는 변압기의 2차 측으로 에너지를 전달하기 위한 변압기의 1차 측의 주권선(4)과 전력회로의 제어를 위한 수단으로서의 보조권선(10)이 권취된다.

이에 대응하는 에너지 수수를 위한 변압기 2차권선(5)은 휴대형 장치 하부의 페라이트 시트(8) 상에 구성된다. 2차권선(5)은 충전 모체(1)의 에너지 송출용 변압기 1차권선(4)과 대향하는 위치에 수직으로 약간의 간격을 두고 형성된다. 이 수직 간격은 작을수록 바람직하지만, 페라이트 시트(8)가 휴대형 장치(2) 내부에 장착되게 됨으로써 휴대형 장치의 케이스 외벽 두께에 의하여 불가피하게 발생하는 공간 때문에 약 1mm 내외의 간격을 두게 된다.

페라이트 시트(8) 위에서 에너지 수수용 변압기의 2차권선(5)이 권취되는 위치는 원통형 페라이트 코어(3)의 중앙 돌출부(3-1)와 외곽 돌출부(3-2) 사이에 대 응하는 위치에 설치된다. 때문에, 2차권선(5)으로는 얇은 박막형태의 권선을 이용하는 것이 바람직하다.

RF신호의 송신을 위한 3차권선(7)은 휴대형 장치(2)의 페라이트 시트(8) 상에 에너지 수수용 변압기의 2차권선(5)과 수평으로 일정한 거리를 두고 별도로 설치되며, 1차 또는 2차권선과는 가급적 자기적인 결합을 최소화할 수 있도록 하여야 한다. 한편, RF신호의 수신을 위한 4차권선(6)은 충전 모체(1) 측에 설치하되 3차권선(7)과는 자기적으로 잘 결합될 수 있도록 하여야 하며, 보통의 PCB기판(9) 상에 설치가 가능하다. 이 두 권선(6, 7)은 배터리의 충전 상태에 관한 정보를 RF신호로 변조시켜 송수신하기 위한 목적으로 설치되는 것이며, 전력의 전달을 목적으로 하지 않기 때문에 가느다란 권선을 사용하여 작은 크기의 원형 또는 다각형으로 구현할 수 있다.

도 1b는 2차권선(5)을 얇은 박막형태의 권선으로 구현하기 위한 방안으로 얇은 플렉시블(flexible) 기판 상에 양면을 이용하여 구현한 모습을 예시한 것이다. 특히, 도시된 바와 같이 2차권선(5)의 권선과 권선사이에 일정한 간격을 두고 형성시킨다면 하나의 바람직한 특성을 얻는데 도움이 된다. 실제 상황에서 사용자가 휴대형 장치(2)내의 축전지를 충전하기 위하여 충전 모체(1) 위에 휴대형 장치(2)를 올려놓는다고 할 때, 충전 모체(1)의 1차권선(4) 위치 위에 휴대형 장치(2)의 2차권선(5) 위치를 정확하게 일치시켜서 올려놓는 일이 쉽지 않다. 이 두 권선 간의 위치가 어긋나게 되면 1차 측에서 2차 측으로의 에너지 전달 효율이 나빠지게 된다. 본 발명에서는 이와 같은 경우를 미리 고려하여 2차권선(5)의 권선과 권선 사이에 일정한 간격을 두고 형성시킴으로써, 사용자가 휴대형 장치를 충전 모체 위에 올려놓을 때 상당한 위치의 오차가 존재하는 경우에도 불구하고 충전에 미치는 영향을 최소화하도록 하였다.

도 1c는 휴대형 장치(2)의 2차권선(5)을 충전 모체(1)의 1차권선(4)으로부터의 거리(가로축:d2)가 각각 0mm에서 6mm 까지 어긋나게 위치시키면서, 1차권선(4)에 일정 크기의 고주파 교류전압을 인가할 때 2차권선(5) 양단에 나타나는 단자전압(Vo)을 도시한 그래프이다. 또한, a, b, c, d는 각각 2차권선(5)의 권선과 권선사이에 간격을 몇가지 값으로 변화시킨 경우를 도시한 것이다. 도시된 바와 같이 d2 의 변화에 대하여 가장 변화가 적은 것은 c의 경우이며, 이는 2차권선(5)의 권선과 권선사이에 간격을 4mm 정도로 하는 것이 가장 바람직함을 의미한다.

도 2는 본 발명에 따른 비접촉식 충전 시스템의 구조 및 제어회로를 블록다이아그램 형태로 정리한 것이다. 이하 각 블록의 구성 및 기능에 대하여 상술한다.

저주파 AC/DC 정류기(11)는 상용의 110V 또는 220V 등의 저주파 교류입력 전압을 받아서 직류로 변환하기 위한 것이며, 이렇게 변환된 직류전압(Vdc)은 입력전압의 변화에 따라 달라진다.

프리볼트(Free Volt) DC/DC 컨버터(12)는 상기 저주파 AC/DC 정류기로(11)부터 얻어지는 직류전압(Vdc)의 변화에도 불구하고 일정한 직류전압(Vs)을 출력한다.

고주파 병렬공진형 인버터(13)는 상기 프리볼트 DC/DC 컨버터(12)에서 입력 되는 직류전압(Vs)을 받아서 고주파 교류 전력으로 변환한다.

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이렇게 변환된 고주파 교류 출력은 충전 모체(1)에 속한 것이며, 이 에너지를 공간적으로 분리되어 있는 휴대형 장치(2)에 전달하기 위해서는 두 장치간에 존재하고 있는 간격을 극복하여야 한다. 이 것은 자기 결합을 통하여 가능하며, 이러한 목적으로 충전 모체(1) 측에는 1차 코어(3)에 권취된 1차권선(4)이 설치되어 상기 고주파 교류 전력에 의한 자계를 형성하며, 이에 대향하는 위치에 상기 1차권선(4)으로부터의 상기 교류 전력을 수수하기 위한 휴대형 장치(2)의 2차권선(5)이 페라이트 시트(8) 상부에 설치되어 있다.

고주파 AC/DC 정류기(15)는 상기 2차권선(5)을 통하여 수수한 고주파 교류 전력을 직류 전력으로 변환하여 휴대형 장치(2)내의 축전지(16)로 제공하는 역할을 한다.

충전제어회로(17)는 상기 축전지(16)의 충전상태를 나타내는 정보를 검출하여 충전모드를 제어하기 위한 목적으로, 고주파 AC/DC 정류기(15)에 흐르는 전류와 축전지(16) 양단의 전압을 검출하고 전류모드 또는 전압모드 중 어느 하나로 제어할 것인지를 결정하여 제어신호를 만들어 출력한다.

RF 변조 및 송신회로(18)는 상기 충전제어회로(17)로부터 입력받은 충전상태를 무선 송출하기 위한 것으로, 입력 데이터를 무선신호로 변조하고 이렇게 변조된 신호를 3차권선(7)에 인가한다. 3차권선(7)은 페라이트 시트(8) 상의 일정 위치에 고주파 자계를 형성하도록 하기 위한 것이다.

RF 수신 및 복조회로(20)는 상기 3차권선(7)과 분리되어 있고, 3차권선에 의 해 형성된 상기 고주파 자계로부터 RF 신호를 수신하기 위한 4차권선(6)을 통하여 신호를 수신하고 복조한다.

PWM(Pulse Width Modulation) 제어회로(21)는 상기 RF 수신 및 복조회로(20)에서 복조된 신호를 입력 받고, 상기 프리볼트 DC/DC 컨버터(12)를 제어하기 위하여 펄스폭 변조된 신호를 만든다.

마지막으로 보상회로(14)는 상기 프리볼트 DC/DC 컨버터(12)의 출력전압(Vs)으로부터 리플성분만을 PWM 제어회로(21)에 직접 귀환시켜 줌으로써 리플성분을 제거한다. 예컨대, 저주파 AC/DC 정류기(11)의 출력파형에서 저주파 교류 입력 전원 주파수가 60Hz라고 할 때 120Hz에 해당하는 리플성분이 주로 발생하는데, 보상회로(14)는 이 성분이 축전지(16)의 충전 전류에 영향을 주는 현상을 방지하기 위하여 이를 미리 제거하는 것이다.

도 3은 저주파 AC/DC 정류기(11)의 회로를 예시한 것이다. 이것은 기존에 많이 사용되는 회로로서 교류입력 전원이 네 개의 다이오드(D1-D4)를 통하여 정류되어 캐패시터(C1) 양단에 직류전원(Vdc)으로 변환된다.

도 4는 파워 MOSFET(Metal-Oxide-Semiconductor Field-Effect-Transistor: M1)을 사용하여 구현한 프리볼트 DC/DC 컨버터(12)의 구체적인 회로를 예시한 것이다. 이와 같은 회로 역시 기존에 많이 사용되는 구조로서, 플라이백(flyback) 컨버터라고 부르기도 한다. 플라이백 컨버터는 MOSFET(M1)이 도통할 때 변압기(22)의 1차(N11) 측에 Vdc가 인가되어 전류가 증가하면서 변압기(22)의 여자 인덕턴스 내에 에너지가 저장된다. MOSFET(M1)이 꺼지면 2차(N12) 측에서 전류가 다이오드 D6를 통하여 흐르고 캐퍼시터 C2의 전압은 상승한다. 이와 같은 방식으로, 1차 회로에서 여자 인덕턴스 내에 저장되는 에너지가 2차 회로로 방출되면서 C2 양단에 직류전압(Vs)을 발생시킨다. 직류전압(Vs)의 크기는 PWM 제어회로(21)에 의해서 MOSFET(M1)의 도통시간을 조절하여 제어가 가능하다.

도 5는 고주파 병렬공진형 인버터(13)의 구체적인 구조를 도시한 것이다. 이 회로의 역할은 상기 프리볼트 DC/DC 컨버터(12)의 직류출력 전압(Vs)을 받아서 고주파 교류 전력으로 변환하는 것이다. 병렬공진형 인버터는 두 개의 MOS 트랜지스터 M2, M3를 구비하고 있고, 이 두 트랜지스터에 분리형 변압기의 1차 측(4) 자화인덕턴스와 캐퍼시터(C3)로 구성된 L-C 공진회로가 연결되어 있다. 분리형 변압기의 1차권선(4)의 중앙점은 인덕터(L1)에 연결되며, 이 인덕터(L1)의 다른 단자는 프리볼트 DC/DC 컨버터(12)의 출력전압(Vs)에 연결된다.

병렬공진형 인버터(13)의 동작은 다음과 같다. 두 개의 트랜지스터 M1, M2는 교대로 온/오프되며, 전원측에 연결된 인덕터(L1)가 충분히 클 경우 구형파에 가까운 전류가 변압기의 1차권선(4)에 흐르게 한다. L-C 공진회로는 이와 같은 구형파 전류에 포함되어 있는 기본파 성분의 전압만 변압기 양단에 잘 나타나도록 한다. 따라서, 1차권선(4) 양단에 나타나는 전압파형은 정현파 형태가 되며 두 개의 트랜지스터 M1, M2의 스위칭이 공진주기와 일치하여 일어나도록 하면 스위칭 손실이 극소화되고 스위칭 주파수를 크게 높일 수 있다. 현존하는 파워 MOS 스위치의 동작 주파수를 고려할 때, 이 동작 주파수는 대략 수백 kHz 이상 수 MHz의 범위가 적당하다고 할 수 있다.

이 병렬공진형 인버터(13)가 만일 바이폴라 트랜지스터로 구성되어 있다면, 분리형 변압기의 보조권선(10)에 의해 자려식으로 동작할 수 있다. 그러나, 본 발명에서와 같이 MOS 트랜지스터를 사용하여 구현하고자 하는 경우에는 자려식 동작이 잘 되지 않는다. 그 이유는 첫째, 이와 같은 병렬 공진형 인버터에서는 1차권선(4) 양단에 매우 높은 전압이 나타나는데 MOS 트랜지스터는 바이폴라 트랜지스터에 비해서 고압에 약한 단점이 있다. 둘째, MOS 트랜지스터는 게이트 소스간의 임계전압이 높기 때문에 보조권선(10) 양단에 나타나는 전압파형만으로는 쉽게 구동하기가 어렵다는 단점이 있기 때문이다. 이상의 이유로 병렬공진형 인버터에서는 바이폴라 트랜지스터를 주로 사용하여 왔다고 할 수 있다.

본 발명의 특징 중 하나는 병렬공진형 인버터에 MOS 트랜지스터를 사용하여 동작 가능하도록 구현한 것이며, 그렇게 한 이유는 다음과 같다. 첫째는, 본 발명에서 구현하고자 하는 전력이 수W 정도에 불과하므로 전달하고자 하는 전력이 크지 않기 때문에 MOS 트랜지스터가 적당하기 때문이다. 둘째는, 프리볼트 DC/DC 컨버터(12)를 앞에 두는 방식을 채택함으로써 교류입력전원의 변화에도 불구하고 일정한 직류출력전압(Vs)을 얻을 수 있을 뿐아니라, 직류전압(Vs)을 낮게 제어함으로써 MOS 트랜지스터(M1, M2)의 내압범위에서 동작가능하도록 제어가 가능하다는 점 때문이다. 마지막으로 가장 중요한 이유는, MOS 트랜지스터가 바이폴라 트랜지스터에 비해서 스위칭 속도가 빠르기 때문에 더욱 높은 고주파에서 동작시키는 것이 가 능하다는 점이다. 즉 수MHz에서 동작하도록 하는데는 MOS 트랜지스터가 유리한데, 공간적으로 분리되어 있는 휴대형기기에 무게와 부피가 작으면서 고밀도로 에너지를 전달하기 위해서는 고주파 자계의 주파수가 높을수록 효과적이기 때문이다.

그러나, MOS 트랜지스터를 사용한 회로가 자려식으로 동작하기 위해서는 보조권선(10)과 연계시킨 별도의 게이트 증폭기(A1, A2)가 추가로 필요하게 된다. 여기에서 게이트 증폭기의 역할은 크게 두가지이다. 하나는, 1차권선(4)에

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서 발생되는 전압파형이 정현파 형태이기 때문에 보조권선(10)에서 나타나는 신호 또한 정현파의 형태인데, 이것이 그대로 MOS 트랜지스터의 게이트에 인가되는 경우에는 MOS의 도통과 차단 상태를 결정하는 게이트의 경계전압인 문턱전압이 높아서 회로가 잘 동작하지 않는다. 따라서, 이 회로에서 게이트 증폭기의 역할은 정현파를 구형파로 바꾸어줌으로써 MOS 트랜지스터의 온/오프 상태를 빠른 속도로 변화시키면서 확실하게 스위칭하여 주는 것이다. 두 번째는 정상동작시 MOS 트랜지스터의 게이트에 인가되는 최대전압이 게이트가 견딜 수 있는 최대정격 이하에서 안전한 동작이 이루어지도록 하기 위하여 적절한 값으로 인가해 주는 역할을 하는 것이다.

도 6은 도 5의 병렬공진형 인버터에서 사용될 수 있는 게이트 증폭기(A1, A2)의 구조를 예시한 것으로서, 기존에 상용화되어 있는 고속의 아날로그 비교기 칩을 사용해서도 구현이 가능하지만, 여기에서는 바이폴라 트랜지스터를 사용하여 구성한 형태를 한가지 예시한 것이다. 트랜지스터 Q1이 증폭을 담당하며, Q2 및 Q3는 전류 증폭을 위한 출력 트랜지스터이다. 분리형 변압기의 보조권선(10)과 트랜지스터 Q1의 베이스 사이에는 두 개의 저항(R2, R3)을 직렬로 연결하고, 그 중간 은 다이오드(D7)가 접지와의 사이에 연결되며, 저항 R2 양단에는 하나의 캐패시터(C4)가 병렬로 연결되어 있다. 또한, 보조권선(10)의 중앙점은 저항(R1)을 통하여 제어회로의 전원(Vcc)에 연결되어 있다. 따라서, 초기에는 Vcc 로부터 저항 R1, R2, R3 및 Q1의 베이스로 형성되는 경로를 통해서 흐르는 전류로 인하여 병렬공진회로의 충전이 시작되면서 자려발진이 시동된다. 정상상태의 스위칭 동작에서는 C4의 역할에 의해서 Q1의 턴온 또는 턴오프가 빠른 속도로 가능하게 되므로 고주파 동작이 가능하게 된다.

도 7a 내지 7c는 휴대형 장치 측 분리형 변압기의 2차권선(5)에 연결하여 설치한 고주파 AC/DC 정류기(15)의 세가지 구조를 예시한 것이다. 이 회로들 역시 본 발명의 특징적인 회로들로서, 도 7a는 분리형 변압기의 2차권선(5)의 중앙점을 이용하여 다이오드(D8, D9) 두 개를 사용하여 전파정류한 구조이고, 도 7b는 중앙점이 없는 2차권선(5)을 사용하되, 네 개의 다이오드(D81, D82, D91, D92)를 사용하여 전파정류한 구조를 보인 것이다. 한편, 도 7c는 앞의 두 구조와는 약간 다른 형태로서 두 개의 다이오드(D81, D91)와 두 개의 캐패시터(C61, C62)를 사용하여 출력전압파형을 전파정류한 형태로 얻으면서 동시에 2배로 상승시켜 배압 정류한 구조이다.

상술한 바와 같은 전파정류 또는 배압정류 회로의 구조는 이미 기존에 잘 알려진 방식이나, 본 발명에서는 수동소자로 구성된 형태를 사용함에 그 특징이 있다. 즉, 2차권선(5)의 양단간에 연결한 R5 및 C5를 포함하여 직류로 변환된 뒤에 연결된 필터로서 C6(또는 C61, C62)와 L2로 형성된 필터부의 구성에 본 발명의 특징이 있다. 이러한 구성은 고주파 병렬공진형 인버터부(13)와 연계하여 동작할 때 그 특징이 나타난다. 일반적인 필터의 구성은 다이오드 정류부 바로 다음에 인덕터가 연결되고 그 다음에 캐패시터가 연결되는 것이 보통이나, 본 발명에서 이렇게 순서를 서로 바꾸어 놓은 이유는 이렇게 함으로써 고주파 병렬공진형 인버터부(13)와 연계하여 동작할 때 C6(또는 C61, C62)양단의 전압이 기존의 구조를 채택하는 경우에 비해서 훨씬 낮아지게 되며, 캐패시턴스의 크기 또한 작아지면서 인덕터(L2)에 흐르는 전류의 리플을 더욱 작게 하는데 효과적이기 때문이다. 캐패시터 C6(또는 C61, C62) 양단의 전압이 낮아지는 것은 고주파 병렬공진형 인버터(13) 측에서도 1차권선(4) 양단간의 전압을 낮아지게 하는 효과가 있으며, 이것은 또 MOS 스위치(M2, M3) 양단의 최대 전압 스트레스를 낮추어 주는 효과가 있게 된다.

또한, 도 7a 내지 7c에서 2차권선(5) 양단에 연결한 R5와 C5는 정류다이오드들이 온 상태에서 오프 상태로 변화하는 순간 역회복전류가 흐르면서 차단되게 되는데, 이와 연계하여 발생할 수 있는 고압 스파이크 전압을 줄이면서 동시에 다이오드들의 턴오프 손실을 줄여주기위한 스너버 작용을 담당하는 역할을 한다. 마지막으로 배압정류 회로에 있어서의 캐패시터(C61, C62) 역할은 출력의 직류전압을 두배로 한다는 점이 상이하지만, 나머지의 역할은 C6의 그것과 동일하다. 이와 같은 배압정류회로를 채택한다면 2차권선(5)의 수를 최소화 할 수 있다는 장점이 있다.

도 7a 내지 7c에서 마지막으로 언급할 사안은 인덕터(L2)의 구조에 대한 것이다. 즉, 인덕터(L2)의 인덕턴스는 필터의 역할을 수행해야 하기 때문에 상당히 큰 값의 인덕턴스가 요구된다. 그러나 이 인덕터(L2)에는 충전전류가 흘러야 하기 때문에 큰 충전전류가 흐르는 상황에서도 포화상태에 빠져서는 안 된다. 충전회로를 구현함에 있어서 이러한 조건을 만족하는 인덕터(L2)를 별도로 개별소자를 사용하여 구현하고자 한다면 크기가 커지는 문제로 인하여 휴대기기의 경박단소화를 추구함에 있어서 큰 장애요소가 된다. 따라서, 본 발명에서는 도 1b에 예시한 바와 같이, 인덕터(L2)를 분리형변압기의 2차권선(5)과 동일한 평면상에서 일정한 거리를 두고 분리시킨 형태로 평면형으로 구현함으로써 상기 문제를 해결하였다. 이와 같은 방식으로 구현함으로써 충전을 위한 큰 직류전류가 흐르는 상황에서도 인덕터(L2)가 포화되지 않으므로 상당한 크기의 인덕턴스를 유지하는 것이 가능하게 되며 필터로서의 역할을 훌륭하게 수행할 수 있게 된다.

도 8은 충전제어회로(17)를 상세히 도시한 것으로서, 기존의 축전지를 충전하는 회로에서 일반적으로 사용되는 개념을 구현한 것이라고 할 수 있다.

즉, 축전지의 전압(Vbb)이 기준전압(Vr) 보다 낮은 상태라면 전압비교기(31)의 출력은 'high' 상태에 있게 되며, 따라서 게이트(33)의 출력신호(Vf)는 전류비교기(32)의 출력을 그대로 따라가게 된다. 이런 경우에는 전류비교기(32)의 역할에 의하여 정전류원 형태로 충전되며, 충전전류(Ibb)는 기준전류원(Ir)의 값으로 일정하게 제어된다.

한편, 축전지의 전압(Vbb)이 상승하여 기준전압(Vr) 보다 높아지려고 하면 전압비교기(31)의 역할이 나타나면서 정전압원의 형태로 충전모드가 바뀌게 된다. 이 때에는 충전전류(Ibb)의 크기가 기준전류원(Ir)의 값보다 작아지게 되며 전류비교기(32)의 출력이 'high' 상태에 머물러 있게 되므로, 이 경우의 게이트(33) 출력신호(Vf)는 전압비교기(31)의 출력을 그대로 따라가게 된다.

도 9는 RF 변조 및 송신회로(18)를 예시한 것으로서, 충전제어회로(17)의 출력신호(Vf)에 따라서 RF발생기(36)의 고주파신호를 변조하여 버퍼(35)에 보내주기위한 게이트(34)가 연결되어 있다. 버퍼(35)의 출력은 휴대형 장치(2)의 페라이트 시트(8) 상에 설치된 3차권선(7)에 인가된다.

도 10은 RF 수신 및 복조회로부(20)를 예시한 것으로서, 충전 모체(1)의 PCB기판(9) 상에 설치되어 있는 4차권선(6)을 통하여 RF신호를 수신하고 복조하여, 최종출력신호(Vp)는 충전제어회로(17)에서 보내준 제어신호(Vf)를 복원한

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것이 되도록 한다. 여기에서 신호처리를 위한 회로는 고역필터(HPF)와 피크검출기(PD) 및 비교기(36)로 구성되며 각각의 동작은 다음과 같다. 먼저 고역필터(HPF)가 필요한 이유는 4차권선(6)을 통하여 수신한 RF신호에는 저주파 대역의 잡음이 포함되어 있는데, 특히 고주파 병렬공진형 인버터(13)로부터 스위칭 주파수가 큰 값으로 수신되게 되므로 이 성분을 제거하기 위해서 필요하게 된다. 즉, 인버터(13)가 고주파로 동작한다고 하더라도 RF신호에 비해서는 저주파에 해당되므로, RF신호를 분리수신하기 위해서는 고역필터가 필요한 것이다. 이렇게 한 다음에 피크검출기(PD)와 비교기(36)를 거치면 출력(Vp)에서는 충전제어회로(17)의 제어신호(Vf)를 복원할 수 있게 된다.
도 11a 및 11b는 각각 PWM(Pulse Width Modulation) 제어회로(21)의 블록도와 회로도를 예시한 것이며, 상기 RF 수신 및 복조회로(20)로부터 복조된 신호(Vp)를 받아서 프리볼트 DC/DC 컨버터(12)를 제어하기 위한 펄스폭 변조(PWM)된 신호를 만들어 낸다. 이 회로는 적분기(41), 삼각파발생기(42), 비교기(43)로 이루어져 있다. 적분기(41)에서는 복조신호(Vp)를 받아서 적분하는 역할을 하며 적분기(41)의 출력은 비교기(43)에서 삼각파발생기(42)의 출력과 비교되어 PWM 신호를 발생시킨다. 이렇게 하여 발생된 PWM 신호는 프리볼트 DC/DC 컨버터(12)의 MOSFET(M1) 게이트에 인가되어 직류출력전압(Vs)을 제어하게 된다.

발명의 효과

본 발명에 따른 비접촉식 충전 시스템은, 충전 장치의 소형경량화를 위하여 유도결합을 이루는 분리형 변압기의 2차측을 평면상에 구성하여 휴대형 장치의 축전지에 장착하기 쉽게 하였고, 축전지의 충전상태를 무선으로 충전 모체에 전달하여 제어될 수 있도록 하였다. 따라서, 본 발명에 따른 충전 시스템은 앞으로 더욱 더 소형화, 경량화될 휴대폰, MP3 플레이어 등과 같은 휴대형 장치에 대하여 편리성과, 안전성 그리고 미관의 수려함을 위한 디자인의 다양성을 제공하는 효과가 크다고 할 수 있다.

(57) 청구의 범위

청구항 1.
유도 결합 방식을 사용하여 충전 모체로부터 휴대형 장치에 장착된 축전지를 충전하는 비접촉식 충전 시스템에 있어서,
상기 충전 모체는, 저주파 교류전압을 입력 받아 직류전압으로 변환하여 출력하는 저주파 AC/DC 정류기;
상기 직류전압의 크기에 관계없이 일정한 직류전압을 만들어 출력하는 프리볼트 DC/DC 컨버터;
상기 일정한 직류전압을 받아 고주파 교류전력으로 변환하여 출력하는 고주파 병렬공진형 인버터;
상기 고주파 병렬공진형 인버터에 연결되는 페라이트 코어; 및
상기 페라이트 코어의 중앙돌출부와 외곽돌출부 사이에 설치되고, 상기 고주파 교류전력을 받아 유도 결합을 통해 상기 휴대형 장치 측으로 전달하는 1차권선;을 구비하고,
상기 휴대형 장치는, 얇은 페라이트 시트;
상기 1차권선으로부터 상기 교류전력을 수수하기 위하여 상기 1차권선에 대향하도록 상기 페라이트 시트 상에 설치되는 얇은 박막형의 2차권선; 및
상기 2차권선이 수수한 교류전력을 직류전력으로 변환하여 축전지에 제공하는 고주파 AC/DC 정류기;를 구비하는 것을 특징으로 하는 비접촉식 충전 시스템.

청구항 2.
제 1 항에 있어서,
상기 휴대형 장치는, 상기 축전지의 충전상태를 검사하여 제어신호를 생성하고 출력하는 충전제어회로; 및
상기 제어신호를 받아 RF 신호로 변조하여 무선 송출하는 RF 변조 및 송신회로;를 더 구비하고,
상기 충전 모체는, 상기 RF 신호를 수신하고 복조하여 상기 제어신호를 검출하고 출력하는 RF 수신 및 복조회로; 및
상기 제어신호를 받아 펄스폭 변조 신호를 만들어 상기 프리볼트 DC/DC 컨버터에 인가함으로써 직류전압을 조정하도록 하는 PWM 제어회로;를 더 구비하는 것을 특징으로 하는 비접촉식 충전 시스템.

청구항 3.
제 2 항에 있어서,
상기 휴대형 장치는, 상기 페라이트 시트 상에 상기 2차권선과 일정한 거리를 두고 설치되고 상기 RF 변조 및 송신회로에 연결되어 상기 RF 신호에 의해 고주파 자계를 형성하는 3차권선;을 더 구비하고,
상기 충전 모체는, 상기 3차권선에 대향하는 위치에 설치되고 상기 RF 수신 및 복조회로에 연결되어 상기 고주파 자계를 무선으로 수신하여 상기 RF 수신 및 복조회로에 전달하는 4차권선;을 더 구비하는 것을 특징으로 하는 비접촉식 충전 시스템.

청구항 4.
제 2 항에 있어서,
상기 충전 모체는 상기 프리볼트 DC/DC 컨버터의 출력전압으로부터 리플성분을 검출하여 상기 PWM 제어회로에 귀환시키는 보상회로;를 더 구비하는 것을 특징으로 하는 비접촉식 충전 시스템.

청구항 5.
제 2 항에 있어서,
상기 RF 수신 및 복조회로는, 상기 RF 신호에서 제어신호를 복조하기 전에 상기 RF 신호와 함께 입력된 상기 고주파

병렬공진형 인버터의 구동 주파수 성분을 제거하는 고역필터를 구비하는 것을 특징으로 하는 비접촉식 충전 시스템.

청구항 6.

제 1 항 또는 제 2 항에 있어서,

상기 고주파 병렬공진형 인버터는 인덕터(L1); 캐패시터(C3); 두 개의 MOS 트랜지스터(M2, M3); 및 두 개의 게이트 증폭기(A1, A2);를 구비하고,

상기 1차권선의 세 단자 중 중간단자에는 상기 인덕터를 통하여 직류전원(Vs)이 연결되고, 상기 1차권선의 양끝단자에는 공진을 형성하기 위한 상기 캐패시터와 상기 두 MOS 트랜지스터의 드레인(Drain)이 연결되며,

상기 두 MOS 트랜지스터의 소스는 모두 접지되고,

상기 두 게이트증폭기는 각각 상기 1차권선의 주권선과 보조권선으로부터 수신된 신호를 증폭하여 인가하도록, 상기 두 MOS 트랜지스터의 게이트에 각각 연결되는 것을 특징으로 하는 비접촉식 충전 시스템.

청구항 7.

제 6 항에 있어서,

상기 게이트증폭기는 상기 보조권선에서 발생하는 정현파 형태의 전압파형을 구형파 형태로 바꾸어 주는 것을 특징으로 하는 비접촉식 충전 시스템.

청구항 8.

제 1 항에 있어서,

상기 2차권선은 중앙점이 있으며, 상기 고주파 AC/DC 정류기는 상기 중앙점을 이용함으로써 두 개의 다이오드(D8, D9)를 사용하여 전파정류하는 것을 특징으로 하는 비접촉식 충전 시스템.

청구항 9.

제 1 항에 있어서,

상기 2차권선은 중앙점이 없으며, 상기 고주파 AC/DC 정류기는 네 개의 다이오드(D81, D82, D91, D92)를 사용하여 전파정류하는 것을 특징으로 하는 비접촉식 충전 시스템.

청구항 10.

제 8 항 또는 제 9 항에 있어서,

상기 고주파 AC/DC 정류기는 상기 다이오드의 정류부 뒤에 연결되는 캐패시터(C6)와 상기 캐패시터 뒤에 연결되는 인덕터(L2)로 구성된 필터를 더 구비하는 것을 특징으로 하는 비접촉식 충전 시스템.

청구항 11.

제 10 항에 있어서,

상기 인덕터(L2)는 상기 2차권선과 동일한 평면상에서 일정한 거리를 두고 분리시킨 형태의 평면형 구조인 것을 특징으로 하는 비접촉식 충전 시스템.

청구항 12.

제 8 항 또는 제 9 항에 있어서,

상기 고주파 AC/DC 정류기는 직렬로 연결된 저항(R5)과 캐패시터(C5)를 더 구비하는 것을 특징으로 하는 비접촉식 충전 시스템.

청구항 13.

제 1 항에 있어서,

상기 고주파 AC/DC 정류기는 두 개의 다이오드(D81,D91)와 두 개의 캐패시터(C61,C62)를 구비하여, 출력전압파형을 전파정류한 형태를 얻음과 동시에 2배로 상승시켜 배압정류하는 것을 특징으로 하는 비접촉식 충전 시스템.

청구항 14.

제 13 항에 있어서,

상기 고주파 AC/DC 정류기는 상기 다이오드의 정류부 뒤에 연결되는 두 개의 캐패시터(C61,C62)와 상기 캐패시터 뒤에 연결되는 인덕터(L2)로 구성된 필터를 더 구비하는 것을 특징으로 하는 비접촉식 충전 시스템.

청구항 15.

제 14 항에 있어서,

상기 인덕터(L2)는 상기 2차권선과 동일한 평면상에서 일정한 거리를 두고 분리시킨 형태의 평면형 구조인 것을 특징으로 하는 비접촉식 충전 시스템.

청구항 16.

제 15 항에 있어서,

상기 고주파 AC/DC 정류기는 직렬로 연결된 저항(R5)과 캐패시터(C5)를 더 구비하는 것을 특징으로 하는 비접촉식 충전 시스템.

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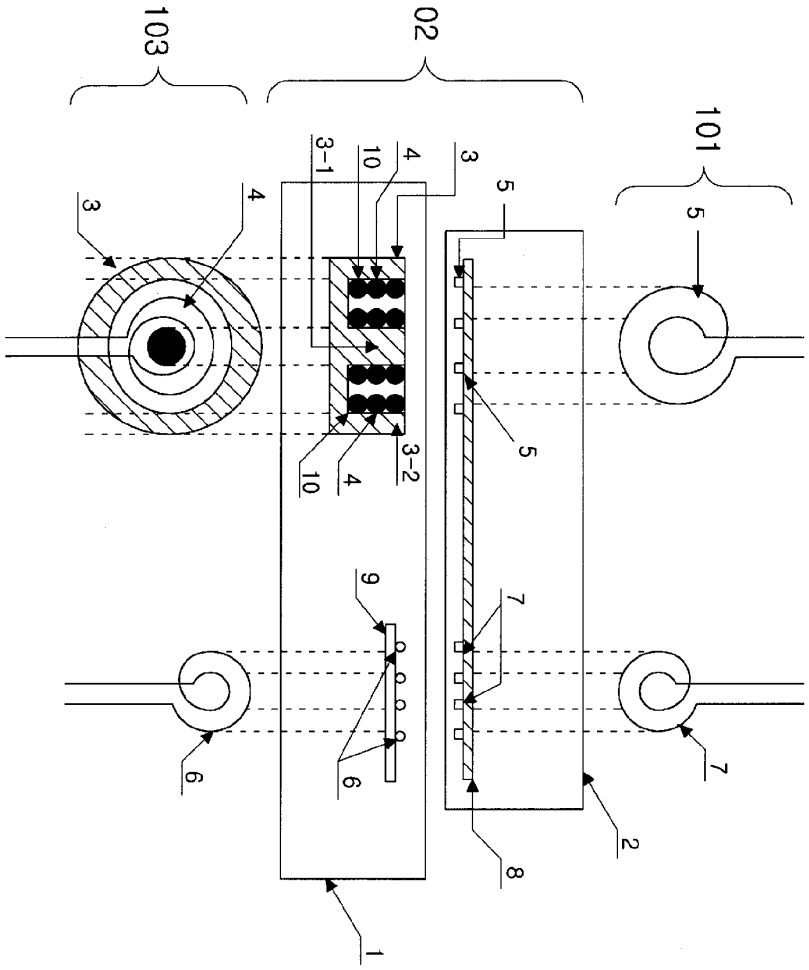

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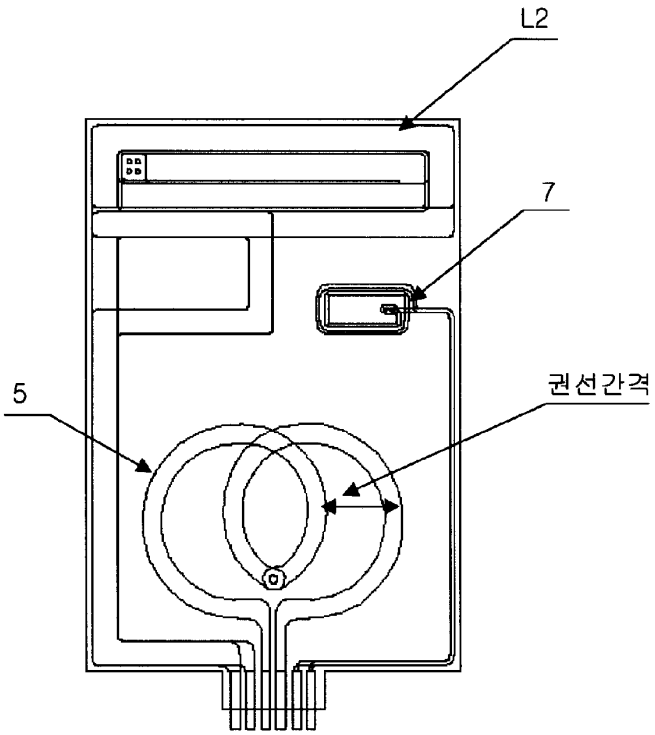

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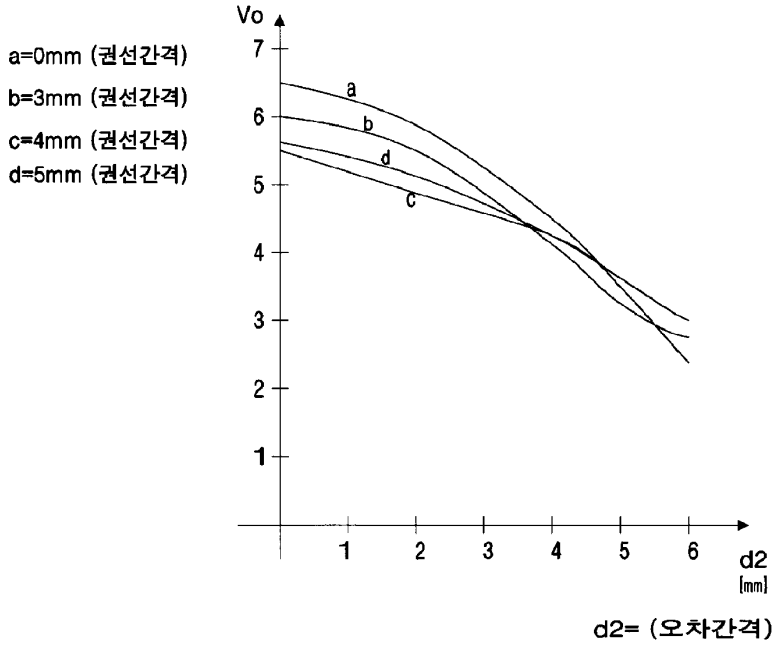

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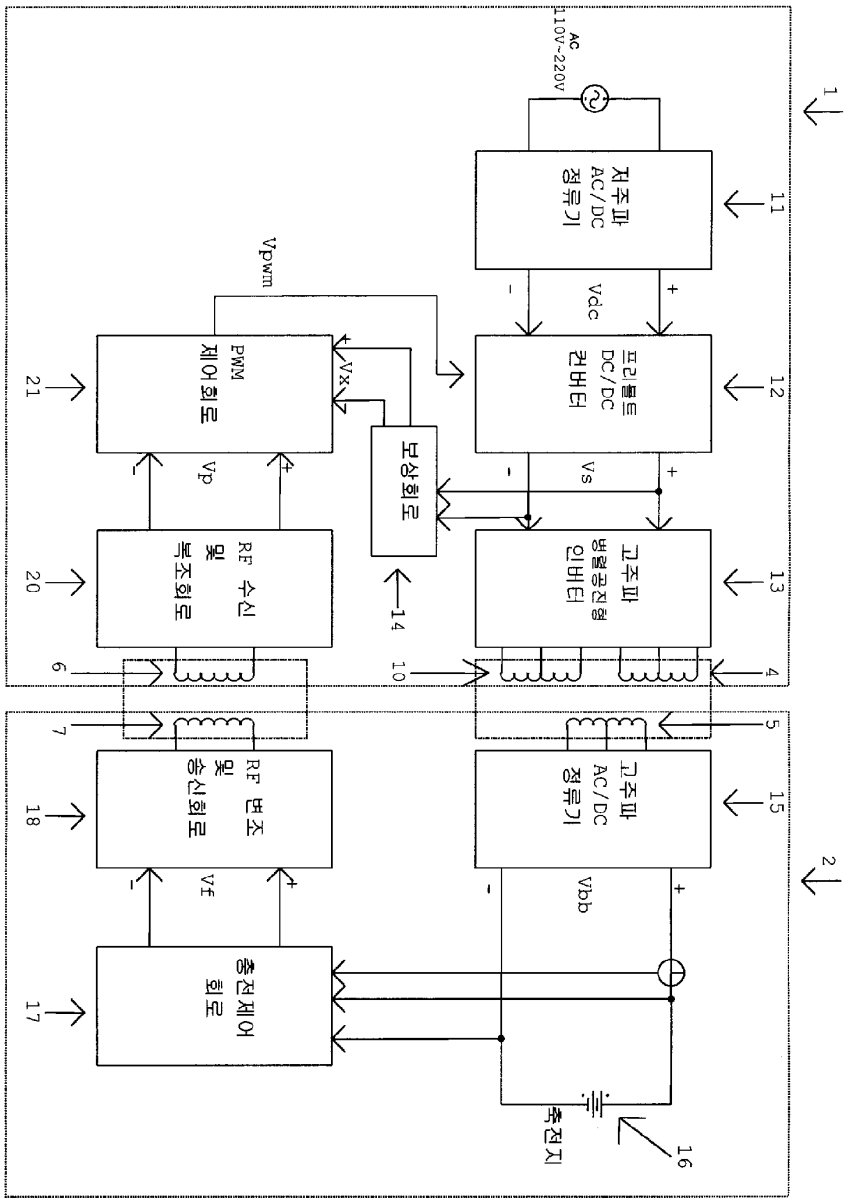

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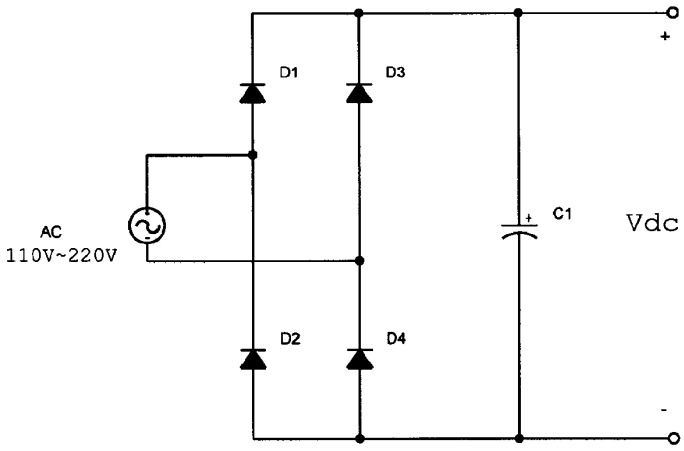

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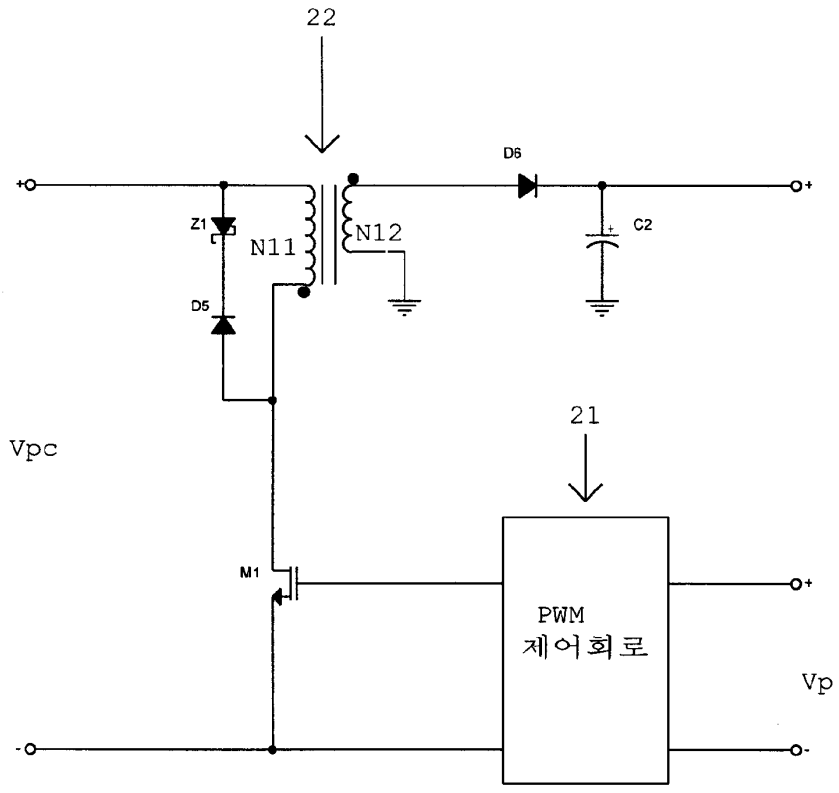

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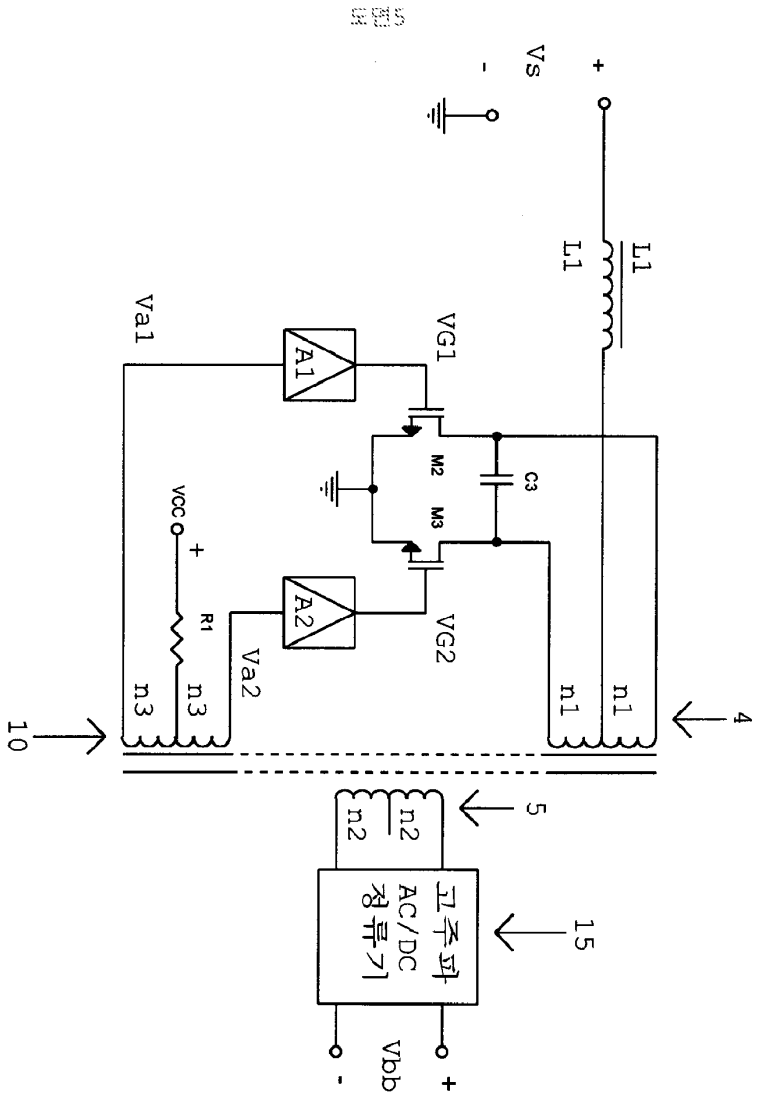

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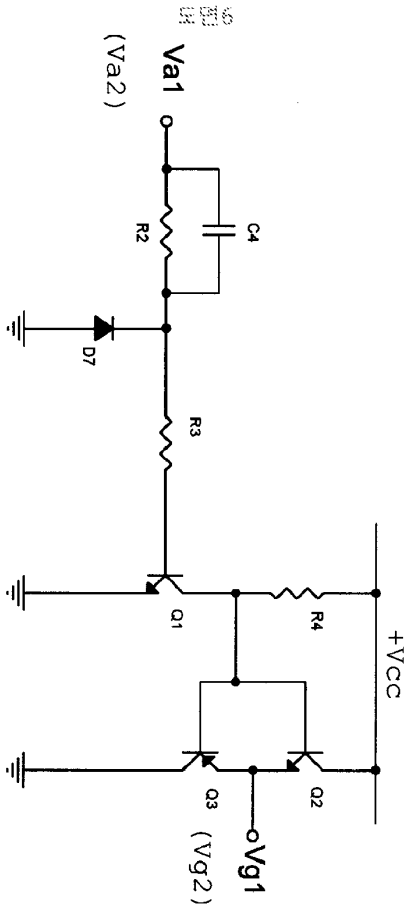

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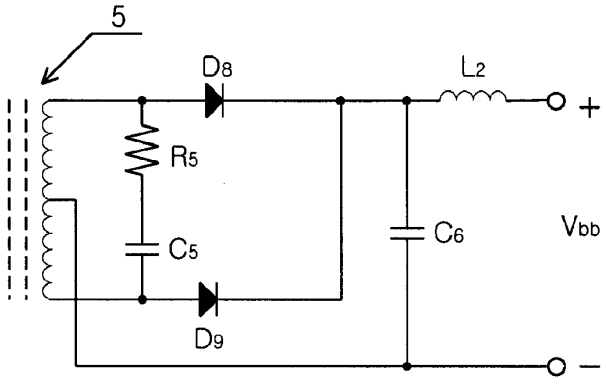

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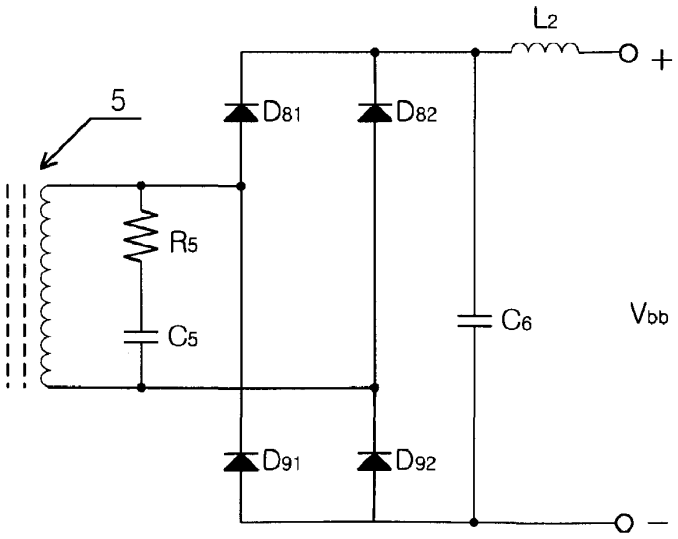

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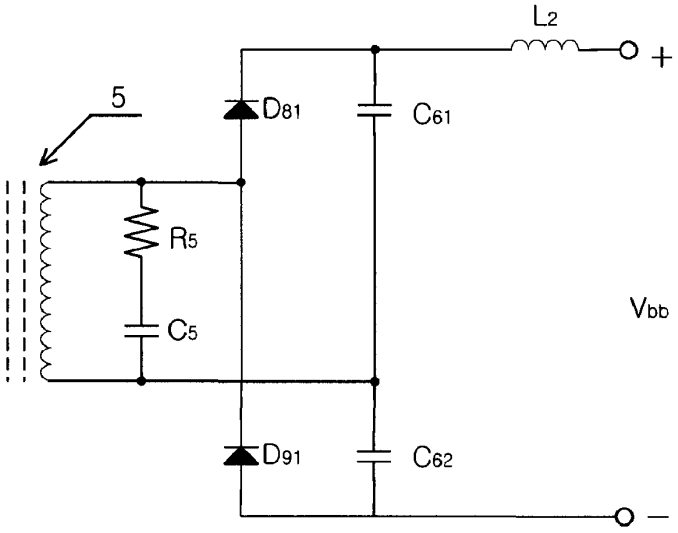

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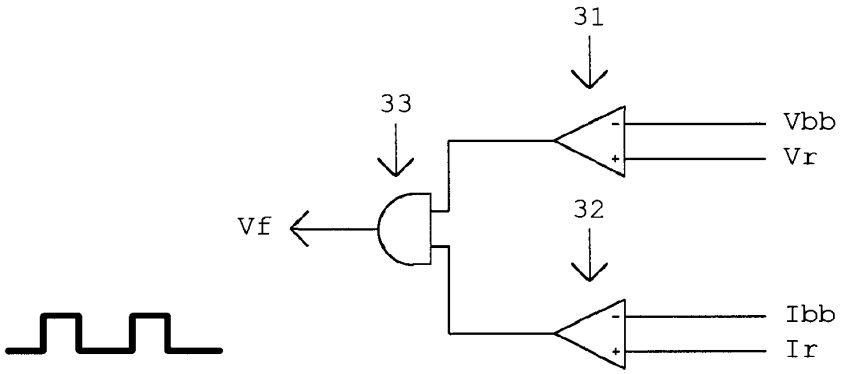

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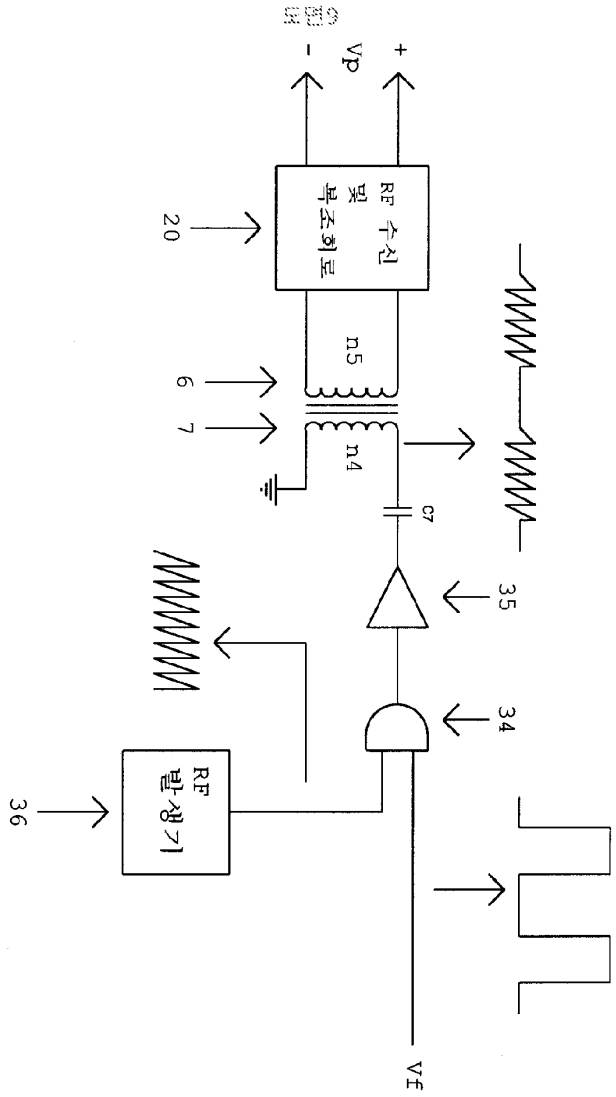

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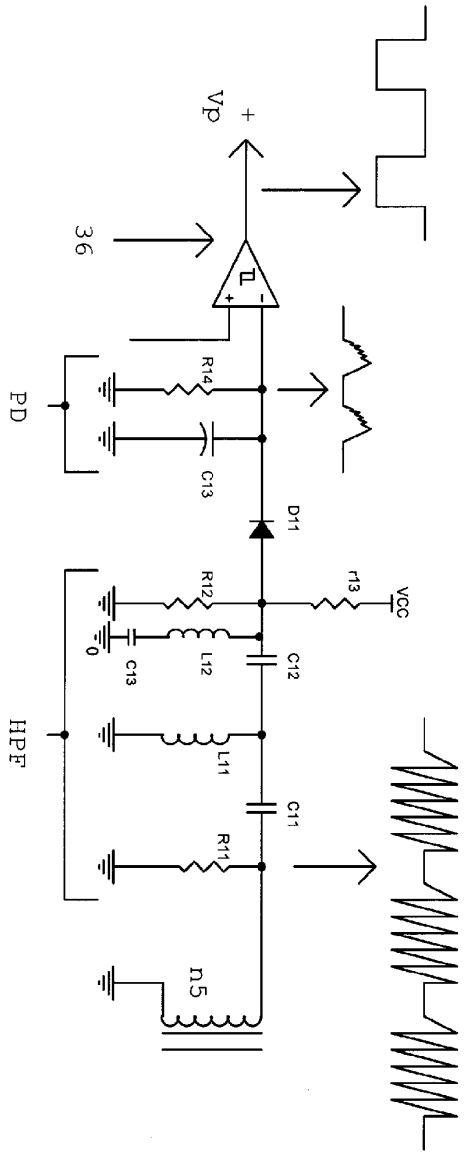

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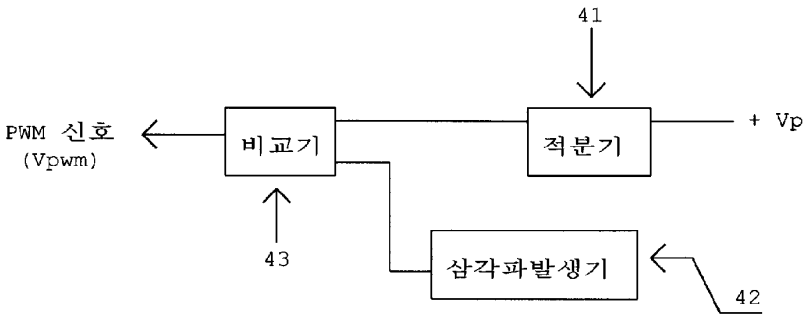

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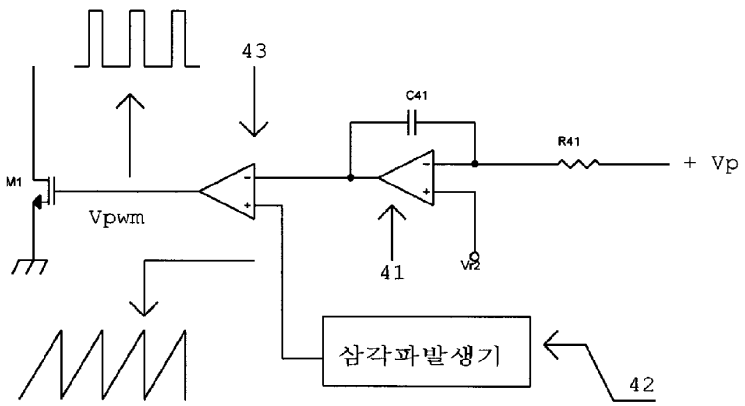

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Power supply circuit and power supply system

DOCUMENT ID	DATE PUBLISHED
CN-101507091-B	2012-03-07

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DATE FILED
2007-08-21

CPC CURRENT

TYPE	CPC	DATE
CPCI	H02M3/28	2013-01-01
CPCI	H02M3/338	2013-01-01
CPCI	H02M3/3385	2013-01-01
CPCI	H02M3/3385	2013-01-01
CPCA	H02M1/0058	2021-05-01
CPCA	H02M1/0058	2021-05-01
CPCA	Y02B70/10	2013-01-01
CPCA	Y02B70/10	2013-01-01

Abstract

The invention claims a power supply circuit and a power supply system, even without using a large voltage switching element is also capable of corresponding to all over the world ground voltage and to supply stable power to the load device. the power supply circuit, between the turn-off capacitor (C4) and the feedback coil (L3) is provided with a charging part (14). the anode of the charging part (14) is connected to the positive terminal of the feedback coil (L3) and the cathode connected to the cathode of the voltage stabilizing diode (Z1). Thus, the lower the voltage of the commercial power supply (E) is large, the charging part (14), disconnecting the capacitor (C4) is quickly charged, ON period of the transistor (Q1) is shortened, so as to prevent the drain-source electrode of the transistor (Q1) between excessive voltage is applied, and (E) the representative commercial voltage to voltage and current output characteristic of the relationship between the current of the load device are flat.

Description

INVENTION-TITLE
TECHNICAL-FIELD

Technology field
[0001] This invention relates to a self-excited oscillation type power supply circuit and power supply system.
BACKGROUND-ART
Backgcircular technology
[0002] In recent years, along with the activity of overseas travel, desired development out of an overseas use not only in this country, but also different from the country in the voltage of the commercial power supply, that is to say capable of corresponding to wide voltage power supply device is used as the device such as shaver, electric toothbrush for charging of the power supply device.
[0003] Picture 17 is the Japanese special platen 8-80042 number gazette patent claims (hereinafter called " patent document 1) disclosed a conventional circuit diagram of power supply device. power supply device shown in FIG. 17 is of the self-excited oscillation type power device, its operation is as follows. First, when it is connected with the power supply part, the power supply part through bias voltage resistor R80 to capacitor C20, so the capacitor C20 is charged, FETI the gate voltage VG rises. and when the voltage VG exceeds the threshold voltage FETI, FETI is conducted, the current ID flows. threshold voltage (Threshold-max) when the current ID increases, R40XID exceeds a transistor TrlO, the transistor TrlO is turned on, the gate capacitance discharge of the FTEI. Therefore, voltage VG is reduced, FETI starts off, the coil current ILI is stopped. Therefore, based on the voltage feedback winding L30 senses the voltage VG is suddenly reduced, FETI completely off.
[0004] when the FETI stop, free vibrating of the resonant circuit formed by capacitor C10, a primary winding LIO of the voltage VG again based on the coil current ILI exceeds the threshold voltage FETI, FETI is connected again. this is repeated FETI off, supplying power to load E20.
[0005] and, FETI by resistor R40 two end voltage IDXR40 determines, that is determined by the current ID, even during the transition will not be over-large current ID flowing, voltage VG is cannot be excessively reduced, so it can make stable in oscillation in the resonance circuit.
[0006] application technology associated with the invention as other, Japanese special platen 10-98880 number gazette patent claims (hereinafter called " patent document 2) disclosed in RCC (Ringing. Converter) power device of the type.
[0007] However, patent document 1 of power supply device cannot correspond to all parts of the world of voltage, the voltage of the power supply part with larger EO regional, national, the drain FETI-source voltage too, there must be between drain and source of pressure element as a problem FETI.
[0008] On the other hand, switching power device patent literature 2, because it is an RCC type, so the switching element is hard to open and close, the result is there is generating more noise and change the problem of large power consumption. drain-to-source voltage and switch power device patent literature 2, because of RCC, so even if the power supply voltage is a large country, region, the drain of switch element between gate-source voltage does not like the image, there is no need to reduce the switching element. Therefore, the problem that there is no self-excitation oscillation type power device is generated.
[0009] The purpose of the invention is to provide a power supply circuit and a power supply system, even without using pressure larger switching element can also be the voltage corresponding to the world, and can provide stable power to the load device.
DISCLOSURE
Invention contents
[0010] This invention relates to a power supply circuit by using a power supply part providing power to the self-excited oscillation of power circuit, comprising a resonance part, a resonant capacitor and a resonant coil, and supplying power to the load device, oscillation part; having a first switching element connected in series with the resonance part and the feedback coil of the resonant coil magnetically coupled, switching on/off the first switching element so that the resonant self-excitation oscillation; separation section, has the second switch element and connected to the second switching element control terminal disconnected from the capacitance between the cathode of the power supply part. when the first switching element is turned on through the conducted current reaches a predetermined value, turns on the second switching element, switches off said first switching element, and a first charging section having a positive electrode connected to the feedback coil one side of diode, and cathode connected to the cathode of the diode, the anode connection to the turn-off capacitor one side of voltage stabilizing diode.
[0011] According to the structure, since the between the feedback coil and the turn-off capacitor has a first

charging part comprises stopping current flow in one direction from the turn-off capacitor to the feedback coil of the diode and the voltage of the feedback coil exceeds a certain value when performing an operation of voltage regulator diode, therefore, when the output large voltage from the power supply part, the voltage of the feedback coil exceeds a certain value, the first charging part to act to the turn-off capacitor. Therefore, the first switching element ON period, conduction current using the first switching element and the current provided by the first charging unit turn-off capacitor is charged, can be quickly connected to the second switching element, the first switching element quick disconnect. time result thereof, first switching element shortens the resonant energy stored is reduced, and it can inhibit flow to the load device of the output current is increased. Therefore, the voltage output from the power supply part is transverse to flow to the output current of the load device is longitudinal, output characteristic representing the relationship between the two becomes flat, which can be corresponding to the world ground voltage of the power supply circuit.
[0012] In addition, under the condition of higher voltage output from the power supply part, through action of the first charging part, a turn-off capacitor is quickly charged, so the first switch element ON period shortens, can prevent the first switch element is applied voltage.
[0013] during ON and the first charging part which prevents the current from the turn-off capacitor flow to the direction of the diode and feedback loop, so as to make the first switching element off capacitance is switched when the accumulated charge quantity constant, cut off the charging time of the capacitor, a first switching element of a certain, capable of providing stable power to load device.

MODE-FOR-INVENTION

Preferred Embodiment

[0031] Next, the embodiment of the present invention relates to a power supply system will be described.
[0032] (Embodiment 1)
[0033] FIG. 1 shows embodiment 1 of the present invention relates to a power supply system diagram. The power supply system has a power supply circuit 10 and the load device 20. power supply circuit 10 has a resonance (constitute section) 11, an oscillation part (oscillationsection) 12, the disconnected part (turn-off section) 13, a charging part 14 (first charging section) and a power supply part 15.
[0034] resonant part 11 has a parallel connection of the resonant coil and resonant capacitor C3, supplying power to load device 20.
[0035] an oscillation part 12 has a feedback coil L3, a capacitor C2, a resistor R2, a transistor (first switching element) and a resistor R4, the resonant part 11 self-oscillation. the feedback coil L3 and the resonant coil magnetically coupled to the gate of the transistor (gate) side terminal is positive. gate side terminal of the transistor hereinafter called feedback coil L3 is a positive terminal, and terminal at the opposite side of the positive terminal is a negative terminal. the feedback coil is connected with the cathode power supply section L3 to the negative terminal of 15. resonant drain (drain) connected to transistor one terminal of coil.
[0036] transistor is n channel field effect transistor, a drain connected to the resonant part 11, a source electrode connected to the disconnection portion 13, the gate (control terminal) connected with the positive terminal of the feedback coil L3 through a resistor R2 and capacitor C2. In addition, for preventing excessive output voltage to the gate of the resistor R4 are connected between the gate of the transistor-source.
[0037] capacitor C2 one end through feedback loop L3 cathode connected to the power supply part 15, and the other end through resistor R2 connected to the transistor of the gate. and, a capacitor C2 and a resistor R2 prevents the current from the starting resistor to the feedback coil L3 side flow.
[0038] disconnecting parts 13 having an off transistor Tr (second switching element), an off capacitance C4, resistance R5, R6, the drain current (conduction current) using transistor is conducted, the flow of charging the turn-off capacitor C4, when disconnecting the voltage of the capacitor C4 exceeds the off transistor Tr the threshold voltage, it will cut off the transistor Tr and the off transistor off.
[0039] cut off one end of the capacitor C4 connected to the negative pole, and the other end connected to the base (control terminal) off the transistor Tr.
[0040] disconnecting transistor Tr is an npn bipolar transistor (catatonia transistor), disconnecting capacitor C4 connected in parallel between negative TI, base-emitter of emitter is connected to the power supply part 15, the collector electrode through starting resistor connected with the anode T2 of the power source part 15. and when the off-voltage of the capacitor C4 exceeds a threshold voltage, off transistor Tr turns, discharging the gate capacitance of the transistor, and the transistor is cut off. Thus, it is possible to prevent excessive drain current flows to the transistor Q1, the protection transistor Q1.

[0041] a resistor one terminal R6 connected to the negative pole, and the other end through the resistor R5 voltage connected to a disconnect transistor Tr of the base, through the resistor R5 to the turn-off capacitor C4 output and the transistor is conducted, the flow of drain current corresponding to charge off capacitor C4.
[0042] a charging section 14 comprises a diode D1, a voltage stabilizing diode and a resistor R3 for action when output from power unit 15 greater than the voltage of a certain value, charging the turn-off capacitor C4. the anode of the diode (which) is connected to the positive terminal of the feedback coil L3. the cathode of the voltage stabilizing diode connected with cathode of a diode, positive pole connected to disconnect capacitor C4 through resistor R3.
[0043] 15 power supply part has a rectifying circuit 151 and a capacitor CI, the AC voltage from the commercial power supply E into DC voltage. the commercial power supply E output amplitude is 80V to M6V of the alternating voltage. rectification circuit 151 is, for example, a diode bridge circuit, the AC voltage from the commercial power supply E output by the full-wave rectification. a capacitor such as an electrolytic capacitor, the rectifying circuit 151 full-wave rectifying voltage to filter so as to generate DC voltage.
[0044] loading device 20 includes a loading coil L2, connected in parallel with the load coil L2 of capacitance C5, anode connected to capacitor C5 of the diode D2 and the anode connection pole connect to the secondary battery 21 of the capacitor C5 to the cathode of the diode D2 and negative.
[0045] the load coil L2 and the resonant coil magnetically coupled to the negative side of the secondary battery 21 has a positive polarity. Here, the resonant coil and the load coil L2 through an insulator of the joint in a non-contact manner. In addition, the resonant coil and the load coil L2 form a transformer, resonant coil is a primary winding and the load coil L2 is the secondary winding.
[0046] capacitor C5 for filtering the voltage output from the load coil L2 and the diode D2 from the load coil L2 voltage output by the rectification. Thus, a charging current flows to the secondary battery 21. 21. The lithium-ion secondary battery uses a lithium ion secondary battery, nickel-cadmium secondary battery and so on.
[0047] Next, the action of the power supply system shown in FIG. 1 will be described. FIG. 2 shows a sequence diagram of the power supply system shown in FIG. 1, wherein (a) shows the drain of transistor between gate-source voltage, (b) represents the drain current, (c) represents voltage feedback coil L3, (d) represents the off transistor Tr of base-emitter voltage, (e) represents the off transistor Tr of a collector current. Next, with reference to the circuit diagram of FIG. 1 and timing diagram of FIG. 2, the action of the power supply system will be described.
[0048] output from the commercial power E AC80 to AU64V voltage of the rectification circuit 151 rectifying and capacitor filtering, into Iturin 13 to DC374V direct current voltage. if the feedback coil L3 and the capacitor voltage rises, a current flows through the starting resistor, a gate of the transistor is applied voltage. when the threshold voltage exceeds the transistor gate voltage of the transistor of the transistor conducts (time TMI), the resonant capacitor C3 and resonant coil with current.
[0049] At this time, as shown in FIG. 2 (b), in the transistor to a drain current flows, starting current flows through the resonance coil. if the starting current flows through the resonance coil, and also generates a voltage on the feedback coil of with the magnetic coupling of the resonant coil L L3, based on resonance directivity of the coil to maintain transistor turned on. Furthermore, if the transistor is conducted, based on the drain current begins to generate voltage on the resistor R6, disconnecting capacitor C4 is charged.
[0050] Meanwhile, on the positive terminal of the feedback coil L3 creates a positive voltage, when the voltage of the commercial power supply E larger than a certain value, charging portion 14 acts a current through diode D1, voltage stabilizing diode Z1, resistance R3 to disconnect capacitor C4, turn-OFF capacitor C4 is charged. That is, by the charging part 14 and the voltage on the resistor R6 generated by charging the turn-off capacitor C4 so as to make the off transistor Tr turned on quickly.
[0051] if the voltage of the capacitor C4 rises the threshold voltage of the off transistor Tr (time TM2), cutting the transistor Tr is turned on, discharging the gate capacitance of the transistor so that the transistor QI off (time TM3).
[0052] At this time, because disconnecting the capacitor C4, thus disconnecting transistor Tr temporarily maintain the conducting until after time TM4, on the positive terminal of the feedback coil L3 generating negative voltage, transistor is maintained off. At this time, flow to the resonant coil current flowing to the resonant capacitor C3, a resonant coil (gate-induced emission) of the leakage inductance and resonant capacitor C3 starts resonance, shown in FIG. 2 (a), the drain of the transistor between gate-source voltage is

an upward convex curve shape change. In addition, the feedback voltage loop L3 is downwardly protruding curve shape change.
[0053] Furthermore, in the present embodiment, the resonant coil and the load coil L2 coupling (loose coupling), the resonant coil generating excitation inductance (exciting emission) and leakage inductance (gate-induced emission). If the resonant start after a period of time, generates a positive voltage on the positive terminal of the feedback coil L3, transistor is connected again (time TM5). In addition, determining off electrostatic capacitance of the capacitor C4 and the resistor R5, the resistance value of R6, so that the transistor is conducted, accumulated in the off capacitance C4 of all or a certain amount of charge in the conduction period of the transistor through resistors R5 and R6 is discharged.
[0054] Picture 3 is the output characteristic of the power supply system of the graph, the vertical axis represents output current and the horizontal axis represents the input voltage. the solid line curve represents the output characteristic using the charging part 14, the dotted curve shows that there is no output characteristics using the charging part 14. output current representing the load device 20 of the secondary battery 21 through the charging current, input voltage representing an output E of commercial power supply voltage. and E represents the voltage of the commercial power supply E when the charging part 14 is applied to the positive terminal of the feedback coil L3 starts operation of the threshold voltage.
[0055] with resonant coil number of turns is Ni, feedback loop L3 circle number is N3, voltage output by the commercial power supply E is E, when the completely coupled resonant coil and a feedback coil L3, generating EXN3/W voltage on the feedback coil L3. and when the breakdown voltage (breakdown voltage) VZI voltage (EXN3/N1) generated on the feedback coil L3 is higher than the voltage stabilizing diode, the charging part 14 action.
[0056] Thus, the broken line shown in FIG. 3 should increase the charging current control is shown in the high voltage area larger than EI greatly inhibit increase of charging current. That is, although the charging part 14 of current with the voltage increase of the commercial power supply E is further increased, however, the ON period of the transistor shortens, the resonant part 11 accumulation in the ON period of the energy decrease, which results restrain output electric current is increased. Furthermore, the inclination of the output current of the high voltage area by adjusting the resistance value of the resistor R3 can be adjusted as shown in FIG. 3, so as to make the output current substantially constant, or as shown in FIG. 6 by adjusting the resistance value of R3, the output current can be slowly decreased.
[0057] Next, considering the charging section 14 does not have a diode. lower in this case, as shown in FIG. 2 (c), during the transistor off, because on the feedback coil L3 generates a voltage negative, thus cutting off electric charge of the capacitor C4 is also discharged to the feedback coil L3 side. And, the voltage of negative generated on the feedback coil L3 along with time change and unstable, so that the amount of charge being discharged is not stable, C4 remaining capacitance of the off capacitance may conduct the transistor cannot be kept constant. Therefore, each time releasing a charge from the off capacitance C4, this will cause the unstable ON period of the transistor.
[0058] On the other hand, in the power supply system, the charging part 14 having a positive electrode connected to the diode of the positive terminal of the feedback coil L3 D1. Therefore, the transistor cut-off period, accumulating the charge off capacitor C4 in only from the resistors R5 and R6 is discharged, thereby preventing through the charging part 14 to charge and discharge. The result, when transistor on/off capacitor C4 the accumulated charge becomes 0 or a certain value, can make the conduction period of the transistor constant.
[0059] mentioned above, if using embodiment 1 of the power supply system because it has charging part 14, so as to the size of the voltage of the commercial power supply E irrespective of the output current control in a range of a certain degree, can provide the corresponding voltage of the power supply circuit 10. and because it has the charging unit 14, the ON period of the transistor is shortened along with the increasing of the voltage of the commercial power supply E, thus it can prevent the transistor apply excessive voltage. and the charging unit 14 having a positive electrode connected to feedback loop L3 of the positive terminal of the diode D1, it can prevent the cut capacitor C4 through the charging unit 14 discharge, the conduction period of the transistor is stable, the supply to the load device 20 stable power.
[0060] (Example 2) [0061] Next, the embodiments of the present invention 2 involved in power supply system will be described. FIG. 4 shows circuit diagram of the power supply system related to Example 2. In addition, in FIG. 4, with the same structure as embodiment 1 marking the same reference notations and

explanations are omitted. Example 2 relates to the power system to connect with resistor R7 between the transistor Tr with off base electrode anode T2.
[0062] If the commercial power E input voltage, current through resistor R7 flows to the turn-off capacitor C4, therefore always output resistor R7 to disconnect capacitor C4 between the combined resistance of the resistor R5, R6 of the divided voltage. Therefore, the turn-off capacitor C4 voltage output of the commercial power supply E voltage increases, thus voltage of the commercial power supply E corresponding to the ON period of the control transistor to control the output load device 20.
[0063] In addition, only by charging unit 14, further through a resistor R7 capacitor C4 power supply to cut off, thus disconnecting capacitor C4 can rapidly conduct the off transistor Tr transistor conduction period is shortened so that it can adopt low-voltage resistance of the transistor as the transistor.
[0064] mentioned above. The embodiment 2 relates to the power system capable of adjusting the voltage of the commercial power supply E to control the output load device 20, and can prevent the transistor apply excessive voltage.
[0065] (Embodiment 3)
[0066] Next, the embodiments of the present invention 3 involved in power supply system will be described. FIG. 5 shows circuit diagram of the power supply system related to Example 3. In addition, in FIG. 5, the same with embodiment 1, 2 of the structure marking the same reference notations and explanations are omitted. connection filtering unit 16 in parallel on the charging unit 14 as characteristic Example 3 relates to the power system 1 in the embodiment of the power supply system. filtering part 16 comprises a diode D3, a capacitor C7 and a resistor R8. the anode of the diode D3 is connected to the positive terminal of the feedback coil L3, the cathode through resistance R8 connected to the off transistor Tr, and through the capacitor C7 connected to the negative electrode.
[0067] a filter part 16 for filtering the voltage of the feedback coil L3, generating a voltage equivalent to the power supply voltage. Thus, from the charging part 14 and the filter part 16 the two path the turn-off capacitor C4 charging. Therefore, the voltage of the voltage ripple (ripple) output reduces the off capacitance C4 generated on the capacitor, off transistor Tr is stable until the time of conduction, the conduction period of the transistor is stable, capable of the resonant part 11 performing a stable oscillation.
[0068] Picture 6 is the output characteristic of power supply system involved in representing embodiment 3 of the graph, the vertical axis represents the output current, and the horizontal axis represents the input voltage. In addition, the solid line represents an output characteristic of the embodiment 3, and the dotted line represents the output characteristics of Example 4. output current represents the current load device 20 to the secondary battery 21 of the charging current, the input voltage represents a commercial power supply E of the voltage. As shown in FIG. 6, inclined and diagram of low voltage area when setting filter part 16 voltage reaches more gently than 3 shown in graph. Therefore, regardless of the voltage size output by the commercial power supply E, the output current control in a certain range.
[0069] mentioned above. The embodiment 3 relates to the charging system, because it has a filter portion 16, thus disconnecting the capacitor C4 to output stable voltage, more flat output characteristic, the result can provide more suitable for all over the world ground voltage of the power supply system.
[0070] (Embodiment 4)
[0071] Next, the embodiments of the present invention 4 involved in power supply system will be described. FIG. 7 shows circuit diagram of the power supply system related to Example 4. In addition, in FIG. 7, the same with embodiment 1 to 3 of the structure marking the same reference notations and explanations are omitted. filtering part of the power system embodiment 4 relates to a power supply system with charging unit 17, replace 3 relates to the 16, that is, using two charging sections 14, 17 to charge off capacitor C4 as feature.
[0072] the charging part 17 and the charging part 14 structure has the same diode D5, voltage stabilizing diode Z2 and a resistor R9. the anode of the diode D5 is connected to the positive terminal of the feedback coil L3 and the cathode connected to the cathode of the voltage stabilizing diode Z2. the anode of the voltage regulator diode Z2 through resistor R9 connected to base of the off transistor Tr.
[0073] Here, the breakdown voltage VZ2 of the voltage regulator diode Z2 larger than the voltage stabilizing diode breakdown voltage VZI is set. Therefore, when the voltage of the positive terminal of the feedback coil L3 is lower than VZI, a charging part 14, 17 does not act, the positive terminal of the feedback coil L3 voltage over the VZI, and does not reach VZ2, only the charging part 14, the voltage of the positive terminal of the

feedback coil L3 at more than VZ2, the charging part 14, a charging part 17 together action.
[0074] Thus, as shown in the coordinate graph of the dotted line FIG. 6, appears two inflection points P1, P2 on the output characteristic. that is, the voltage of the commercial power supply E is lower than E2, the feedback winding voltage positive terminal L3 does not reach the breakdown voltage VZI, the charging part 14, 17 does not act. In addition, the voltage of the commercial power supply E is more than E2, does not reach E3, the feedback winding voltage more than the breakdown voltage of the positive terminal L3 VZI, and does not reach the breakdown voltage VZ2, the charging part 14 operation only. Therefore, charge off capacitor C4 by charging section 14, result is ON period is shortened, the output current is decreased. Therefore, the medium voltage region of E2 to E3, the output characteristic of inclined gentler than the low-voltage area.
[0075] and, when the voltage of the commercial power supply E is more than E3, positive terminal of the feedback coil L3 voltage higher than the breakdown voltage VZ2, except the charging part 14, a charging part 17 is moving. Thus, from the charging part 14 and the charging part 17 two strip path charging the off capacitance C4, result is ON period is further shortened, and the output current is further reduced. Therefore, the tilt ratio of output characteristics of the high voltage area in the voltage region is more gentle.
[0076] mentioned above. The embodiment 4 relates to the power system is further provided with a charging part 17 except the charging part 14, therefore, the output characteristic is two stage changes, the variation in output amplitude of current is suppressed to be smaller, more flat output characteristics, it is possible to provide more suitable for the world ground voltage of the power supply system.
[0077] In addition, in the embodiment 4 relates to the power system, although the two charging portions 14, 17, but may also be provided with more than three of the charging part. lower in this case, as long as the breakdown voltage of the voltage-stabilizing diode of each charging unit has set different values, can be obtained with the number of charging part corresponding to the output characteristic of the inflection point, can obtain more flat output characteristics. and through adjusting the number of breakdown voltage value of the charging part and a voltage stabilizing diode, it can adjust output characteristics so as to obtain a desired output current in the voltage area of the commercial power supply E of the target (target).
[0078] (Embodiment 5)
[0079] Next, the embodiments of the present invention 5 involved in power supply system will be described. FIG. 8 shows circuit diagram of the power supply system related to Example 5. In addition, in FIG. 8, the same with embodiment 1 to 4 of the structure marking the same reference notations and explanations are omitted. Example 5 relates to the power supply system with the power supply system of the embodiment 4, saves the charging part 17 of voltage stabilizing diode Z2 charging unit 18 as feature.
[0080] also will act because the charging part 18 does not include a voltage regulator diode Z2, so even if the lower voltage of the commercial power supply E, a charging part 14 does not act the lower charging part 18 for charging the turn-off capacitor C4. Therefore, the output characteristic of the power system is inclined in the low voltage region becomes gentle, the output characteristic is flat.
[0081] On the other hand, when the charging part 14 operation of the high voltage output at the commercial power supply E, with embodiment 1 same, controlling the output current increases in the high-voltage area, can obtain a flat output characteristic.
[0082] mentioned above. The embodiment 5 relates to the power system, because it has charging part 18, so as to make the output characteristics of the low voltage area is flat, it is possible to provide more suitable for the world ground voltage of the power supply system.
[0083] (Embodiment 6)
[0084] Next, the embodiments of the present invention 6 involved in power supply system will be described. FIG. 9 shows circuit diagram of the power supply system related to Example 6. In addition, in FIG. 9, the same with embodiment 1 to 5 of the structure marking the same reference notations and explanations are omitted. Example 6 relates to the power system 1 in the embodiment of the power supply system, the power supply circuit 10 and the load device 20 characterized by shell 30 is connected.
[0085] housing 30 makes the resonant coil insulated from the load coil L2, and the magnetic flux generated in the resonant coil (interlink), through electromagnetic induction to transmit power in the load coil L2. Thus, the power supply circuit 10 a non-contact manner for the secondary battery 21 to be charged. as the housing 30, can use the power supply circuit 10 of the housing and the load device 20 of the housing. and on the shell of the power supply circuit 10 is provided for loading device 20 for loading and placing part, when

placing the load device 20 on the placing part of the loading, by setting resonant coil and a load coil L2 makes the resonant coil magnetically coupled with the load coil L2.
[0086] under the condition of unloading the load device 10 on from the power supply circuit 20, resonant excitation inductance of the coil also becomes the leakage inductance, and is compared with a condition of the load device 20, the leakage inductance is increased, the resonant voltage increases, the drain voltage of the transistor also increases. However, in embodiment 6 the power system has charging part 14, so even if the resonance voltage increases, the charging part 14 acts so that the ON period of the transistor shortens, so it can not use large withstand voltage transistor as the transistor Q1, and the output characteristic flat.
[0087] mentioned above. The embodiment 6 relates to the power system, because shell 30, so that it can contact to charge the secondary battery 21. and even if the load device 20, resonant voltage increases due to charging unit 14 acts so as to shorten the ON period of the transistor, so that the transistor will not long time applying a larger voltage to protect the transistor Q1. the result, there is no need to use large pressure of the transistor as the transistor Q1, which can realize miniaturization and low cost of the circuit.
[0088] (Embodiment 7)
[0089] Next, the embodiments of the present invention 7 involved in power supply system will be described. FIG. 10 shows circuit diagram of the power supply system related to Example 7. In addition, in FIG. 10, the same with embodiment 1 to 6 of the structure marking the same reference notations and explanations are omitted. Example 7 relates to the power system to use the shaver as the load device 20, the power supply circuit supplying power to the shaver to heating the tool face 22.
[0090] shaving cutter has a cutting surface 22 and a body portion 23. the knife face (22) is formed by metal, in contact with skin when people shave and cut long on the skin of hair. 23 has various circuit control a shaver main body part and so on.
[0091] housing 30 formed by the power circuit 10 of the housing so that the resonant coil insulated from blade surface 22. power supply circuit 10 is a power supply circuit of Example 1 10 identical to the power supply circuit so that the magnetic flux generated in the resonant coil, which makes the knife with the knife surface 22 surface 22 flows in an eddy current, and thereby heating the tool face 22. cutter is IOOnm thickness surface 22, thin, low coupling with the metal pot. Therefore, the inductance (emission) of resonant coil substantially in a leakage inductance, the resonant voltage becomes high, which causes the drain voltage of the transistor increases. However, in embodiment 7 the power system has charging part 14, so even if the resonance voltage increases, the charging part 14 acts so that the ON period of the transistor shortens, so it can not use larger withstand voltage transistor as transistor Q1, and output characteristic is flat.
[0092] mentioned above. The embodiment 7 relates to a power supply system, the power supply circuit 10 can be a non-contact heating cutter surface of the electric shaver 22. In addition, because the resonance coil of the secondary side is formed by metal cutting face 22, therefore the resonant voltage increases, but the charging part 14 acts so as to shorten the ON period of the transistor, so that the transistor will not long time applying a larger voltage to protect the transistor Q1. the result, there is no need to use large pressure of the transistor as the transistor Q1, which can realize miniaturization and low cost of the circuit.
[0093] (Embodiment 8)
[0094] Next, the embodiments of the present invention 8 involved in power supply system will be described. FIG. 11 shows circuit diagram of the power supply system related to Example 8. In addition, in FIG. 11, and Example 1 to 7 same structure is marking the same
10 image marking, explanations are omitted. Example 8 relates to the power supply system to the load device 20a for current control as feature.
[0095] load device of load device 20a relative to Example 1 20 also has a transistor Q2, four resistors R21, R22, R23, R24 and 24. transistor Q2 is an n-channel field effect transistor, drain electrode is connected to the cathode of the diode D2, the source electrode is connected at the anode of the secondary battery 21. series connection of resistors R21 and R22 and the secondary battery 21 are connected in parallel connection. the resistor R21 connected with the connecting point of the resistor R22 with the microcomputer 24. the grid electrode of the transistor Q2 is connected through resistor R23 and the microcomputer 24. the resistor R24 is connected to positive terminal of load coil L2 between the cathode of the secondary battery 21. microcomputer connection ground terminal 24 and the cathode of the secondary battery 21.
[0096] the microcomputer 24 detects the charging current flowing through the resistor R24. The gate of the

transistor Q2 outputs the pulse signal (charging signal), transistor Q2 carries out PWM (width modulation, pulse-width modulation) control so that the average value of the charging current is kept a certain value. Therefore, is adjusted to the average value of the charging current is kept to a certain value, the current unstable output from the power supply circuit 10 becomes stable current can accurately charge the secondary battery.
[0097] Further, in the embodiment 8, the secondary battery 21 is equal to the load body section and the load coil L2, diode D2, capacitor C5, transistor Q2 and resistor R24 equal to the supplying part, the microcomputer 24 is equal to the current detecting part and a control part.
[0098] Picture 12 represents the charging signal and waveform of the charging current, the charging signal, wherein (a) represents a normal charging represents average value of charging current smaller than the normal charging, the charging current of the charging current with the waveform pattern, (b) (the output) of the charging signal and waveform diagram of charging current.
[0099] It can be seen when the charging signal is high level from FIG. 12 (a), (b), the transistor Q2 is turned on, a charging current of a certain size; when the charging signal is low level, the transistor Q2 is turned off and the charging current is 0. that is, when increasing the average value of the charging current, the microcomputer 24 increases the charge signal pulse width; when the average value of the charging current is reduced, the microcomputer 24 decreases the charging signal of pulse width, so as to adjust the average value of the charging current.
[0100] described above, in accordance with embodiment 8 of the power supply system and the load device 20a is provided with a transistor Q2, resistors R21 to R24 and a microcomputer 24, therefore, can be adjusted to the average value of the charging current is kept a certain value so that the output from the power supply circuit 10 unstable current into stable current and precisely charge the secondary battery 21, and can be increased or decreased by adjusting the average value of the charging current.
[0101] Furthermore, in Embodiment 8, the microcomputer 24 controls the transistor Q2 keeps a certain value such that the average value of the charging current, but also can control the transistor Q2 to make the secondary battery 21 charging voltage keeps a certain value.
[0102] lower in this case, the microcomputer 24 according to the voltage applied to the resistors R21, R22 is detecting the charging voltage of the secondary battery 21, as long as the pulse width of adjusting charging signal to control transistor Q2 so that charging voltage of the detected keep a certain value. the voltage of the secondary battery 21 is kept a certain value of the control as needed for stabilizing charging of secondary battery as the secondary battery 21 in the lithium ion battery using the lower effective. And, according to the power supply system, the microcomputer 24 also enables transistor Q2 is always turned off so as to stop charging.
[0103] (Embodiment 9)
[0104] Next, the embodiments of the present invention 9 involved in power supply system will be described. FIG. 13 is a circuit diagram of the power supply system represents Example 9 involved. In addition, in FIG. 13, the same with embodiment 1 to 8 of the structure marking the same reference notations and explanations are omitted. Example 9 relates to the power system to the secondary cell 21 of the cell number change, through changing the electrostatic capacity of the capacitor C5 according to the size of adjusting charging current is characteristic.
the electrostatic capacity (0105) in the load device 20, the charging current flows to the diode D2 as the vertical axis, represents the relationship between charging current and capacity for cross shaft by the electrostatic capacity of the capacitor C5, the charging current resonant with capacitor C5 to load coil L2 is peak value, Ionicerae shape change.
[0106] Therefore, by adjusting the electrostatic capacity of the capacitor C5 can make the charging current becomes a target value.
[0107] Therefore, when the battery number is two of the secondary battery 21 of the load device 20b to replace the battery number is one of secondary battery 21, the load device 20, through the load device 20b of the electrostatic capacity of the capacitor C5 so that the charging current is higher than the load device 20 charging current, thus does not change under the condition of the structure of the power supply circuit 10, the charging current of a desired size to load device 20b.
[0108] Furthermore, in Embodiment 9, a load device 20b has a secondary battery cell number of 21 is two, but it is not limited to this, and also can be the secondary battery 21 of the battery number is more than

three. lower in this case, through the electrostatic capacity of the capacitor C5, and the secondary battery 21 of the battery corresponds to the desired charging current flows, thus does not change under the condition of the structure of the power supply circuit 10, the charging current of a desired size to load device 20b. In addition, it can set the electrostatic capacity of the capacitor C5, not only the battery number, further such as a nickel cadmium battery, a lithium ion battery of the secondary battery 21 of the type corresponding to the desired charging current.
[0109] mentioned above. The embodiment 9 relates to the power supply system, even if secondary battery 21 of battery change, also can through the electrostatic capacity of the capacitor C5 through the charging current of a desired size, so does not change under the condition of the structure of the power supply circuit 10 so that the desired charging current to flow to the load device 20b.
[0110] (Embodiment 10)
[0111] Next, the embodiments of the present invention 10 involved in power supply system will be described. FIG. 14 shows circuit diagram of the power supply system related to Example 10. In addition, in FIG. 14, the same with embodiment 1 to 9 of the structure marking the same reference notations and explanations are omitted. Example 10 relates to the power system to the secondary battery 21 of the battery number is changed, by changing the load coil L2 number of turns to adjust the charging current as feature.
the number of turns (0112) in the load device 20, the charging current flows to the diode D2 as vertical axis and load coil L2 number of turns as the horizontal axis and indicates a relationship between the charging current and the number of turns, the charging current resonant with capacitor C5 to load coil L2 is peak value, Ionicerae shape change.
[0113] Therefore, by adjusting the load coil L2 of coil number can make the charging current becomes a target value.
[0114] Therefore, when the battery number is two of the secondary battery 21 of the load device 20c to replace the battery number is one of secondary battery 21, the load device 20, through the load device 20c, the load coil L2 number of turns so that the charging current is higher than the load device 20 charging current, thus does not change under the condition of the structure of the power supply circuit 10, the charging current of a desired size to load device 20c.
[0115] Furthermore, in Embodiment 10, a load device 20c has a secondary battery cell number of 21 is two, but it is not limited to this, and also can be the secondary battery 21 of the battery number is more than three. lower in this case, through the load coil L2 number of turns, with the secondary battery cell number of 21 corresponds to the desired charging current flows, thus does not change under the condition of the structure of the power supply circuit 10, the charging current of a desired size to load device 20b (should be 20c). In addition, it also can set the load coil L2 number of turns, only with cell number, further such as a nickel cadmium battery, a lithium ion battery of the secondary battery 21 of the type corresponding to the desired charging current.
[0116] size of charging current as mentioned above, according to the embodiment 10 relates to a power supply system, even if secondary battery 21 of battery change, also can through the feedback coil L3 (should the load coil (L2) such that a desired number of turns of flows, so as to not change under the condition of the structure of the power supply circuit 10, the charging current of a desired size to load device 20c.
[0117] (Embodiment 11)
[0118] Next, the embodiments of the present invention 11 involved in power supply system will be described. diagram of the power supply system shown in FIG. 15 and FIG. 16 shows embodiment 11 involved. In addition, in FIG. 15 and FIG. 16, and Example 1 to 10 same structure marking the same reference notations and explanations are omitted. Example 11 relates to the power system to by changing the distance of L2 between the resonant coil and the load coil for adjusting the charging current flows to the diode D2.
[0119] when the resonant coil and the load coil the distance between L2, leakage magnetic flux (flux leakages) increases, so the transmission to the load device 20, the power reducing result, charging current decreases. On the other hand, when reducing the distance of L2 between the resonant coil and the load coil, the leakage magnetic flux is reduced, so that transmitted to the electric load device 20 is increased, the result, charging current increases. Therefore, by adjusting the thickness of the shell 30 can adjust the magnitude of the charging current.
[0120] relative to the loading device 20 of FIG. 15 of the secondary battery 21 of the battery number is one,

as shown in FIG. 16 the load device 20 of the secondary battery 21 of the battery number is two. Therefore, the flow shown in FIG. 16 load device 20 of the charging current size to larger than flow shown in FIG. 15 the charging current load device 20 is preferable.
[0121] Therefore, in the power supply system shown in FIG. 16, shell 30 of the thickness is set thickness of the two is the resonant coil and the load coil the distance between L2 less power supply system is shown in FIG. 15. Therefore, as shown in FIG. 16 power supply system and the power supply system shown in FIG. 15 compared with, a greater charging current flows to the load device 20.
[0122] mentioned above. The embodiment 11 relates to the power supply system, even if cell number change of secondary battery 21, it is possible to flow the charging current of a desired size through the predetermined thickness of the shell body, so as to not change under the condition of the structure of the power supply circuit 10, the charging current of a desired size to load device 20.
[0123] In addition, the secondary battery 16 as shown in FIG. 21 of the cell number is two, but the cell number can be more than three. lower in this case, by adjusting the thickness of the shell, corresponding to the battery so that the charging current of a desired size, thus does not change under the condition of the structure of the power supply circuit 10, the charging current of a desired size to load device 20. In addition, it can set the thickness of housing 30, only with the cell number, but also as the nickel-cadmium battery, lithium ion battery, secondary battery 21 of the type corresponding to the desired charging current.
[0124] (summary of the invention)
[1] (0125) The invention relates to a power supply circuit is formed by the power supply part provides power for self-oscillation of the power supply circuit, comprising a resonance having a resonant capacitor and a resonant coil and supplying power to the load device, oscillation part; having a first switching element connected in series with the resonance part and the feedback coil of the resonant coil magnetically coupled, switching on/off the first switching element so that the resonant self-excitation oscillation; separation section, has the second switch element and connected to the second switching element control terminal disconnected from the capacitance between the cathode of the power supply part. when the first switching element is turned on through the conducted current reaches a predetermined value, turns on the second switching element, switches off said first switching element, and a first charging section having a positive electrode connected to the feedback coil side of the diode, and the negative pole connected to the cathode of the diode, positive pole connection voltage stabilizing diode to the turn-off capacitor side.
[0126] According to the structure, because between the feedback coil and the turn-off capacitor has a first charging part comprises stopping current flow in one direction from the turn-off capacitor to the feedback coil of the diode and the voltage of the feedback coil exceeds a certain value when performing an operation of voltage regulator diode, therefore, when the output large voltage from the power supply part, the voltage of the feedback coil exceeds a certain value, the first charging part to act to the turn-off capacitor. Therefore, the first switching element ON period, conduction current using the first switching element, and a current provided by the first charging section to charge the turn-off capacitor, can fast turn on the second switching element, the first switching element quick disconnect. The result is the first switch element on-time is shortened, the accumulated resonance energy is reduced, it is possible to suppress current to the load device of the output current is increased. Therefore, the voltage output from the power supply part is transverse to flow to the output current of the load device is longitudinal, output characteristic representing the relationship between the two becomes flat, which can be corresponding to the world ground voltage of the power supply circuit.
[0127] In addition, under the condition of higher voltage output from the power supply part, through action of the first charging part, a turn-off capacitor is quickly charged, so the first switch element ON period is shortened, which can prevent the first switch element is applied voltage.
[0128] and the first charging part which prevents the current from the turn-off capacitor flow to the direction of the diode and feedback loop, so as to make the first switching element off capacitance is switched when the accumulated charge quantity to the ON period, cut off the charging time of the capacitor, the first switching element of a certain, capable of providing stable power to load device.
[2] (0129) in the power supply circuit, the more ideal is the first charging section has one end connected to the anode of the voltage stabilizing diode and the other end connected to a resistance of the off capacitance.
[0130] According to the structure, it can adjust the output characteristics by adjusting the resistance of the inclined.

[3] (0131) in the power supply circuit, the ideal is, further comprising a second charging section for charging said turn-off capacitor in addition to the first charging section.
[0132] According to the structure, in addition to the first charging part, and also to charge the turn-off capacitor from the second charging section so as to make the second switch element switched on more quickly, the period shortening the first switching element.
[4] (0133) in the power supply circuit, it is perfect, there are a plurality of said second charging section.
[0134] According to the structure, it can adjust the number of the second charging section to adjust the value of the output current to the load device.
[5] (0135) in the power supply circuit, ideal is the second charging unit to the first charging unit in parallel connection, the voltage of the feedback coil for filtering part of the filter.
[0136] According to the structure, the voltage of the feedback coil is further filtered, thereby removing the ripple effect of the voltage output from the power supply unit caused by voltage variation, capable of stable oscillation of the oscillation unit.
[6] (0137) in the power supply circuit, the more ideal is the second charging section is connection resistance between the control terminal and the second switch element to the anode of said power supply part of.
[0138] According to the structure, it can by a simple structure using only resistance to form the second charging part.
[7] (0139) in the power supply circuit, the ideal is the first charging section is a plurality of parallel connection, and the breakdown voltage of each zener diode provided in each first charging section are different from each other.
[0140] According to the structure, the breakdown voltage stabilizing diode, so as to make the output characteristic is flat.
[8] (0141) the power supply system of the invention comprises any of the installed (7) one of the power supply circuit and the load device power supply system, wherein the load device comprises a magnetic coupling through the insulating member and the resonant coil magnetically coupled.
[0142] According to the structure, when the load device is detached, all the inductive resonant coil become the leakage inductance, the first switch element of the voltage changeable during high, but due to the action of the charging portion of the first switching element is shortened, it is possible to prevent the first switch element is applied voltage, and can reduce flow to the idle current of the power supply circuit capable of reducing the standby power.
[9] (0143) in the power supply system, it is perfect, the magnetic coupler is a metal, and the power supply circuit in the metal generate eddy current for heating.
[0144] According to the structure, in the load device has a metal, the resonant coil from flux so as to generate eddy current and heated, so the power supply circuit is used as a heating device. In addition, without metal load device is detached from the power supply circuit, the load becomes open circuit, the result, all the inductive resonant loop to be leakage inductance applied to the switching element of the voltage changeable during high, but the action switch element of the first charging part is shortened, thus it can prevent the switching element is applied over-voltage, and can reduce flow to the idle current of the power supply circuit capable of reducing the standby power.
[10] (0145) in the power supply system, it is perfect, the load device comprises a load main body, providing a part with the load coil of the resonant coil magnetic coupling, and main body part provided to the load current in the load generated by the coil, a current detecting part for detecting the current supplied to the load main body, a control part, the current detected out by said current detecting part of keeping a certain control value.
[0146] According to the structure, detecting flow currents to the load main body part, control part is provided so that the current is kept a certain value, so it can under the condition of not changing the structure of the power supply circuit, it is possible to provide stable current the load main body, the whole power supply system can realize cost reduction and miniaturization.

Claims

1. A power supply circuit using the power provided by the power supply part for self-excited oscillation, comprising a resonance part, a resonant capacitor and a resonant coil, supplying power to the load device,

and an oscillation unit having a first switching element connected in series with the resonance part and the feedback coil of the resonant coil magnetically coupled, turning on/off the first switching element so that the resonance part self-excitation oscillation, separation section, has the second switch element and connected to the second switching element control terminal disconnected from the capacitance between the cathode of the power supply part. when the first switch element is turned on through the conducted current reaches a predetermined value, turning on the second switching element, turning off the first switching element, and a first charging section having a positive electrode connected to one side of the diode of the feedback coil, and a negative electrode connection electrode to the cathode and anode of the diode are connected to one side of the off capacitance of the voltage stabilizing diode, the first charging section from when the voltage of the power supply output part larger than a certain value, charging the turn-off capacitor; said first charging section is a plurality of parallel connection, the breakdown voltage of each zener diode provided in each first charging section are different from each other.

2. The power supply circuit according to claim 1, wherein said first charging section has one end connected to the anode of the voltage stabilizing diode, while the other end is connected to resistance of the turn-off capacitor.

3. The power supply circuit according to claim 1, wherein it further comprises a second charging section for charging said turn-off capacitor other than the first charging section.

4. The power supply circuit according to claim 3, wherein there are a plurality of said second charging section.

5. The power supply circuit according to claim 3 or 4, wherein said second charging section is connected parallel with the first charging section, the voltage of the feedback coil for filtering part of the filter.

6. The power supply circuit according to claim 3 or 4, wherein said second charging section is connected between control terminal to the anode of said power supply part and said second switch element of the resistance.

7. A power supply system, comprising: a magnetic coupling according to any one of claims 6 to 1 the power supply circuit, and a load device, wherein the load device has through insulating part and the resonant coil magnetically coupled.

8. The power supply system according to claim 7, wherein said magnetic coupler is metal; said power supply circuit for heating by generating eddy current in the metal.

9. The power supply system according to claim 7 or 8, wherein the load device comprises a load main body, providing a part with the load coil of the resonant coil magnetically coupled, to provide the current to the load generated by the load coil main body part, current detecting part for detecting the current supplied to the load main body part, and a control part controls the supplying part to the current detected out by the current detection unit of keep a certain value.

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(19)中华人民共和国国家知识产权局

(12)发明专利

(10)授权公告号 CN 101507091 B
(45)授权公告日 2012.03.07

(21)申请号 200780030800.6

(22)申请日 2007.08.21

(30)优先权数据
228849/2006 2006.08.25 JP

(85)PCT申请进入国家阶段日
2009.02.19

(86)PCT申请的申请数据
PCT/JP2007/066150 2007.08.21

(87)PCT申请的公布数据
WO2008/023679 JA 2008.02.28

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(51)Int.Cl.
H02M 3/28(2006.01)
H02M 3/338(2006.01)

(56)对比文件

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审查员 陈新红

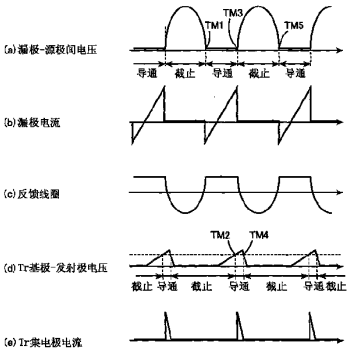
权利要求书 1 页 说明书 13 页 附图 17 页

(54)发明名称

电源电路及电源系统

(57)摘要

本发明提供一种电源电路及电源系统，即使不使用耐压较大的开关元件也能够对应世界各地电压，并且给负载装置提供稳定的电力。所述电源电路，在断开电容(C4)与反馈线圈(L3)之间设置充电部(14)。充电部(14)的正极连接于反馈线圈(L3)的正端子，负极连接于稳压二极管(Z1)的负极。由此，在商用电源(E)的电压较大的情况下，充电部(14)动作，断开电容(C4)被迅速充电，晶体管(Q1)的导通期间缩短，从而防止晶体管(Q1)的漏极－源极之间被施加过大的电压，并且使表示商用电压(E)的电压与流至负载装置的电流之间的关系的输出特性平坦。



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1. 一种电源电路，利用由电源部提供的电力进行自激振荡，其特征在于包括：

谐振部，具有谐振电容和谐振线圈，向负载装置供电；

振荡部，具有与所述谐振部串联连接的第一开关元件和与所述谐振线圈磁耦合的反馈线圈，接通 / 断开所述第一开关元件从而使所述谐振部自激振荡；

断开部，具有第二开关元件和连接于所述第二开关元件的控制端子与电源部的负极之间的断开电容，在所述第一开关元件接通时流过的导通电流达到规定值时，接通所述第二开关元件，断开所述第一开关元件；以及

第一充电部，具有正极连接于所述反馈线圈一侧的二极管，和负极连接于所述二极管的负极且正极连接于所述断开电容一侧的稳压二极管；

所述第一充电部在从所述电源部输出大于一定值的电压时进行动作，对所述断开电容进行充电；

所述第一充电部为多个并联连接，

每个第一充电部所具备的各稳压二极管的击穿电压互不相同。

2. 根据权利要求 1 所述的电源电路，其特征在于：所述第一充电部具有一端连接于所述稳压二极管的正极，另一端连接于所述断开电容的电阻。

3. 根据权利要求 1 所述的电源电路，其特征在于还包括：除所述第一充电部以外对所述断开电容进行充电的第二充电部。

4. 根据权利要求 3 所述的电源电路，其特征在于：所述第二充电部存在多个。

5. 根据权利要求 3 或 4 所述的电源电路，其特征在于：所述第二充电部为与所述第一充电部并联连接，对所述反馈线圈的电压进行滤波的滤波部。

6. 根据权利要求 3 或 4 所述的电源电路，其特征在于：所述第二充电部为连接于所述电源部的正极与所述第二开关元件的控制端子之间的电阻。

7. 一种电源系统，其特征在于包括：

如权利要求 1 ～ 6 中任一项所述的电源电路；和

负载装置，其中，

所述负载装置具有通过绝缘部件与所述谐振线圈磁耦合的磁耦合体。

8. 根据权利要求 7 所述的电源系统，其特征在于：

所述磁耦合体是金属，

所述电源电路让在所述金属中产生涡电流来进行加热。

9. 根据权利要求 7 或 8 所述的电源系统，其特征在于，所述负载装置包括：

负载主体部；

提供部，具有与所述谐振线圈磁耦合的负载线圈，向所述负载主体部提供在所述负载线圈中产生的电流；

电流检测部，检测提供给所述负载主体部的电流；以及

控制部，控制所述提供部以使由所述电流检测部检测出的电流保持一定的值。

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电源电路及电源系统

技术领域

[0001] 本发明涉及一种自激振荡式的电源电路及电源系统。

背景技术

[0002] 近年来，伴随着海外旅行的活跃化，期望开发出一种不仅可以在本国、而且也可以在商用电源的电压大小与本国不同的海外使用，即能够对应宽电压的电源装置，用于作为对剃须刀、电动牙刷等装置进行充电的电源装置。

[0003] 图 17 是表示日本专利公开公报特开平 8-80042 号（以下称作“专利文献 1”）公开的以往的电源装置的电路图。图 17 所示的电源装置是自激振荡式的电源装置，其动作如下。首先，当连接电源部 E0 时，电源部 E0 通过偏压电阻 R80 向电容 C20 供电，从而电容 C20 被充电，FET1 的栅极电压 VG 上升。并且，当电压 VG 超过 FET1 的阈值电压时，FET1 导通，电流 ID 流动。当电流 ID 增大、R40×ID 超过晶体管 Tr10 的阈值 (threshold) 电压时，晶体管 Tr10 导通，将 FTE1 的栅极电容放电。由此，电压 VG 减小，FET1 开始截止，线圈电流 IL1 也开始停止。由此，基于在反馈绕组 L30 感应的电压，电压 VG 急剧降低，FET1 完全截止。

[0004] 当 FET1 截止时，由电容 C10、一次绕组 L10 构成的谐振电路自由振动，电压 VG 基于线圈电流 IL1 再次超过 FET1 的阈值电压，FET1 再次导通。这样反复进行 FET1 的导通、截止，向负载 E20 供电。

[0005] 并且，FET1 由电阻 R40 两端电压 ID×R40 决定，也就是由电流 ID 决定，因此即使在过渡时也不会有过大的电流 ID 流动，电压 VG 也不会过度降低，因而能够使谐振电路中的振荡稳定。

[0006] 作为其他与本发明申请相关的技术，有在日本专利公开公报特开平 10-98880 号（以下称作“专利文献 2”）中公开的 RCC(Ringing Choke Converter) 型的电源装置。

[0007] 然而，专利文献 1 的电源装置无法对应世界各地的电压，在电源部 E0 的电压较大的地域、国家使用时，由于 FET1 的漏极 - 源极间电压过大，存在必须采用漏极 - 源极间的耐压较大的元件作为 FET1 的问题。

[0008] 另一方面，专利文献 2 的开关电源装置，因为是 RCC 式，所以开关元件是硬性开闭，其结果是存在产生噪声较多并且功率损耗变大的问题。并且，专利文献 2 的开关电源装置，因为是 RCC 式，所以即使在电源电压较大的国家、地域使用，由于开关元件的漏极 - 源极间电压也不会像谐振式那样变大，因此不需要降低开关元件的漏极 - 源极间电压。因此，不存在自激振荡式的电源装置产生的上述问题。

[0009] 本发明的目的在于提供一种电源电路及电源系统，即使不使用耐压较大的开关元件也能够对应世界各地的电压、并且能够向负载装置提供稳定的电力。

发明内容

[0010] 本发明所涉及的电源电路，利用由电源部提供的电力进行自激振荡的电源电路，包括：谐振部，具有谐振电容和谐振线圈、且向负载装置供电；振荡部，具有与上述谐振部

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串联连接的第一开关元件和与上述谐振线圈磁耦合的反馈线圈，接通 / 断开上述第一开关元件，从而使上述谐振部自激振荡；断开部，具有第二开关元件和连接于上述第二开关元件的控制端子与电源部的负极间的断开电容，在上述第一开关元件接通时流过的导通电流达到规定值时，接通上述第二开关元件，断开上述第一开关元件；以及第一充电部，具有正极连接于上述反馈线圈一侧的二极管，和负极连接于上述二极管的负极、正极连接于上述断开电容一侧的稳压二极管。

[0011] 根据该结构，由于在在反馈线圈和断开电容之间具有包含阻止电流从断开电容向反馈线圈的方向流动的二极管和在反馈线圈的电压超过一定值时进行动作的稳压二极管的第一充电部，因此，当从电源部输出较大的电压时，反馈线圈的电压超过一定值，第一充电部进行动作，向断开电容供电。由此，在第一开关元件的接通期间，利用第一开关元件的导通电流和由第一充电部提供的电流，断开电容被充电，能够使第二开关元件快速接通，第一开关元件快速断开。其结果，第一开关元件的接通时间缩短，谐振部蓄积的能量减少，能够抑制流至负载装置的输出电流的增大。由此，以从电源部输出的电压为横轴、以流至负载装置的输出电流为纵轴时，表示两者的关系的输出特性变得平坦，能够提供可对应世界各地电压的电源电路。

[0012] 另外，在从电源部输出的电压较高的情况下，通过第一充电部的动作，断开电容被快速充电，因此第一开关元件的接通期间缩短，能够防止第一开关元件被施加过大的电压。

[0013] 并且，第一充电部具有阻止电流从断开电容向反馈线圈的方向流动的二极管，因此能够使第一开关元件接通时的断开电容所蓄积的电荷量一定，断开电容的充电时间一定，第一开关元件的接通期间一定，能够对负载装置提供稳定的电力。

附图说明

[0014] 图 1 表示本发明的实施例 1 所涉及的电源系统的电路图。

[0015] 图 2 表示图 1 所示的电源系统的时序图，其中，(a) 表示晶体管 Q1 的漏极 - 源极间电压，(b) 表示漏极电流，(c) 表示反馈线圈的电压，(d) 表示断开晶体管 Tr 的基极 - 发射极间电压，(e) 表示断开晶体管 Tr 的集电极电流。

[0016] 图 3 是表示本电源系统的输出特性的坐标图，纵轴表示输出电流，横轴表示输入电压。

[0017] 图 4 表示本发明的实施例 2 所涉及的电源系统的电路图。

[0018] 图 5 表示本发明的实施例 3 所涉及的电源系统的电路图。

[0019] 图 6 是表示本电源系统的输出特性的坐标图，纵轴表示输出电流，横轴表示输入电压。

[0020] 图 7 表示本发明的实施例 4 所涉及的电源系统的电路图。

[0021] 图 8 表示本发明的实施例 5 所涉及的电源系统的电路图。

[0022] 图 9 表示本发明的实施例 6 所涉及的电源系统的电路图。

[0023] 图 10 表示本发明的实施例 7 所涉及的电源系统的电路图。

[0024] 图 11 表示本发明的实施例 8 所涉及的电源系统的电路图。

[0025] 图 12 表示充电信号与充电电流的波形图，其中，(a) 表示通常充电时的充电信号与充电电流的波形图，(b) 表示充电电流的平均值小于通常充电时的充电电流时（减小输

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出时）的充电信号与充电电流的波形图。

[0026] 图 13 表示本发明的实施例 9 所涉及的电源系统的电路图。

[0027] 图 14 表示本发明的实施例 10 所涉及的电源系统的电路图。

[0028] 图 15 表示本发明的实施例 11 所涉及的电源系统的电路图。

[0029] 图 16 表示本发明的实施例 11 所涉及的电源系统的电路图。

[0030] 图 17 是表示专利文献 1 公开的以往的电源装置的电路图。

具体实施方式

[0031] 下面，对本发明的实施例所涉及的电源系统进行说明。

[0032] （实施例 1）

[0033] 图 1 表示本发明的实施例 1 所涉及的电源系统的电路图。本电源系统具有电源电路 10 和负载装置 20。电源电路 10 具有谐振部 (resonance section)11、振荡部 (oscillationsection)12、断开部 (turn-off section)13、充电部 14（第一充电部）以及电源部 15。

[0034] 谐振部 11 具有并联连接的谐振线圈 L1 和谐振电容 C3，向负载装置 20 供电。

[0035] 振荡部 12 具有反馈线圈 L3、电容 C2、电阻 R2、晶体管 Q1（第一开关元件）以及电阻 R4，使谐振部 11 自激振荡。反馈线圈 L3 与谐振线圈 L1 磁耦合以使晶体管 Q1 的栅极 (gate) 侧端子为正极性。以下称反馈线圈 L3 的晶体管 Q1 的栅极侧端子为正端子，称与正端子相反侧的端子为负端子。反馈线圈 L3 的负端子与电源部 15 的负极 T1 连接。谐振线圈 L1 的一端连接于晶体管 Q1 的漏极 (drain)。

[0036] 晶体管 Q1 为 n 沟道场效应晶体管，漏极连接于谐振部 11，源极连接于断开部 13，栅极（控制端子）通过电阻 R2 和电容 C2 与反馈线圈 L3 的正端子连接。另外，在晶体管 Q1 的栅极 - 源极间连接有用于防止向栅极输出过大电压的电阻 R4。

[0037] 电容 C2 的一端通过反馈线圈 L3 连接于电源部 15 的负极 T1，另一端通过电阻 R2 连接于晶体管 Q1 的栅极。并且，电容 C2 和电阻 R2 阻止电流从起动电阻 R1 向反馈线圈 L3 侧流动。

[0038] 断开部 13 具有断开晶体管 Tr（第二开关元件）、断开电容 C4、电阻 R5、R6，利用晶体管 Q1 导通时流动的漏极电流（导通电流）对断开电容 C4 进行充电，当断开电容 C4 的电压超过断开晶体管 Tr 的阈值电压时，将断开晶体管 Tr 导通，并使断开晶体管 Q1 断开。

[0039] 断开电容 C4 的一端连接于负极 T1，另一端连接于断开晶体管 Tr 的基极（控制端子）。

[0040] 断开晶体管 Tr 是 npn 双极晶体管 (bipolar transistor)，发射极连接于电源部 15 的负极 T1，基极 - 发射极间并联连接有断开电容 C4，集电极通过起动电阻 R1 与电源部 15 的正极 T2 连接。并且，当断开电容 C4 的电压超过阈值电压时，断开晶体管 Tr 导通，将晶体管 Q1 的栅极电容放电，并使晶体管 Q1 断开。由此，能够阻止过大的漏极电流流至晶体管 Q1，保护晶体管 Q1。

[0041] 电阻 R6 的一端连接于负极 T1，另一端通过电阻 R5 连接于断开晶体管 Tr 的基极，通过电阻 R5 向断开电容 C4 输出与晶体管 Q1 导通时流动的漏极电流相应的电压，对断开电容 C4 进行充电。

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[0042] 充电部 14 具有二极管 D1、稳压二极管 Z1 以及电阻 R3，在从电源部 15 输出大于一定值的电压时进行动作，对断开电容 C4 进行充电。二极管 D1 的正极 (anode) 连接于反馈线圈 L3 的正端子。稳压二极管 Z1 的负极连接于二极管 D1 的负极，正极通过电阻 R3 连接于断开电容 C4。

[0043] 电源部 15 具有整流电路 151 和电容 C1，将来自商用电源 E 的交流电压转换为直流电压。商用电源 E 输出振幅为 80V ～ 246V 的交流电压。整流电路 151 例如是二极管电桥电路，对从商用电源 E 输出的交流电压进行全波整流。电容 C1 例如是电解电容，对被整流电路 151 全波整流过的电压进行滤波，从而生成直流电压。

[0044] 负载装置 20 具有负载线圈 L2、与负载线圈 L2 并联连接的电容 C5、正极连接于电容 C5 的二极管 D2 以及正极连接于二极管 D2 的负极且负极连接于电容 C5 的二次电池 21。

[0045] 负载线圈 L2 与谐振线圈 L1 磁耦合以使二次电池 21 的负极侧具有正极性。在此，谐振线圈 L1 与负载线圈 L2 通过未图示的绝缘体非接触地连接。此外，由谐振线圈 L1 与负载线圈 L2 构成变压器，谐振线圈 L1 为一次绕组，负载线圈 L2 为二次绕组。

[0046] 电容 C5 对从负载线圈 L2 输出的电压进行滤波，二极管 D2 对从负载线圈 L2 输出的电压进行整流。由此，一定的充电电流流至二次电池 21。二次电池 21 采用锂离子二次电池、镍镉二次电池等。

[0047] 接下来，对图 1 所示的电源系统的动作进行说明。图 2 表示图 1 所示的电源系统的时序图，其中，(a) 表示晶体管 Q1 的漏极 - 源极间电压，(b) 表示漏极电流，(c) 表示反馈线圈 L3 的电压，(d) 表示断开晶体管 Tr 的基极 - 发射极间电压，(e) 表示断开晶体管 Tr 的集电极电流。下面，参照图 1 的电路图和图 2 的时序图，对本电源系统的动作进行说明。

[0048] 从商用电源 E 输出的 AC80 ～ AC264V 的电压被整流电路 151 整流、被电容 C1 滤波，成为 DC113 ～ DC374V 的直流电压。如果反馈线圈 L3 和电容 C1 的电压上升，在起动电阻 R1 就有电流流过，晶体管 Q1 的栅极开始被施加电压。当晶体管 Q1 的栅极电压超过晶体管 Q1 的阈值电压时，晶体管 Q1 就导通 (时刻 TM1)，在谐振电容 C3 和谐振线圈 L1 开始有电流流过。

[0049] 此时，如图 2(b) 所示，在晶体管 Q1 开始有漏极电流流过，在谐振线圈 L1 开始有电流流过。如果谐振线圈 L1 开始有电流流过，在与谐振线圈 L1 磁耦合的反馈线圈 L3 上也产生电压，基于谐振线圈 L1 的方向性而维持晶体管 Q1 导通。另外，如果晶体管 Q1 导通，基于漏极电流，在电阻 R6 上开始产生电压，断开电容 C4 被充电。

[0050] 与此同时，在反馈线圈 L3 的正端子上产生正的电压，当商用电源 E 的电压大于一定值时，充电部 14 动作，电流通过二极管 D1、稳压二极管 Z1、电阻 R3 流至断开电容 C4，断开电容 C4 被充电。即，利用充电部 14 和在电阻 R6 上产生的电压对断开电容 C4 进行充电，因此能够使断开晶体管 Tr 快速导通。

[0051] 如果断开电容 C4 的电压上升到断开晶体管 Tr 的阈值电压时 (时刻 TM2)，断开晶体管 Tr 就导通，将晶体管 Q1 的栅极电容放电，从而晶体管 Q1 截止 (时刻 TM3)。

[0052] 此时，由于存在断开电容 C4，因此断开晶体管 Tr 暂时维持导通直到经过时刻 TM4，在反馈线圈 L3 的正端子上产生负的电压，晶体管 Q1 维持截止。此时，流至谐振线圈 L1 的电流流至谐振电容 C3，谐振线圈 L1 的漏电感 (leakage inductance) 与谐振电容 C3 开始谐振，如图 2(a) 所示，晶体管 Q1 的漏极 - 源极间电压呈向上凸出的曲线状变化。另外，反馈

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线圈 L3 的电压随之呈向下凸出的曲线状变化。

[0053] 此外，在本实施例中，谐振线圈 L1 与负载线圈 L2 疏耦合 (loose coupling)，在谐振线圈 L1 产生励磁电感 (exciting inductance) 和漏电感 (leakage inductance)。如果谐振开始后经过一段时间，在反馈线圈 L3 的正端子上产生正的电压，晶体管 Q1 再次导通 (时刻 TM5)。此外，决定断开电容 C4 的静电电容与电阻 R5、R6 的电阻值，以使在晶体管 Q1 导通时蓄积在断开电容 C4 中的全部或一定量的电荷在晶体管 Q1 的导通期间内通过电阻 R5 和 R6 被放电。

[0054] 图 3 是表示本电源系统的输出特性的曲线图，纵轴表示输出电流，横轴表示输入电压。实线曲线表示采用充电部 14 时的输出特性，虚线曲线表示没有采用充电部 14 时的输出特性。输出电流表示在负载装置 20 的二次电池 21 流过的充电电流，输入电压表示商用电源 E 输出的电压。并且，E1 表示在对反馈线圈 L3 的正端子施加充电部 14 开始动作的阈值电压时的商用电源 E 的电压。

[0055] 设谐振线圈 L1 的圈数为 N1、反馈线圈 L3 的圈数为 N3、商用电源 E 输出的电压为 E，当谐振线圈 L1 与反馈线圈 L3 完全耦合时，在反馈线圈 L3 上产生 E×N3/N1 的电压。并且，当在反馈线圈 L3 上产生的电压 (E×N3/N1) 高于稳压二极管 Z1 的击穿电压 (breakdown voltage)VZ1 时，充电部 14 就动作。

[0056] 由此，将图 3 的虚线所示的应该增加的充电电流控制为如实线所示，在大于 E1 的高电压区域大幅度地抑制充电电流的增大。即，虽然在充电部 14 流过的电流随着商用电源 E 的电压升高而更变大，但是，据此晶体管 Q1 的导通期间缩短，在导通期间谐振部 11 蓄积的能量减少，其结果抑制输出电流的增大。此外，通过调整电阻 R3 的电阻值能够调整图 3 所示的高电压区域的输出电流的倾斜，因此通过调整 R3 的电阻值能够使输出电流大致一定，或者如图 6 所示，可以使输出电流缓慢减小。

[0057] 接下来，考虑充电部 14 不具有二极管 D1 的情况。在这种情况下，如图 2(c) 所示，在晶体管 Q1 截止期间，由于在反馈线圈 L3 上产生负的电压，因此断开电容 C4 的电荷也被放电至反馈线圈 L3 侧。并且，在反馈线圈 L3 上产生的负的电压随着时间变化而不稳定，因此被放电的电荷量也不稳定，可能使晶体管 Q1 导通时的断开电容 C4 的剩余电容无法保持一定。因此，难以每次都从断开电容 C4 放出一定的电荷，这会导致晶体管 Q1 的导通期间不稳定。

[0058] 另一方面，在本电源系统中，充电部 14 具有正极连接于反馈线圈 L3 的正端子的二极管 D1。因此，在晶体管 Q1 截止的期间，蓄积在断开电容 C4 中的电荷仅从电阻 R5、R6 被放电，从而阻止通过充电部 14 将电荷放电。其结果，当晶体管 Q1 导通时，断开电容 C4 所蓄积的电荷成为 0 或者一定值，能够使晶体管 Q1 的导通期间一定。

[0059] 如上所述，若采用实施例 1 的电源系统，由于具有充电部 14，因此能够与商用电源 E 的电压大小无关地将输出电流控制在某种程度的范围内，能够提供可对应世界各地电压的电源电路 10。并且，由于具有充电部 14，晶体管 Q1 的导通期间随着商用电源 E 的电压增大而缩短，因此能够防止对晶体管 Q1 施加过大的电压。并且，充电部 14 具有正极连接于反馈线圈 L3 的正端子的二极管 D1，因此能够阻止断开电容 C4 通过充电部 14 放电，使晶体管 Q1 的导通期间稳定，使提供给负载装置 20 的电力稳定。

[0060] (实施例 2)

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[0061] 接下来，对本发明的实施例 2 所涉及的电源系统进行说明。图 4 表示实施例 2 所涉及的电源系统的电路图。此外，在图 4 中，对与实施例 1 相同的结构标注相同的附图标记，省略说明。实施例 2 所涉及的电源系统以在正极 T2 与断开晶体管 Tr 的基极之间连接有电阻 R7。

[0062] 如果从商用电源 E 输入电压，电流通过电阻 R7 流至断开电容 C4，因此始终向断开电容 C4 输出电阻 R7 与电阻 R5、R6 的合成电阻之间的分压电压。因而，对断开电容 C4 输出的电压随着商用电源 E 电压的增大而增大，因此能够与商用电源 E 的电压相应地控制晶体管 Q1 的导通期间，控制对负载装置 20 的输出。

[0063] 另外，不仅通过充电部 14，还通过电阻 R7 向断开电容 C4 供电，因此断开电容 C4 能够快速使断开晶体管 Tr 导通，晶体管 Q1 的导通期间缩短，从而可以采用耐压较低的晶体管作为晶体管 Q1。

[0064] 如上所述，根据实施例 2 所涉及的电源系统，能够调整商用电源 E 的电压来控制对负载装置 20 的输出，并且能够防止对晶体管 Q1 施加过大的电压。

[0065] （实施例 3）

[0066] 接下来，对本发明的实施例 3 所涉及的电源系统进行说明。图 5 表示实施例 3 所涉及的电源系统的电路图。此外，在图 5 中，对与实施例 1、2 相同的结构标注相同的附图标记，省略说明。实施例 3 所涉及的电源系统以在实施例 1 的电源系统中在充电部 14 上并联连接滤波部 16 为特征。滤波部 16 具有二极管 D3、电容 C7 以及电阻 R8。二极管 D3 的正极连接于反馈线圈 L3 的正端子，负极通过电阻 R8 连接于断开晶体管 Tr 的基极，并且通过电容 C7 连接于负极 T1。

[0067] 滤波部 16 对反馈线圈 L3 的电压进行滤波，生成相当于电源电压的电压。由此，从充电部 14 和滤波部 16 这两条路径对断开电容 C4 充电。因此，对断开电容 C4 输出降低了产生在电容 C1 上的电压包含的纹波（ripple）的电压，断开晶体管 Tr 直到导通的时间稳定，晶体管 Q1 的导通期间稳定，能够使谐振部 11 进行稳定的振荡。

[0068] 图 6 是表示实施例 3 所涉及的电源系统的输出特性的曲线图，纵轴表示输出电流，横轴表示输入电压。此外，实线表示实施例 3 的输出特性，虚线表示实施例 4 的输出特性。输出电流表示在负载装置 20 的流到二次电池 21 的充电电流，输入电压表示商用电源 E 的电压。如图 6 所示，可知当设置滤波部 16 时，电压到达 E1 为止的低电压区域的倾斜与图 3 所示的曲线图相比更平缓。因此，不管商用电源 E 输出的电压大小如何，能够将输出电流控制在一定的范围内。

[0069] 如上所述，根据实施例 3 所涉及的充电系统，由于具有滤波部 16，因此对断开电容 C4 输出稳定的电压，输出特性更平坦，其结果，能够提供更适于世界各地电压的电源系统。

[0070] （实施例 4）

[0071] 接下来，对本发明的实施例 4 所涉及的电源系统进行说明。图 7 表示实施例 4 所涉及的电源系统的电路图。此外，在图 7 中，对与实施例 1 ～ 3 相同的结构标注相同的附图标记，省略说明。实施例 4 所涉及的的电源系统以具有充电部 17，代替实施例 3 所涉及的电源系统的滤波部 16，即、使用两个充电部 14、17 对断开电容 C4 进行充电为特征。

[0072] 充电部 17 与充电部 14 的结构相同，具有二极管 D5、稳压二极管 Z2 以及电阻 R9。二极管 D5 的正极连接于反馈线圈 L3 的正端子，负极连接于稳压二极管 Z2 的负极。稳压二

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极管 Z2 的正极通过电阻 R9 连接于断开晶体管 Tr 的基极。

[0073] 在此，设稳压二极管 Z2 的击穿电压 VZ2 大于稳压二极管 Z1 的击穿电压 VZ1。由此，在反馈线圈 L3 的正端子的电压低于 VZ1 时，充电部 14、17 不动作，在反馈线圈 L3 的正端子的电压在 VZ1 以上、且未达到 VZ2 时，只有充电部 14 动作，在反馈线圈 L3 的正端子的电压在 VZ2 以上时，充电部 14、充电部 17 一起动作。

[0074] 由此，如图 6 的虚线的坐标图所示，在输出特性上出现两个拐点 P1、P2。即，在商用电源 E 的电压低于 E2、反馈线圈 L3 的正端子的电压未达到击穿电压 VZ1 时，充电部 14、17 不动作。另外，在商用电源 E 的电压在 E2 以上，未达到 E3，反馈线圈 L3 的正端子的电压在击穿电压 VZ1 以上，且未达到击穿电压 VZ2 时，只有充电部 14 动作。由此，由充电部 14 对断开电容 C4 充电，结果是导通期间缩短，输出电流降低。因此，在 E2 ～ E3 的中电压区域，输出特性的倾斜比低电压区域平缓。

[0075] 并且，在商用电源 E 的电压在 E3 以上、反馈线圈 L3 的正端子的电压高于击穿电压 VZ2 时，除充电部 14 动作外，充电部 17 也动作。由此，从充电部 14 和充电部 17 两条路径对断开电容 C4 充电，结果是导通期间进一步缩短，输出电流进一步降低。因此，高电压区域的输出特性的倾斜比中电压区域更平缓。

[0076] 如上所述，根据实施例 4 所涉及的电源系统，除充电部 14 外还设置有充电部 17，因此输出特性呈两阶段变化，将输出电流的变动幅度抑制得更小，得到更平坦的输出特性，能够提供更适于世界各地电压的电源系统。

[0077] 此外，在实施例 4 所涉及的电源系统中，虽然设置了两个充电部 14、17，但也可以设置三个以上的充电部。在这种情况下，只要将各充电部具有的稳压二极管的击穿电压设为不同的值，就能够得到具有与充电部的个数相对应的拐点的输出特性，能够得到更平坦的输出特性。并且，通过调整充电部的个数和稳压二极管的击穿电压的值，能够调整输出特性，以便在目标（target）商用电源 E 的电压区域内得到所期望的输出电流。

[0078] （实施例 5）

[0079] 接下来，对本发明的实施例 5 所涉及的电源系统进行说明。图 8 表示实施例 5 所涉及的电源系统的电路图。此外，在图 8 中，对与实施例 1 ～ 4 相同的结构标注相同的附图标记，省略说明。实施例 5 所涉及的电源系统以具有在实施例 4 的电源系统中，省去了充电部 17 的稳压二极管 Z2 的充电部 18 为特征。

[0080] 由于充电部 18 不包含稳压二极管 Z2，因此即使在商用电源 E 的电压较低、充电部 14 不动作的情况下充电部 18 也会动作，对断开电容 C4 进行充电。因此，电源系统的输出特性在低电压区域的倾斜变得平缓，能够使输出特性更加平坦。

[0081] 另一方面，在商用电源 E 输出使充电部 14 动作的高电压时，与实施例 1 相同，抑制输出电流在高电压区域增大，能够得到平坦的输出特性。

[0082] 如上所述，根据实施例 5 所涉及的电源系统，由于具有充电部 18，因此能够使在低电压区域的输出特性平坦，能够提供更适于世界各地电压的电源系统。

[0083] （实施例 6）

[0084] 接下来，对本发明的实施例 6 所涉及的电源系统进行说明。图 9 表示实施例 6 所涉及的电源系统的电路图。此外，在图 9 中，对与实施例 1 ～ 5 相同的结构标注相同的附图标记，省略说明。实施例 6 所涉及的电源系统以在实施例 1 的电源系统中，将电源电路 10

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和负载装置 20 通过壳体 30 连接为特征。

[0085] 壳体 30 使谐振线圈 L1 与负载线圈 L2 绝缘，并使在谐振线圈 L1 中产生的磁通在负载线圈 L2 中交链 (interlink)，通过电磁感应传输电力。由此，电源电路 10 非接触地对二次电池 21 进行充电。作为壳体 30，可以采用电源电路 10 的壳体和负载装置 20 的壳体。并且，在电源电路 10 的壳体上设置用于载放负载装置 20 的载放部，当在该载放部上载放负载装置 20 时，只要设置谐振线圈 L1 和负载线圈 L2 使谐振线圈 L1 与负载线圈 L2 磁耦合即可。

[0086] 在从电源电路 10 上卸下负载装置 20 的情况下，谐振线圈 L1 中励磁电感也变为漏电感，与安装有负载装置 20 的情况相比，漏电感增大，谐振电压随之增大，导致晶体管 Q1 的漏极电压也增大。然而，实施例 6 所涉及的电源系统由于具有充电部 14，因此即使谐振电压增大，由于充电部 14 动作而使晶体管 Q1 的导通期间缩短，因此也可以不使用耐压较大的晶体管作为晶体管 Q1，并且使输出特性平坦。

[0087] 如上所述，根据实施例 6 所涉及的电源系统，由于设置壳体 30，因此能够非接触地对二次电池 21 进行充电。并且，即使卸下负载装置 20，谐振电压增大，由于充电部 14 动作而使晶体管 Q1 的导通期间缩短，因此不会对晶体管 Q1 长时间施加较大的电压，能够保护晶体管 Q1。其结果，不需要使用耐压较大的晶体管作为晶体管 Q1，能够实现电路的小型化和低成本化。

[0088] (实施例 7)

[0089] 接下来，对本发明的实施例 7 所涉及的电源系统进行说明。图 10 表示实施例 7 所涉及的电源系统的电路图。此外，在图 10 中，对与实施例 1 ～ 6 相同的结构标注相同的附图标记，省略说明。实施例 7 所涉及的电源系统以使用剃须刀作为负载装置 20，电源电路对剃须刀供电来加热刀面 22。

[0090] 剃须刀具有刀面 22 和主体部 23。刀面 22 由金属形成，在人剃须时与皮肤接触，剃掉长在皮肤上的毛。主体部 23 具有控制剃须刀的各种电路等。

[0091] 壳体 30 由电源电路 10 的壳体构成，使谐振线圈 L1 与刀面 22 绝缘。电源电路 10 是与实施例 1 的电源电路 10 相同的电源电路，使在谐振线圈 L1 中产生的磁通与刀面 22 交链，使刀面 22 中流过涡电流从而加热刀面 22。刀面 22 的厚度为 100nm 左右，较薄，与金属锅一样，耦合较低。因此，谐振线圈 L1 的电感 (inductance) 大致成为漏电感，谐振电压变高，导致晶体管 Q1 的漏极电压增大。然而，实施例 7 所涉及的电源系统由于具有充电部 14，因此即使谐振电压增大，由于充电部 14 动作而使晶体管 Q1 的导通期间缩短，因此也可以不使用耐压较大的晶体管作为晶体管 Q1，并且输出特性平坦。

[0092] 如上所述，根据实施例 7 所涉及的电源系统，电源电路 10 能够非接触地加热电动剃须刀的刀面 22。另外，由于谐振线圈 L1 的二次一侧为由金属形成的刀面 22，因此谐振电压增大，但是由于充电部 14 动作而使晶体管 Q1 的导通期间缩短，因此不会对晶体管 Q1 长时间施加较大的电压，能够保护晶体管 Q1。其结果，不需要使用耐压较大的晶体管作为晶体管 Q1，能够实现电路的小型化和低成本化。

[0093] (实施例 8)

[0094] 接下来，对本发明的实施例 8 所涉及的电源系统进行说明。图 11 表示实施例 8 所涉及的电源系统的电路图。此外，在图 11 中，对与实施例 1 ～ 7 相同的结构标注相同的附

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图标记，省略说明。实施例 8 所涉及的电源系统以利用负载装置 20a 进行电流控制为特征。

[0095] 负载装置 20a 相对于实施例 1 的负载装置 20 还具有晶体管 Q2、四个电阻 R21、R22、R23、R24 以及微型计算机 24。晶体管 Q2 是 n 沟道场效应晶体管，漏极连接于二极管 D2 的负极，源极连接于二次电池 21 的正极。串联连接的电阻 R21 和 R22 与二次电池 21 并联连接。电阻 R21 与电阻 R22 的连接点与微型计算机 24 连接。晶体管 Q2 的栅极通过电阻 R23 与微型计算机 24 连接。电阻 R24 连接于负载线圈 L2 的正端子与二次电池 21 的负极之间。微型计算机 24 的接地端子与二次电池 21 的负极连接。

[0096] 微型计算机 24 检测流过电阻 R24 的充电电流，向晶体管 Q2 的栅极输出脉冲信号（充电信号），对晶体管 Q2 进行 PWM(pulse width modulation，脉宽调制）控制，以使充电电流的平均值保持一定的值。由此，被调整为充电电流的平均值保持一定的值，使从电源电路 10 输出的不稳定的电流成为稳定的电流，能够高精度地对二次电池进行充电。

[0097] 此外，在实施例 8 中，二次电池 21 相当于负载主体部，负载线圈 L2、二极管 D2、电容 C5、晶体管 Q2 以及电阻 R24 相当于提供部，微型计算机 24 相当于电流检测部及控制部。

[0098] 图 12 表示充电信号与充电电流的波形图，其中，(a) 表示通常充电时的充电信号与充电电流的波形图，(b) 表示充电电流的平均值小于通常充电时的充电电流时（减小输出时）的充电信号与充电电流的波形图。

[0099] 由图 12(a)、(b) 可知当充电信号为高电平时，晶体管 Q2 导通，流有一定大小的充电电流；当充电信号为低电平时，晶体管 Q2 截止，充电电流为 0。即，在增大充电电流的平均值时，微型计算机 24 增大充电信号的脉宽；当减小充电电流的平均值时，微型计算机 24 减小充电信号的脉宽，由此能够调整充电电流的平均值。

[0100] 如上所述，根据实施例 8 的电源系统，负载装置 20a 中设置了晶体管 Q2、电阻 R21 ～ R24 以及微型计算机 24，因此能够被调整为充电电流的平均值保持一定的值，使从电源电路 10 输出的不稳定的电流成为稳定的电流，高精度地对二次电池 21 充电，并且能够进行增大或者减小充电电流的平均值的调整。

[0101] 此外，在实施例 8 中，微型计算机 24 控制晶体管 Q2 以使充电电流的平均值保持一定的值，但是也可以控制晶体管 Q2 使二次电池 21 的充电电压保持一定的值。

[0102] 在这种情况下，微型计算机 24 根据施加在电阻 R21、R22 上的电压检测二次电池 21 的充电电压，只要调整充电信号的脉宽来控制晶体管 Q2 以使检测出的充电电压保持一定的值即可。使二次电池 21 的电压保持一定的值的控制，在采用锂离子电池那样需要进行稳压充电的二次电池作为二次电池 21 的情况下有效。并且，根据本电源系统，微型计算机 24 也能够使晶体管 Q2 始终截止从而停止充电。

[0103] （实施例 9）

[0104] 接下来，对本发明的实施例 9 所涉及的电源系统进行说明。图 13 是表示实施例 9 所涉及的电源系统的电路图。此外，在图 13 中，对与实施例 1 ～ 8 相同的结构标注相同的附图标记，省略说明。实施例 9 所涉及的电源系统以在构成二次电池 21 的电池数变化时，通过改变电容 C5 的静电容量的大小来调整充电电流为特征。

[0105] 在负载装置 20 中，以流至二极管 D2 的充电电流为纵轴、以电容 C5 的静电容量为横轴表示充电电流与静电容量之间的关系时，充电电流以负载线圈 L2 与电容 C5 谐振时的静电容量为峰值，呈山状变化。

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[0106] 因此，通过调整电容 C5 的静电容量能够使充电电流成为目标值。

[0107] 因而，在采用电池数为两个的二次电池 21 的负载装置 20b 来代替电池数为一个的二次电池 21 的负载装置 20 时，通过设定负载装置 20b 的电容 C5 的静电容量以使充电电流高于负载装置 20 的充电电流，由此可以在不改变电源电路 10 的结构的情况下，使所希望的大小的充电电流流至负载装置 20b。

[0108] 此外，在实施例 9 中，负载装置 20b 具有的二次电池 21 的电池数为两个，但是不限于此，也可以将二次电池 21 的电池数设为三个以上。在这种情况下，通过设定电容 C5 的静电容量，与二次电池 21 的电池数相对应，使所希望的充电电流流过，由此可以在不改变电源电路 10 的结构的情况下，使所希望的大小的充电电流流至负载装置 20b。另外，也可以设定电容 C5 的静电容量，不仅与电池数，还与镍镉电池、锂离子电池那样的二次电池 21 的种类相对应，使所希望的充电电流流过。

[0109] 如上所述，根据实施例 9 所涉及的电源系统，即使二次电池 21 的电池数变化，也能够通过设定电容 C5 的静电容量使所希望的大小的充电电流流过，从而在不改变电源电路 10 的结构的情况下，使所希望的充电电流流至负载装置 20b。

[0110] （实施例 10）

[0111] 接下来，对本发明的实施例 10 所涉及的电源系统进行说明。图 14 表示实施例 10 所涉及的电源系统的电路图。此外，在图 14 中，对与实施例 1 ～ 9 相同的结构标注相同的附图标记，省略说明。实施例 10 所涉及的电源系统以在构成二次电池 21 的电池数变化时，通过改变负载线圈 L2 的圈数来调整充电电流为特征。

[0112] 在负载装置 20 中，以流至二极管 D2 的充电电流为纵轴、以负载线圈 L2 的圈数为横轴，表示充电电流与圈数之间的关系时，充电电流以负载线圈 L2 与电容 C5 谐振时的圈数为峰值，呈山状变化。

[0113] 因此，通过调整负载线圈 L2 的圈数能够使充电电流成为目标值。

[0114] 因而，在采用电池数为两个的二次电池 21 的负载装置 20c 来代替电池数为一个的二次电池 21 的负载装置 20 时，通过设定负载装置 20c 的负载线圈 L2 的圈数以使充电电流高于负载装置 20 的充电电流，由此可以在不改变电源电路 10 的结构的情况下，使所希望的大小的充电电流流至负载装置 20c。

[0115] 此外，在实施例 10 中，负载装置 20c 具有的二次电池 21 的电池数为两个，但是不限于此，也可以将二次电池 21 的电池数设为三个以上。在这种情况下，通过设定负载线圈 L2 的圈数，与二次电池 21 的电池数相对应，使所希望的充电电流流过，由此可以在不改变电源电路 10 的结构的情况下，使所希望的大小的充电电流流至负载装置 20b（应为 20c）。另外，也可以设定负载线圈 L2 的圈数，不仅与电池数，还与镍镉电池、锂离子电池那样的二次电池 21 的种类相对应，使所希望的充电电流流过。

[0116] 如上所述，根据实施例 10 所涉及的电源系统，即使二次电池 21 的电池数变化，也能够通过设定反馈线圈 L3（应为负载线圈 L2）的圈数以使所希望的大小的充电电流流过，从而可以在不改变电源电路 10 的结构的情况下，使所希望的大小的充电电流流至负载装置 20c。

[0117] （实施例 11）

[0118] 接下来，对本发明的实施例 11 所涉及的电源系统进行说明。图 15 和图 16 表示实

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施例 11 所涉及的电源系统的电路图。此外，在图 15 和图 16 中，对与实施例 1 ～ 10 相同的结构标注相同的附图标记，省略说明。实施例 11 所涉及的电源系统以通过改变谐振线圈 L1 与负载线圈 L2 之间的距离来调整流至二极管 D2 的充电电流。

[0119] 当增大谐振线圈 L1 与负载线圈 L2 之间的距离时，漏磁通 (flux leakage) 增多，因此传输到负载装置 20 的电力减小，其结果，充电电流减小。另一方面，当减小谐振线圈 L1 与负载线圈 L2 之间的距离时，由于漏磁通减少，因此传输到负载装置 20 的电力增大，其结果，充电电流增大。因此，通过调整壳体 30 的厚度能够调整充电电流的大小。

[0120] 相对于图 15 所示的负载装置 20 的二次电池 21 的电池数是一个，图 16 所示的负载装置 20 的二次电池 21 的电池数是两个。因此，流入图 16 所示的负载装置 20 的充电电流的大小以大于流入图 15 所示的负载装置 20 的充电电流为宜。

[0121] 因此，在图 16 所示的电源系统中，壳体 30 的厚度被设定为使谐振线圈 L1 与负载线圈 L2 之间的距离小于图 15 所示的电源系统中的两者间的距离的厚度。因此，图 16 所示的电源系统与图 15 所示的电源系统相比，有更大的充电电流流至负载装置 20。

[0122] 如上所述，根据实施例 11 所涉及的电源系统，即使二次电池 21 的电池数变化，也能够通过设定壳体的厚度使所希望的大小的充电电流流过，从而可以在不改变电源电路 10 的结构的情况下，使所希望的大小的充电电流流至负载装置 20。

[0123] 此外，图 16 所示的二次电池 21 的电池数是两个，但是电池数也可以设为三个以上。在这种情况下，通过调整壳体的厚度，与电池数相对应，使所希望大小的充电电流，由此可以在不改变电源电路 10 的结构的情况下，使所希望的大小的充电电流流至负载装置 20。另外，也可以设定壳体 30 的厚度，不仅与电池数，还与镍镉电池、锂离子电池那样的二次电池 21 的种类相对应，使所希望的充电电流流过。

[0124] （本发明的总结）

[0125] (1) 本发明所涉及的电源电路是利用由电源部提供的电力进行自激振荡的电源电路，具有：谐振部，具有谐振电容和谐振线圈、向上述负载装置供电；振荡部，具有与上述谐振部串联连接的第一开关元件和与上述谐振线圈磁耦合的反馈线圈，接通 / 断开上述第一开关元件，从而使上述谐振部自激振荡；断开部，具有第二开关元件和连接于上述第二开关元件的控制端子与电源部的负极之间的断开电容，在上述第一开关元件接通时流过的导通电流达到规定值时，接通上述第二开关元件，断开上述第一开关元件；以及第一充电部，具有正极连接于上述反馈线圈侧的二极管，和负极连接于上述二极管的负极、正极连接于上述断开电容侧的稳压二极管。

[0126] 根据该结构，由于在反馈线圈和断开电容之间具有包含阻止电流从断开电容向反馈线圈的方向流动的二极管和在反馈线圈的电压超过一定值时进行动作的稳压二极管的第一充电部，因此，当从电源部输出较大的电压时，反馈线圈的电压超过一定值，第一充电部进行动作，向断开电容供电。由此，在第一开关元件的接通期间，利用第一开关元件的导通电流和由第一充电部提供的电流对断开电容进行充电，能够使第一开关元件快速接通、使第一开关元件快速断开。其结果，是第一开关元件的接通时间缩短，谐振部蓄积的能量减少，能够抑制流至负载装置的输出电流的增大。由此，以从电源部输出的电压为横轴、以流至负载装置的输出电流为纵轴时，表示两者的关系的输出特性变得平坦，能够提供可对应世界各地电压的电源电路。

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[0127] 另外，在从电源部输出的电压较高的情况下，通过第一充电部的动作，断开电容被快速充电，因此第一开关元件的接通期间缩短，能够阻止第一开关元件被施加过大的电压。

[0128] 并且，第一充电部具有阻止电流从断开电容向反馈线圈的方向流动的二极管，因此能够使第一开关元件接通时的断开电容所蓄积的电荷量为一定，断开电容的充电时间一定，第一开关元件的接通期间一定，能够对负载装置提供稳定的电力。

[0129] (2) 在上述电源电路中，较为理想的是，上述第一充电部具有一端连接于上述稳压二极管的正极、另一端连接于上述断开电容的电阻。

[0130] 根据该结构，能够通过调整电阻值来调整输出特性的倾斜。

[0131] (3) 在上述电源电路中，较为理想的是，还包括除上述第一充电部以外对上述断开电容进行充电的第二充电部。

[0132] 根据该结构，除第一充电部外，还从第二充电部对断开电容进行充电，因此能够使第二开关元件更快速地接通，缩短第一开关元件的接通期间。

[0133] (4) 在上述电源电路中，较为理想的是，上述第二充电部存在多个。

[0134] 根据该结构，能够调整第二充电部的数量来调整流至负载装置的输出电流的值。

[0135] (5) 在上述电源电路中，较为理想的是，上述第二充电部为与上述第一充电部并联连接、对上述反馈线圈的电压进行滤波的滤波部。

[0136] 根据该结构，反馈线圈的电压被滤波部进一步滤波，因此能够去除从电源部输出的电压的纹波影响引起的电压变动，能够稳定振荡部的振荡。

[0137] (6) 在上述电源电路中，较为理想的是，上述第二充电部为连接于上述电源部的正极与上述第二开关元件的控制端子之间的电阻。

[0138] 根据该结构，能够由仅使用电阻的简单结构来构成第二充电部。

[0139] (7) 在上述电源电路中，较为理想的是，上述第一充电部为多个并联连接，且每个第一充电部所具备的各稳压二极管的击穿电压互不相同。

[0140] 根据该结构，使用击穿电压互不相同的稳压二极管，因此能够使输出特性更加平坦。

[0141] (8) 本发明的电源系统是包括 (1) 到 (7) 的任一项所述的电源电路和负载装置的电源系统，其中，上述负载装置包括通过绝缘部件与上述谐振线圈磁耦合的磁耦合体。

[0142] 根据该结构，当卸下负载装置时，谐振线圈的所有电感都成为漏电感，施加在第一开关元件的电压变高，但是由于充电部的动作第一开关元件的接通期间缩短，因此能够防止第一开关元件被施加过大的电压，并且能够减小流至电源电路的无效电流，能够减小待机功率。

[0143] (9) 在上述电源系统中，较为理想的是，上述磁耦合体是金属，上述电源电路让在上述金属中产生涡电流来进行加热。

[0144] 根据该结构，在负载装置具有的金属内，来自谐振线圈的磁通交链从而产生涡电流而被加热，因此能够将电源电路作为加热装置使用。另外，从电源电路卸下负载装置而没有金属时，负载变为开路，其结果，谐振线圈的所有电感成为漏电感，施加在开关元件的电压变高，但是由于第一充电部的动作开关元件的接通期间缩短，因此能够防止开关元件被施加过大的电压，并且能够减小流至电源电路的无效电流，能够减小待机功率。

[0145] (10) 在上述电源系统中，较为理想的是，上述负载装置包括负载主体部；提供部，

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具有与上述谐振线圈磁耦合的负载线圈，并向上述负载主体部提供在上述负载线圈中产生的电流；电流检测部，检测提供给上述负载主体部的电流；控制部，使由上述电流检测部检测出的电流保持一定的值地进行控制。

[0146] 根据该结构，检测流至负载主体部的电流，控制提供部以使该电流保持一定的值，因此可以在不改变电源电路的结构的情况下，也能够对负载主体部提供稳定的电流，电源系统整体能够实现成本降低及小型化。

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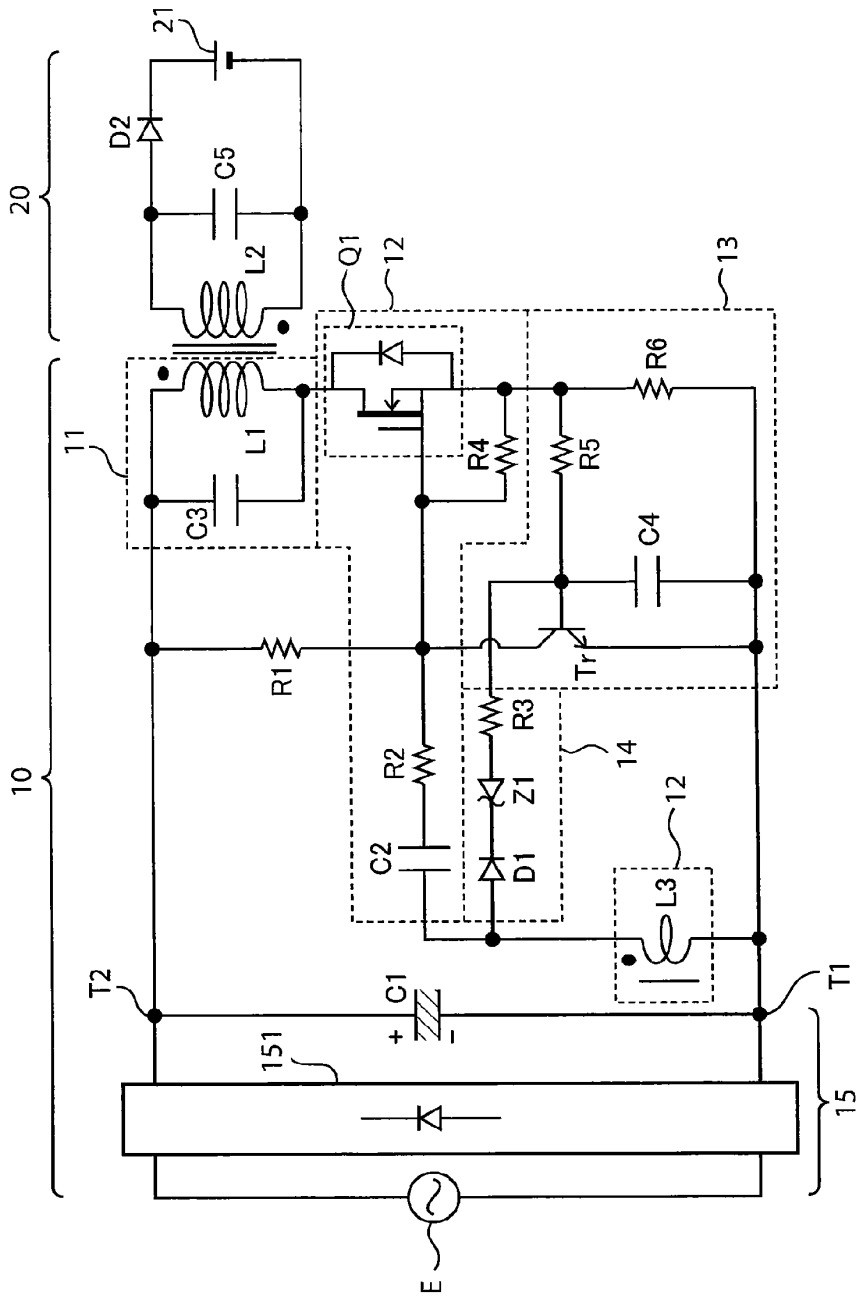

图1

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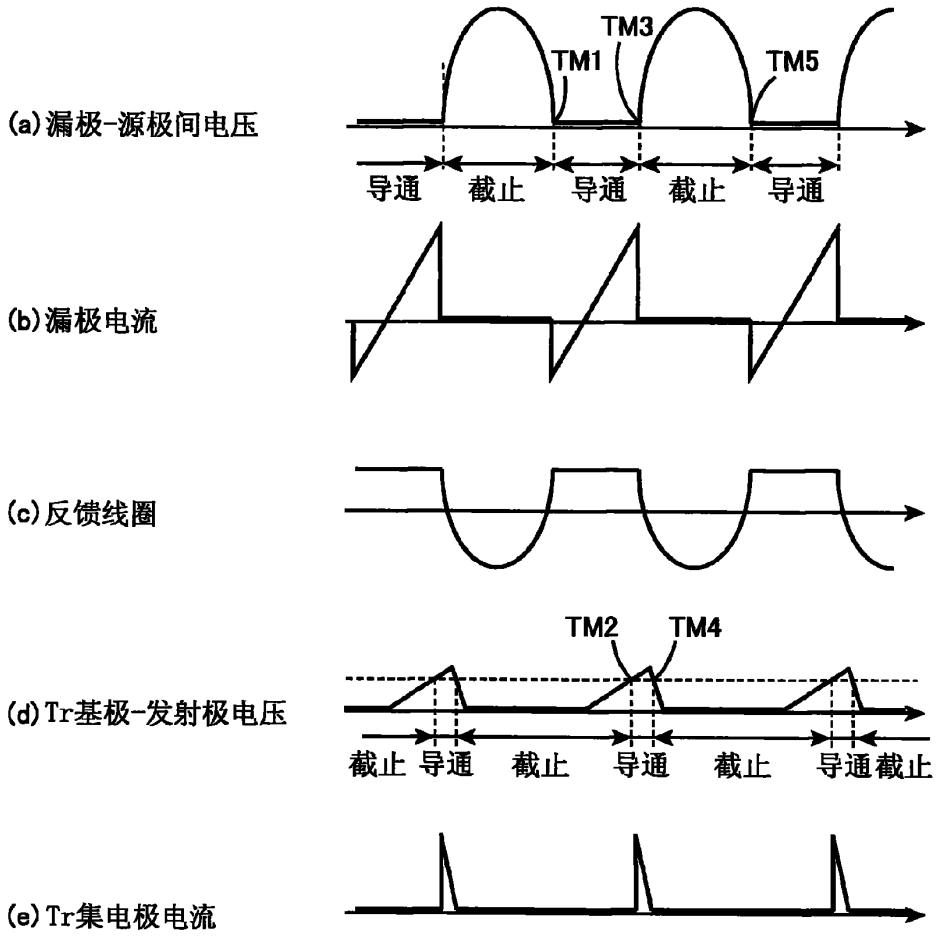

图 2

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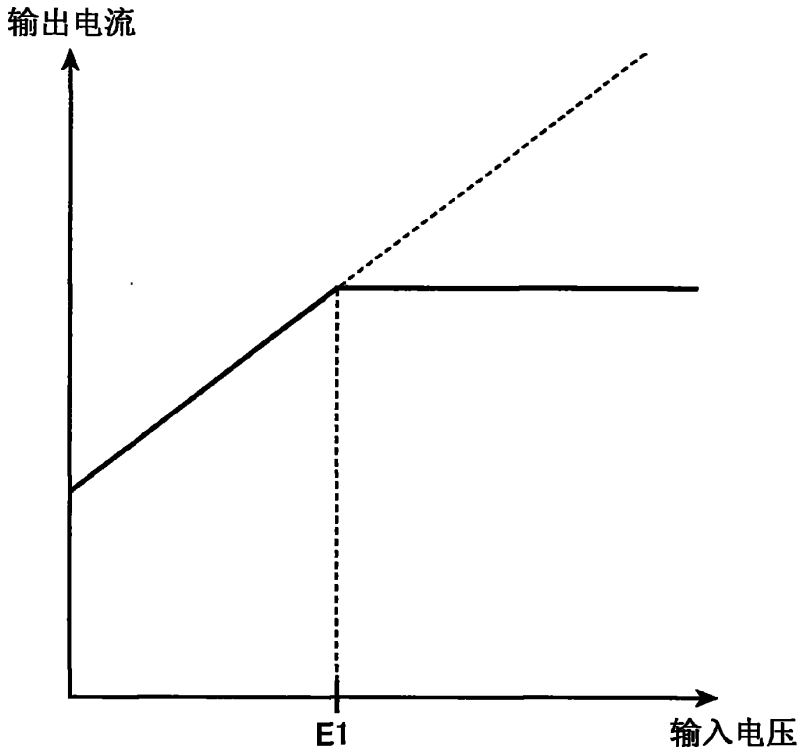

图 3

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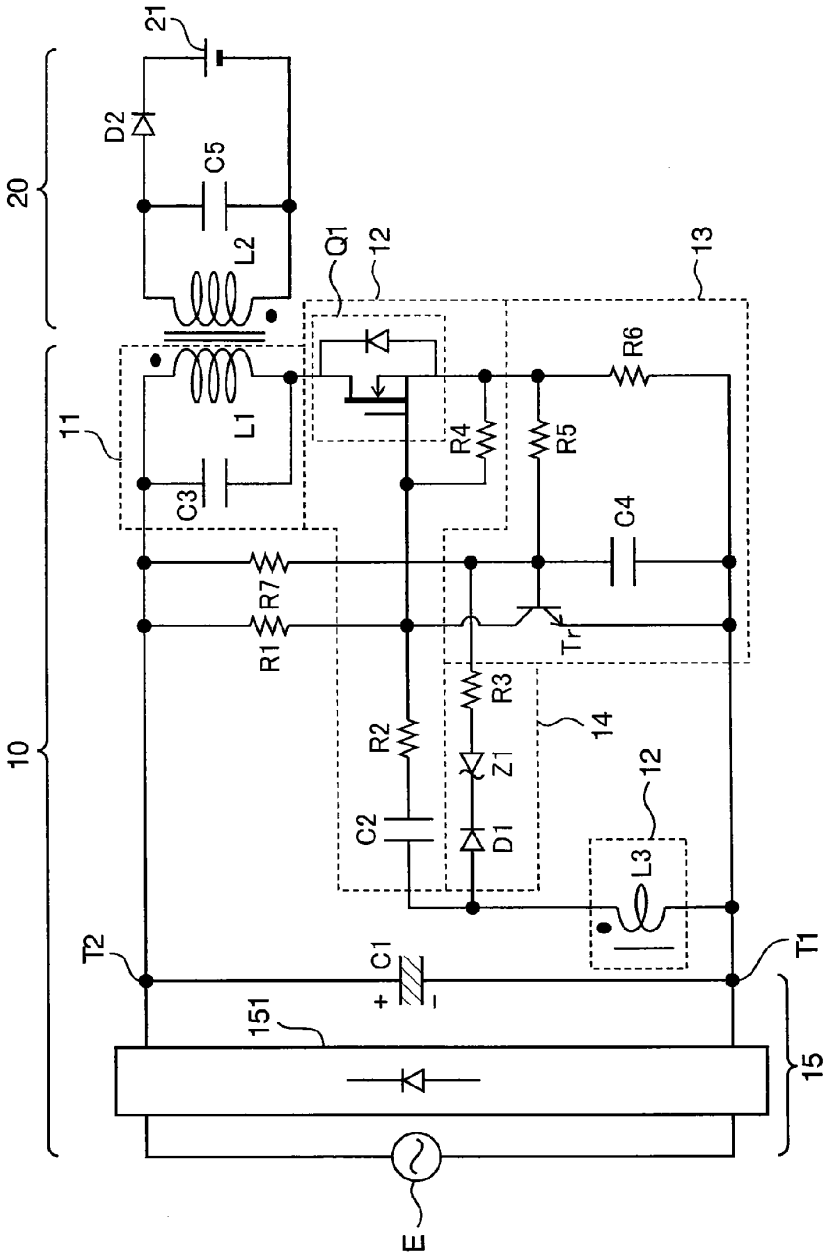

图4

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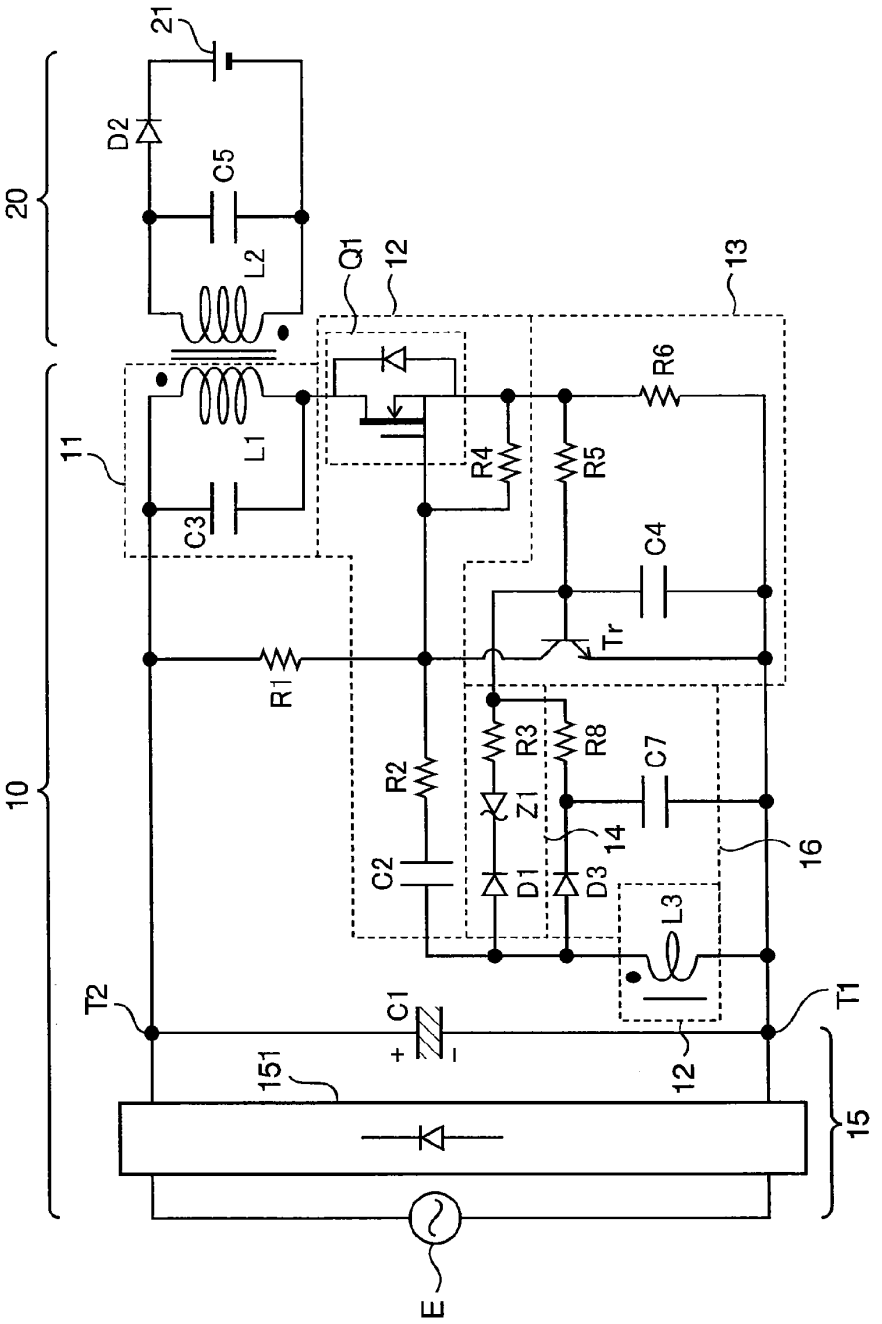

图5

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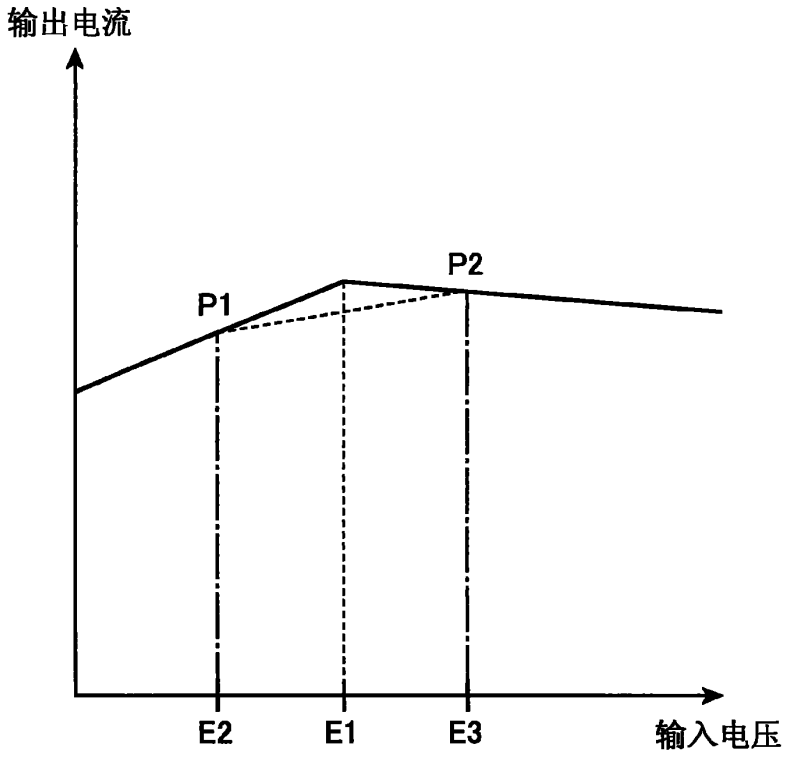

图 6

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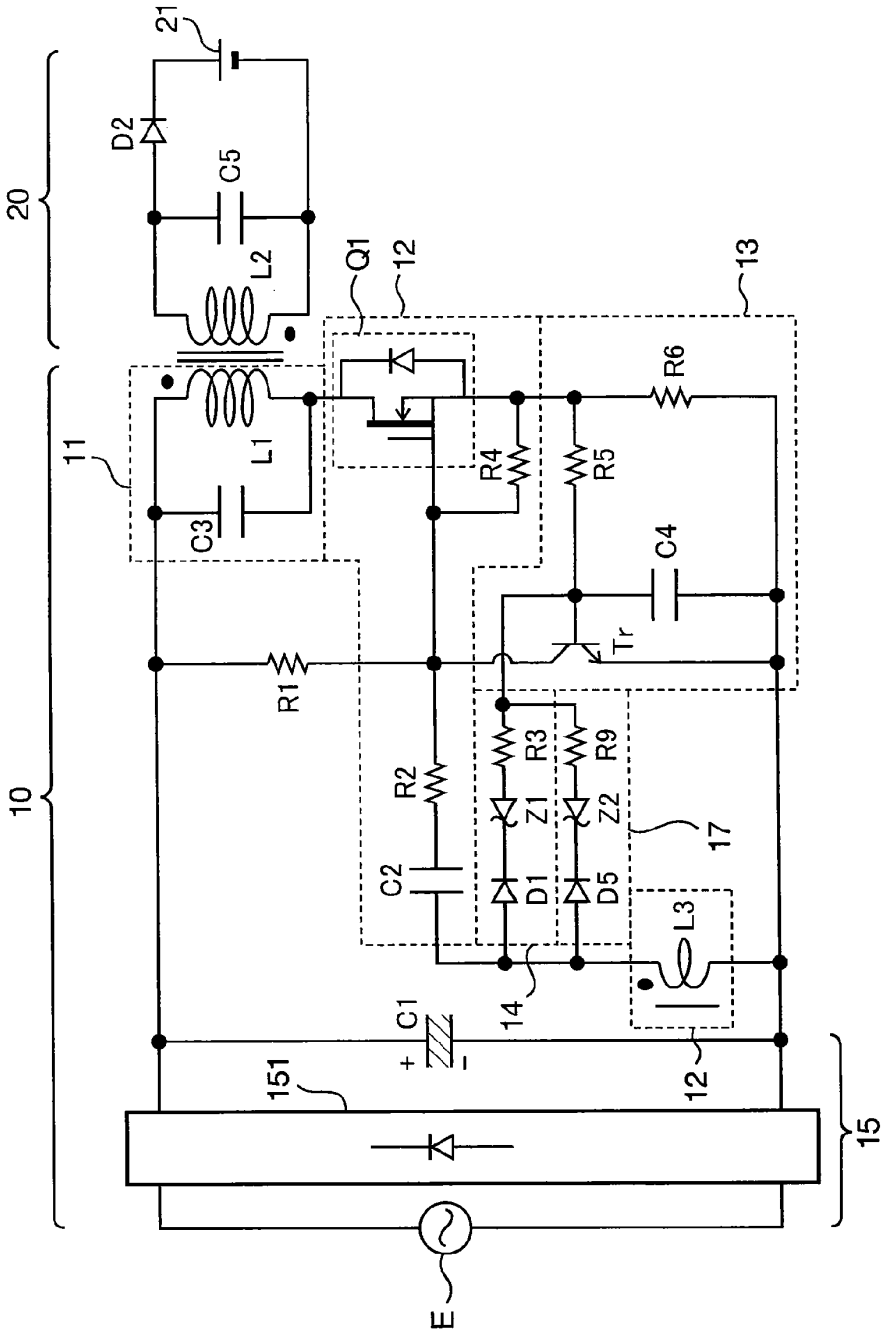

图7

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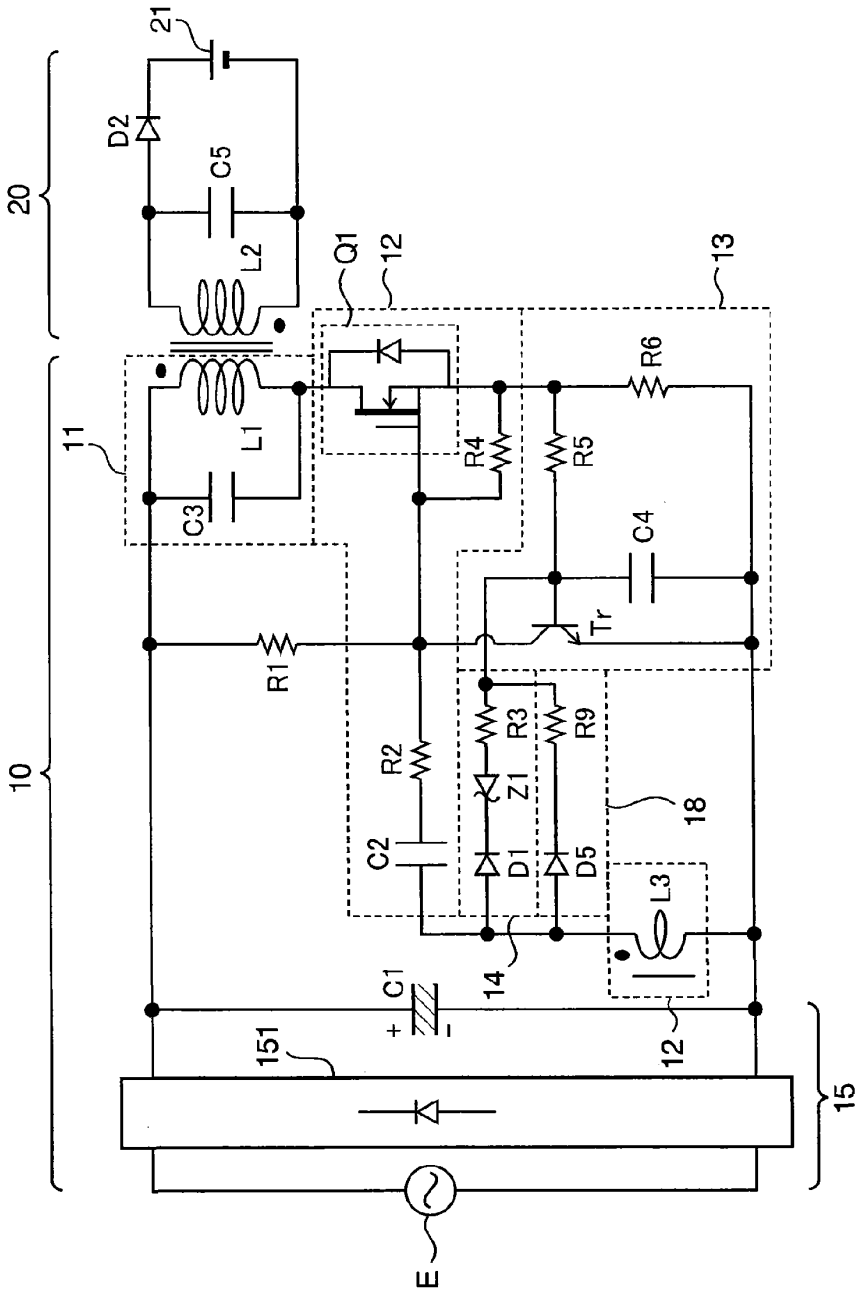

图8

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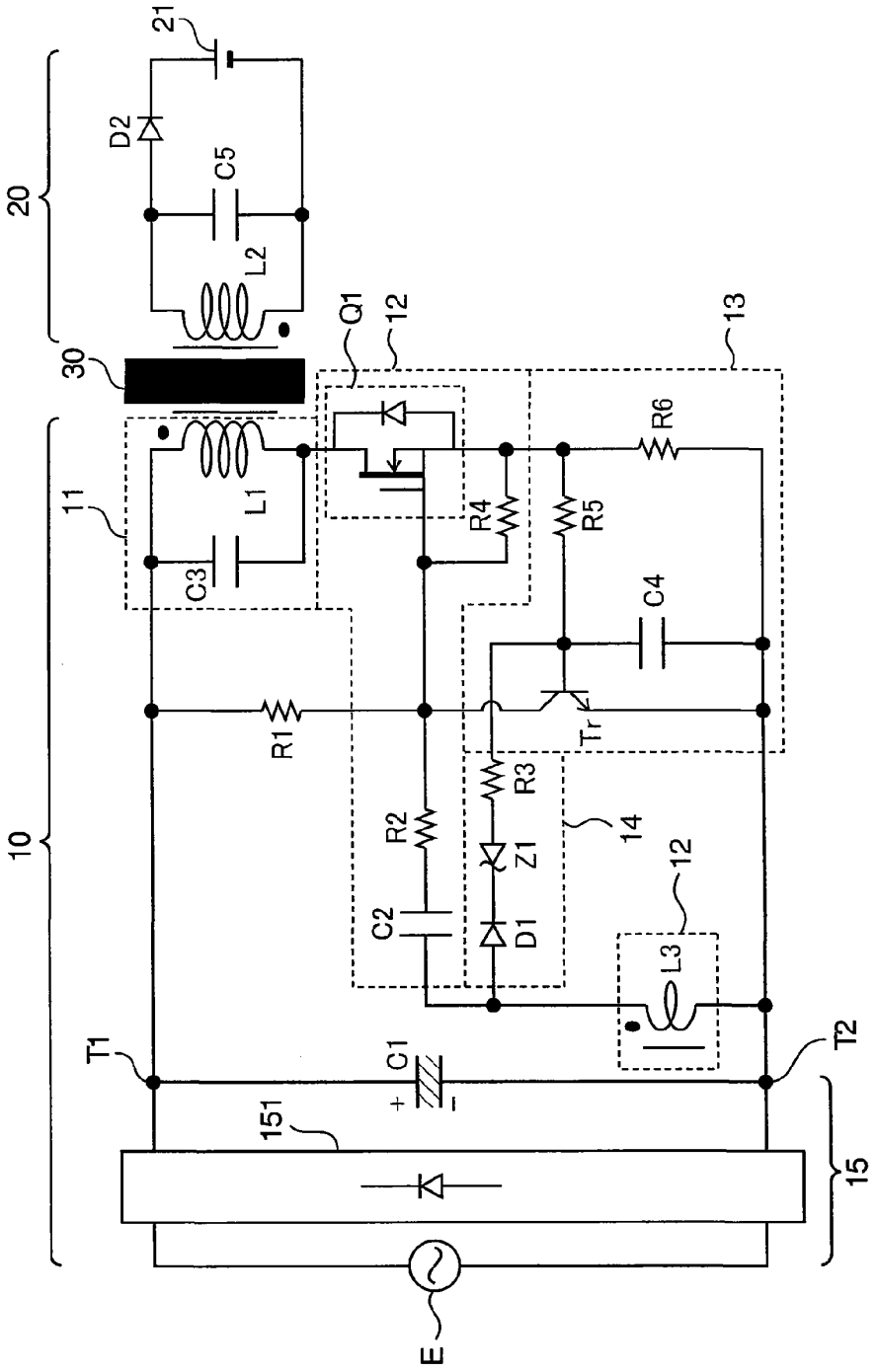

图9

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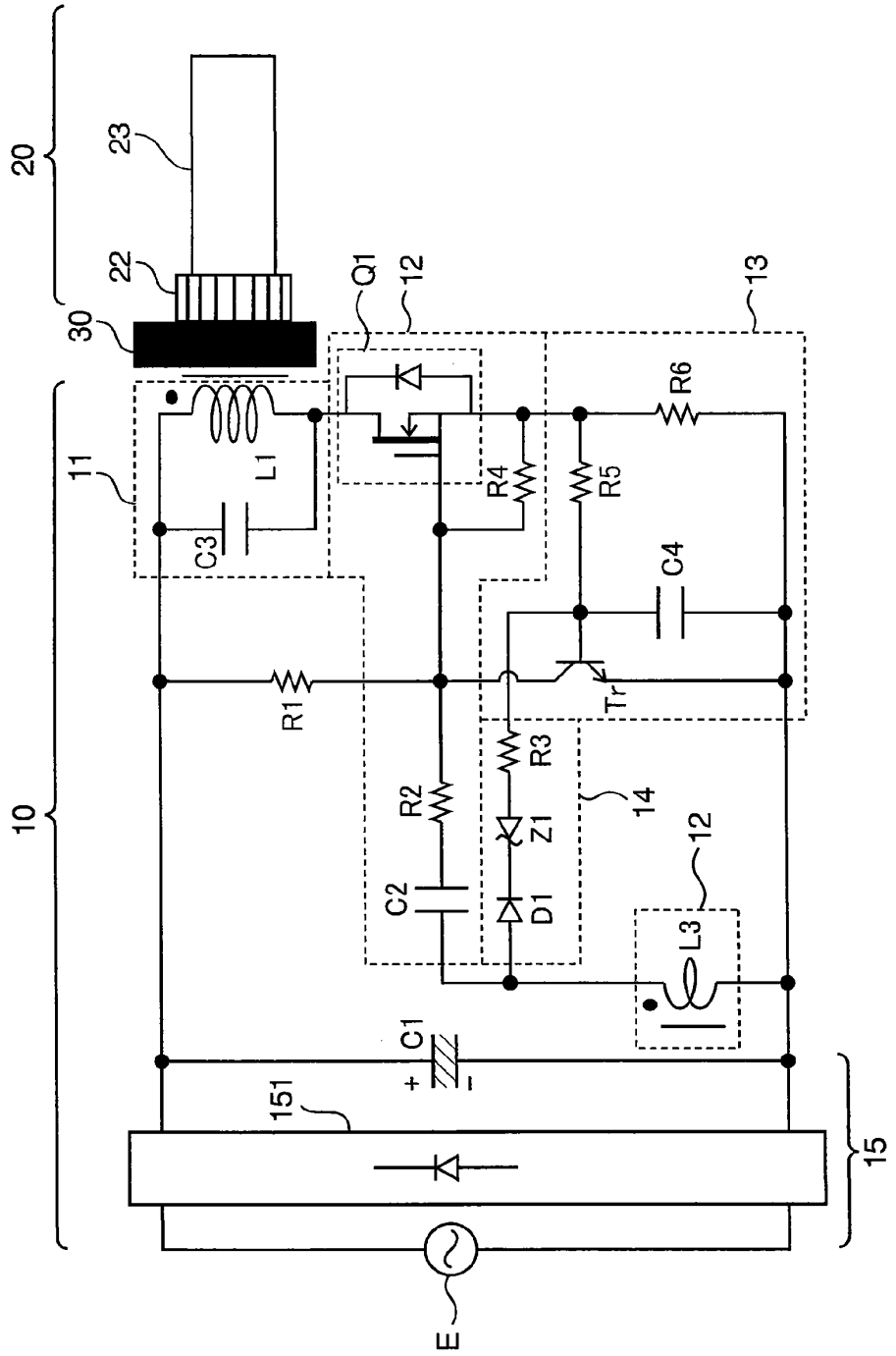

图10

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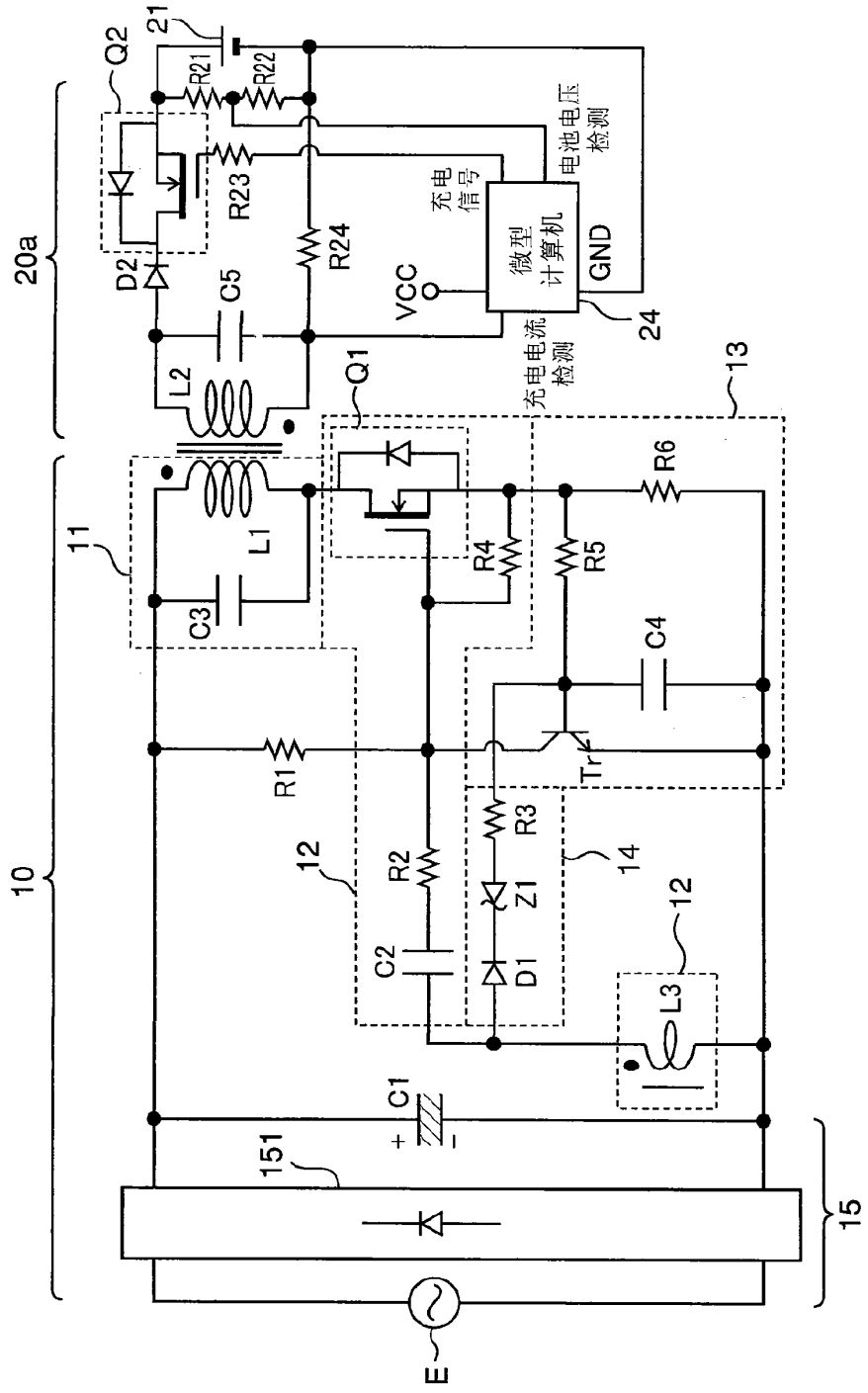

图11

Apple Inc. EX1004B Page 902

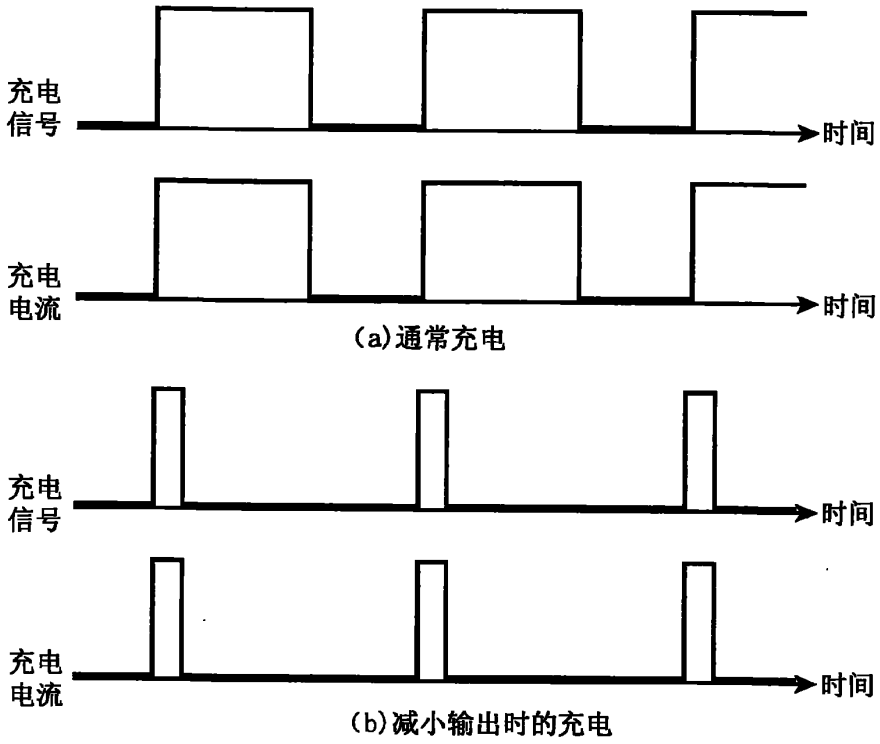

图 12

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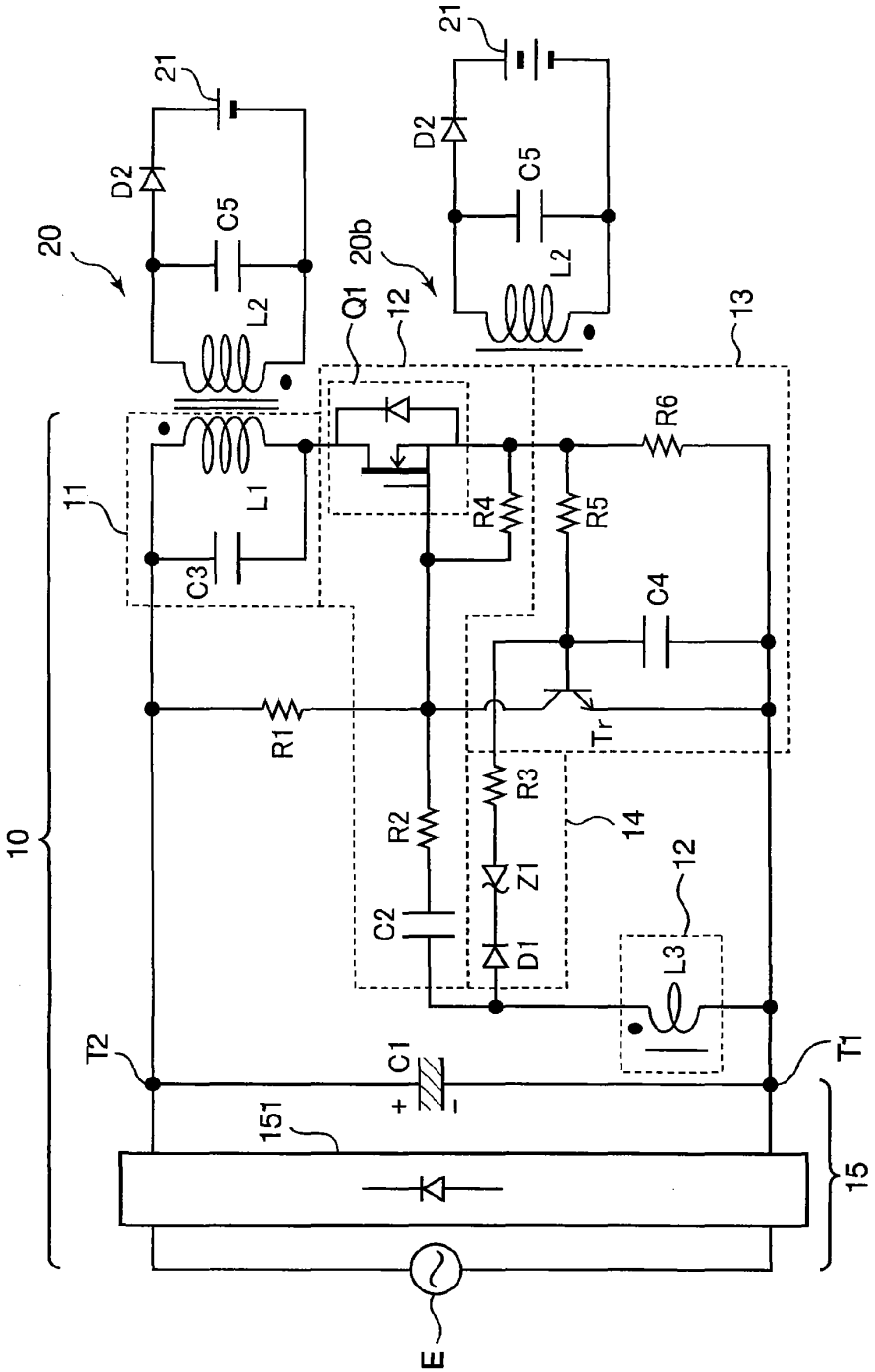

图13

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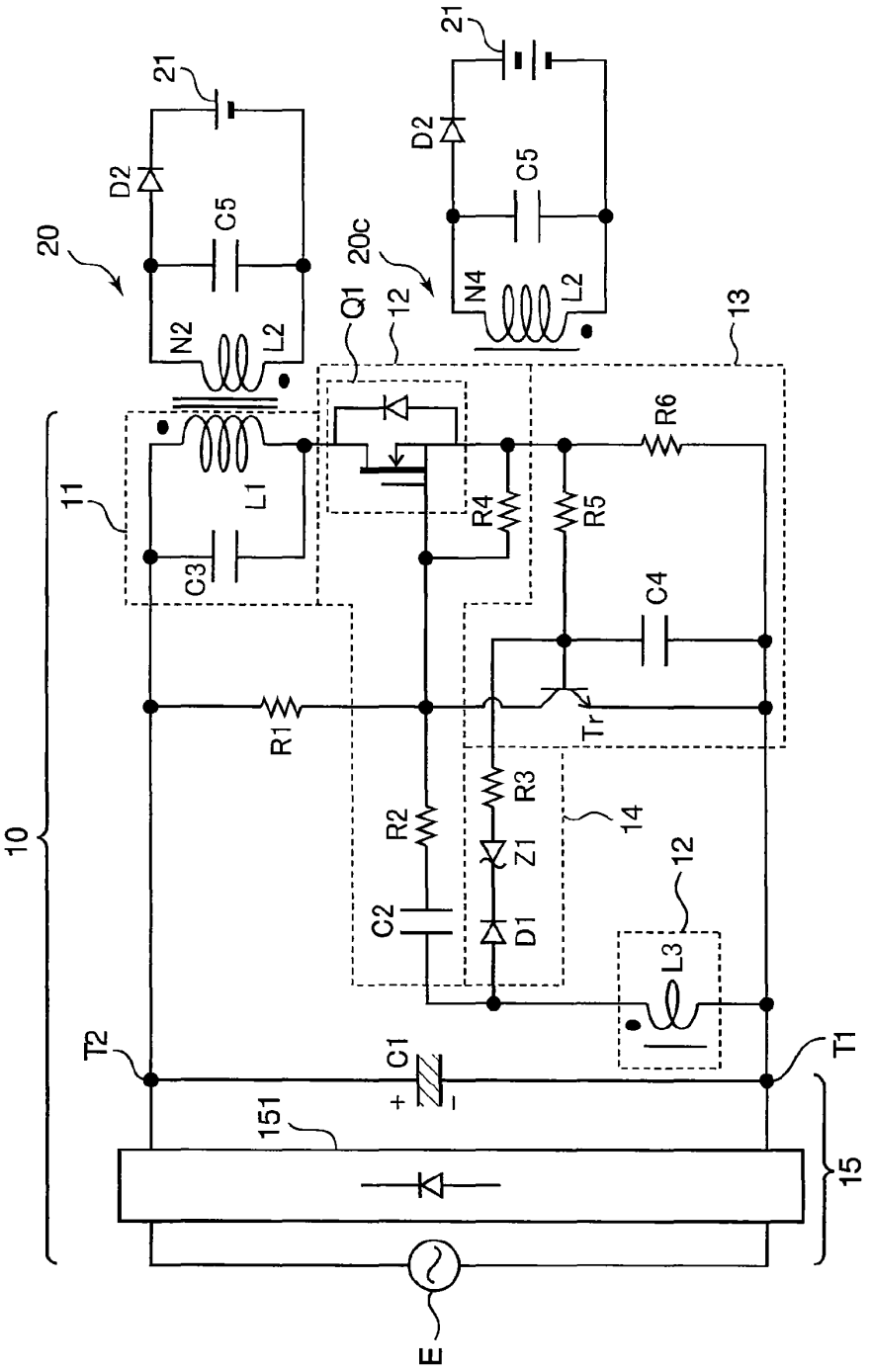

图14

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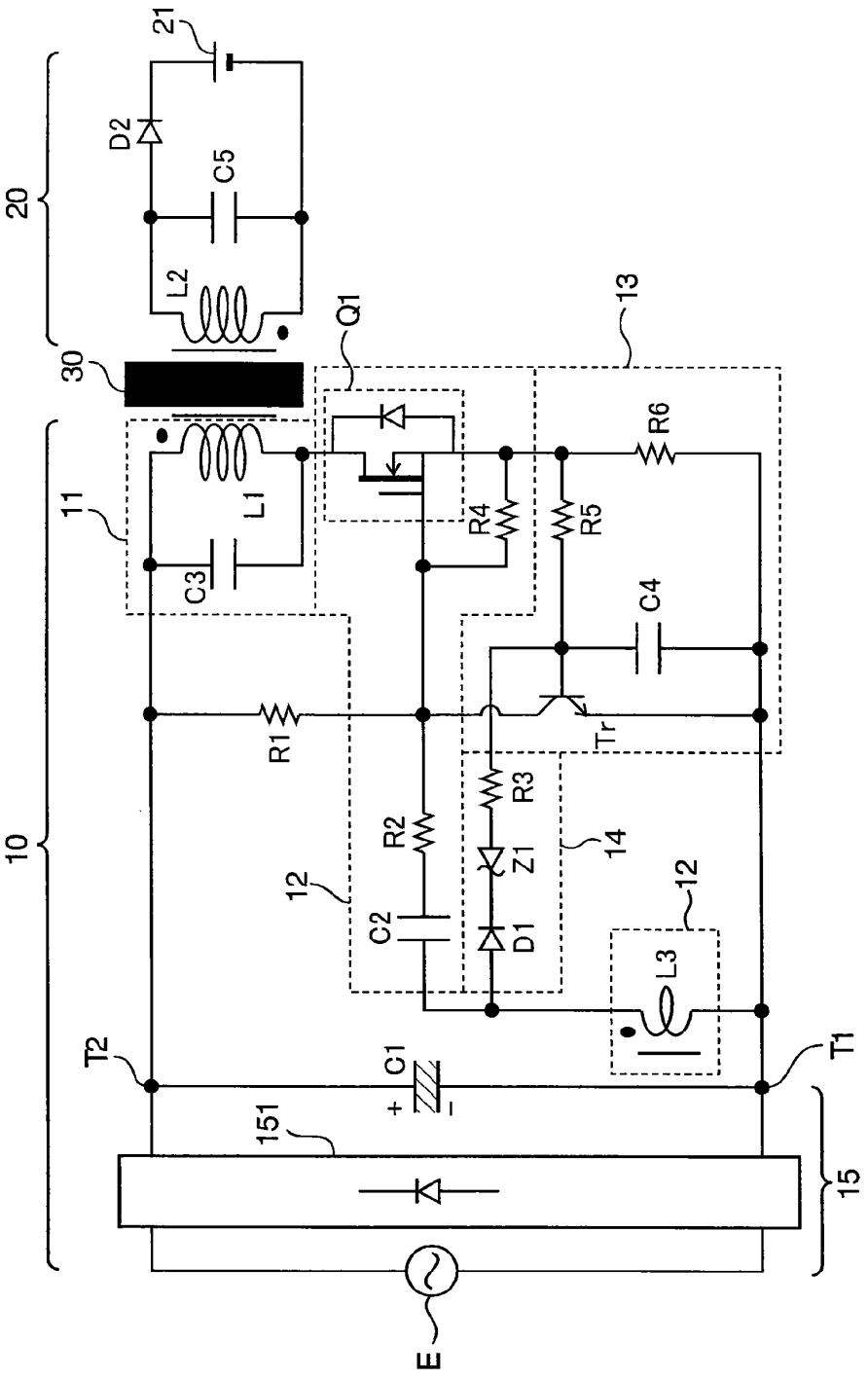

图15

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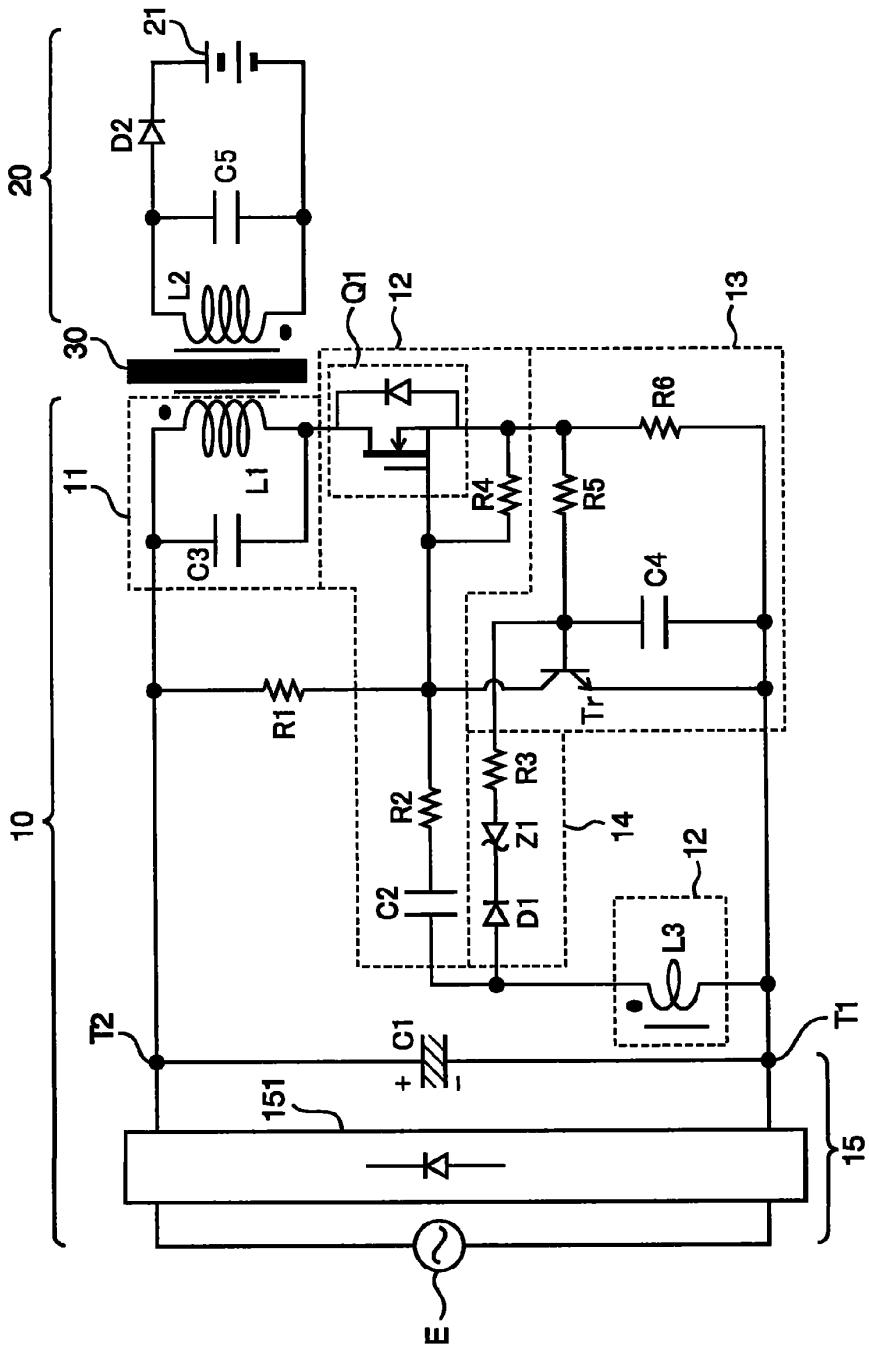

图16

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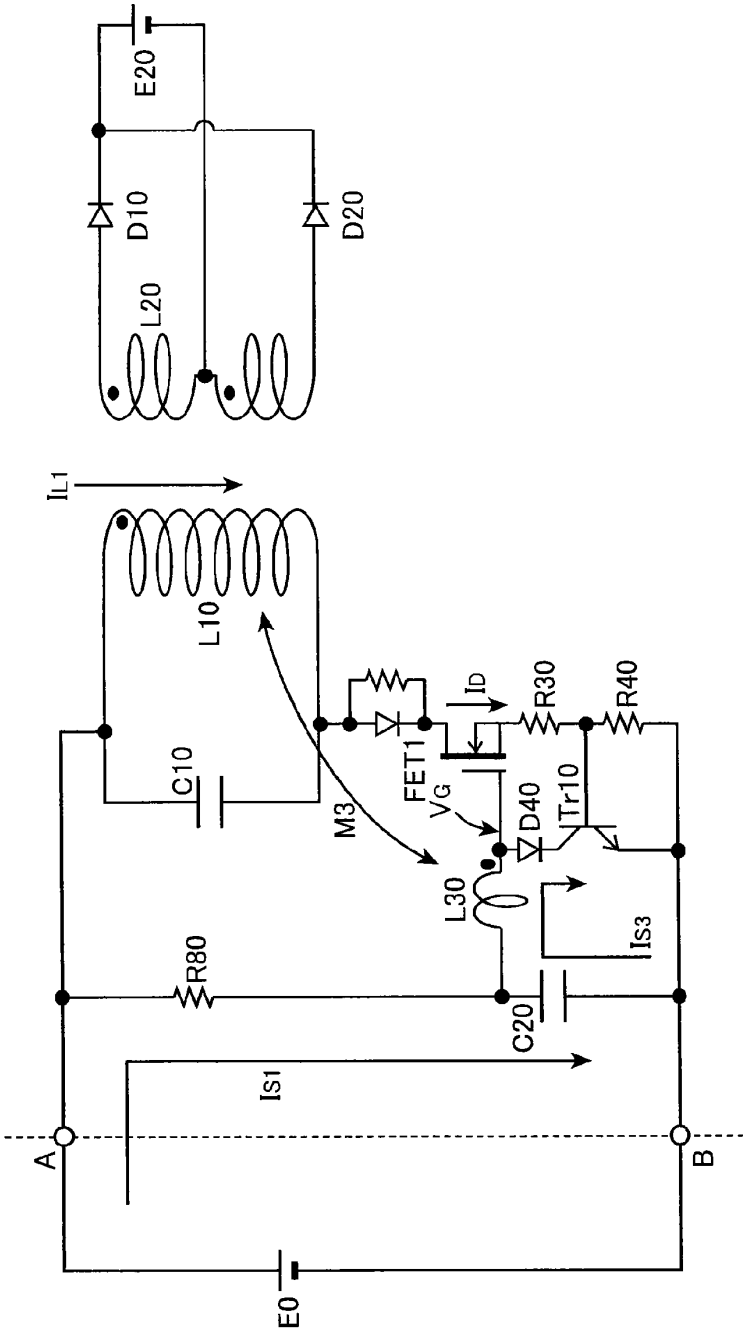

图17

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Title Not Available

DOCUMENT ID	DATE PUBLISHED
JP-H0145230-Y2	1989-12-27

Description

[Detailed explanation of the device]
This design is related with the storage battery which can be charged by high frequency, without connecting with charging equipment. When charging a storage battery conventionally, as shown in Drawing 1, the output terminal of charging equipment 1 and the electrode terminal of storage battery 2 must be connected, but it sets to this design, it is shown in Drawing 2 -- as -- storage battery 2' -- between positive [of main part 3 of a storage battery], and a negative electrode -- low -- anti- -- current flows through 4, diode 5, and input coil 6 only in the direction which charges main part 3 of a storage battery -- as It connected in series and, on the other hand, charging equipment of storage battery 2' 1' is provided with Then and output coil 7 with the high frequency oscillation device, Input coil 6 of storage battery 2' is approached and arranged in output coil 7 of charging equipment 1', and only by sending high frequency current through output coil 7, current flows into input coil 6 of storage battery 2' by electromagnetic induction, the diode of storage battery 2' rectifies this current, and it can charge main part 3 of a storage battery. One example of this design is described. As shown in Drawing 3, storage battery 2' is positive [of main part 3 of a NR-SC type storage battery of cylindrical shape nickel cadmium], between negative electrodes, only input coil 6 takes out outside what connected resistance 4, diode 5, and input coil 6 in series, and seals it hermetically in cylindrical container 8 of a somewhat big NR-D type storage battery Between positive [of main part 3 of a storage battery], positive [of a negative electrode and cylindrical container 8 corresponding to this], cathode terminal 9, and 9' is connected, respectively, Fulcrum 10 of the lower end of cylindrical container 8 is carried out, and input coil 6 taken out out of cylindrical container 8 is provided so that 180 * bending is possible, and at the times other than the time of charge, it is formed so that storage is possible, so that the cathode terminal of the lower end of cylindrical container 8 may be surrounded. On the other hand, as shown in Drawing 4, charging equipment 1' consists of a high frequency oscillation device which approached the upper surface and contained output coil 7, and it performs charge by laying above-mentioned storage battery 2' which opened input coil 6 in the upper surface of charging equipment 1'. Charging current can be adjusted by [which control a high frequency output or changes the distance of output coil 7 of charging equipment 1', and input coil 6 of storage battery 2'] grazing, and can change the charge time of storage battery 2'. As mentioned above, this design can be charged, without connecting with charging equipment, and is the lead connection work for charge, and a size of a storage battery, It is not necessary to form a charge adapter for exclusive use separately, and can perform charging operation very easily, Therefore can also be charged efficiently, without being covered by the metal storage battery container compared with what was built in since the input coil was provided outside, Since there is no generation of heat of the battery at the time of charge by induction heating etc., it is safe, and when it charges, the effect which bends and stores an input coil and enables use of a storage battery is remarkable.
[Brief Description of the Drawings]
The explanatory view showing the state where Drawing 1 charges the conventional storage battery, the explanatory view in which Drawing 2 shows the principle explanatory view of this design, and Drawing 3 shows one example of this design, and Drawing 4 are explanatory views showing the state of charging the storage battery in one example of this design. 1' -- charging equipment and 2' -- a storage battery and 3 -- the main part of a storage battery, and 4 -- resistance and 5 -- a diode and 6 -- an input coil and 7 -- an output coil.

Claims

[The scope of a claim for utility model registration]
Current should flow in the direction which charges the main part of a storage battery from an input coil by the electromagnetic induction according resistance, a diode, and the input coil for high frequency reception to high frequency reception of the coil between positive [of the main part of a storage battery, and the main part of a storage battery], and a negative electrode, in the storage battery which only the input coil took out the thing connected in series outside, and was sealed hermetically in the somewhat big storage battery container Between positive [of the main part of a storage battery] and the terminal of a negative electrode and the storage battery container corresponding to this is connected, respectively, The storage battery having provided the lower end of the above-mentioned storage battery container for the above-mentioned input coil so that bending was possible as a fulcrum, and forming at the times other than the time of charge so that storage is possible so that the terminal of the lower end of the above-mentioned storage battery container may be surrounded.

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⑲日本国特許庁（JP）　⑪実用新案出願公告

⑫実用新案公報（Y2）　平1－45230

⑤⓪Int. Cl.⁴	識別記号	庁内整理番号	㉔㊹公告　平成1年(1989)12月27日
H 02 J 7/02		8021－5G	

（全2頁）

⑤④考案の名称　蓄電池

審　判　昭63－15874　⑳実　願　昭59－222　⑥⑤公　開　昭59－129349
㉒出　願　昭52(1977)6月30日　㊸昭59(1984)8月30日
前特許出願日援用

⑦②考案者　松木　成文　東京都新宿区西新宿2丁目1番1号　新神戸電機株式会社内
⑦①出願人　新神戸電機株式会社　東京都新宿区西新宿2丁目1番1号
審判の合議体　審判長　大久保　宏一　審判官　宮　蘭　豪　審判官　石川　喜久雄

⑤⑥参考文献　実開　昭51－95735（JP，U）

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⑤⑦実用新案登録請求の範囲

蓄電池本体と、蓄電池本体の正、負電極間に、抵抗、ダイオードおよび高周波受信用の入力コイルを、該コイルの高周波受信による電磁誘導によつて入力コイルから蓄電池本体を充電する方向に電流が流れるように、直列に接続したものを入力コイルのみ外に出してひとまわり大きな蓄電池容器中に封入した蓄電池において、蓄電池本体の正、負電極とこれに対応する蓄電池容器の端子間をそれぞれ結線してなり、更に前記入力コイルを前記蓄電池容器の下端を支点として折り曲げ可能に設け、充電時以外の時は、前記蓄電池容器の下端の端子を包囲するように収納可能に形成したことを特徴とする蓄電池。

考案の詳細な説明

本考案は充電装置と結線することなく、高周波により充電することができる蓄電池に関する。

従来、蓄電池を充電するときは、第1図に示すように、充電装置1の出力端子と蓄電池2の電極端子とを結線しなければならないが、本考案においては、第2図に示すように、蓄電池2′は蓄電池本体3の正、負電極間に、低抗4、ダイオード5および入力コイル6を蓄電池本体3を充電する方向にのみ電流が流れるように、直列に接続してなり、一方、蓄電池2′の充電装置1′は高周波発振装置であつて、出力コイル7を備えていることにより、充電装置1′の出力コイル7に蓄電池

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2′の入力コイル6を近接して配置し、出力コイル7に高周波電流を流してやるだけで、電磁誘導で蓄電池2′の入力コイル6に電流が流れ、この電流を蓄電池2′のダイオードで整流して蓄電池本体3を充電することができる。

本考案の一実施例を説明する。第3図に示すように、蓄電池2′は円筒形ニツケルカドミウムのNR－SC型蓄電池本体3の正、負電極間に、抵抗4、ダイオード5、および入力コイル6を直列に接続したものを入力コイル6のみ外に出してひとまわり大きなNR－D型蓄電池の円筒容器8中に封入し、蓄電池本体3の正、負電極とこれに対応する円筒容器8の正、負極端子9，9′間をそれぞれ結線してなり、更に、円筒容器8の外に出された入力コイル6を円筒容器8の下端の支点10をして180°折り曲げ可能に設け、充電時以外の時は、円筒容器8の下端の負極端子を包囲するように収納可能に形成されている。

一方、第4図に示すように、充電装置1′は出力コイル7を上面に近接して内蔵した高周波発振装置からなり、充電は、充電装置1′の上面に入力コイル6を広げた前記蓄電池2′を載置して行う。

充電電流は高周波出力を制御するか、充電装置1′の出力コイル7と蓄電池2′の入力コイル6との距離を変えるかすることにより調節でき、蓄電池2′の充電時間を変えることができる。

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上述したように、本考案は充電装置と結線することなく充電することができ、充電のためのリード線接続作業や、蓄電池の大きさにより、専用の充電アダプターを個々に設ける必要もなく、極めて簡単に充電作業を行うことができ、而も、入力コイルが外側に設けられているので内蔵したものに比べ金属製の蓄電池容器に遮蔽されることなく効率よく充電でき、誘導加熱等による充電時の電池の発熱等がないため安全であり、充電されたときは入力コイルを折り曲げて収納して蓄電池の使用を可能とする効果が顕著である。

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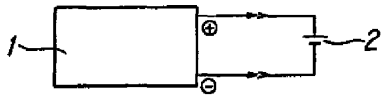
図面の簡単な説明

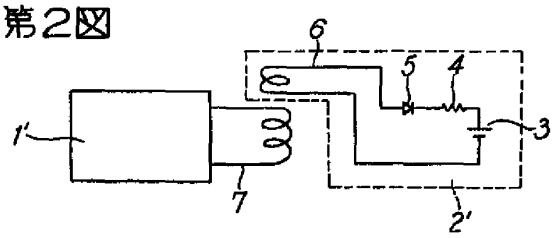
第1図は従来の蓄電池を充電する状態を示す説明図、第2図は本考案の原理説明図、第3図は本考案の一実施例を示す説明図、第4図は本考案の一実施例における蓄電池を充電する状態を示す説明図である。

1′は充電装置、2′は蓄電池、3は蓄電池本体、4は抵抗、5はダイオード、6は入力コイル、7は出力コイル。

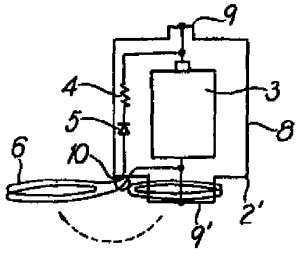
第1図



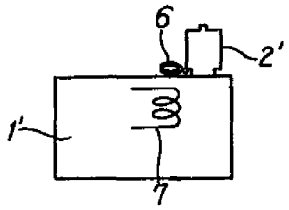
第2図



第3図



第4図



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96/000,355 Interview Demonstrative

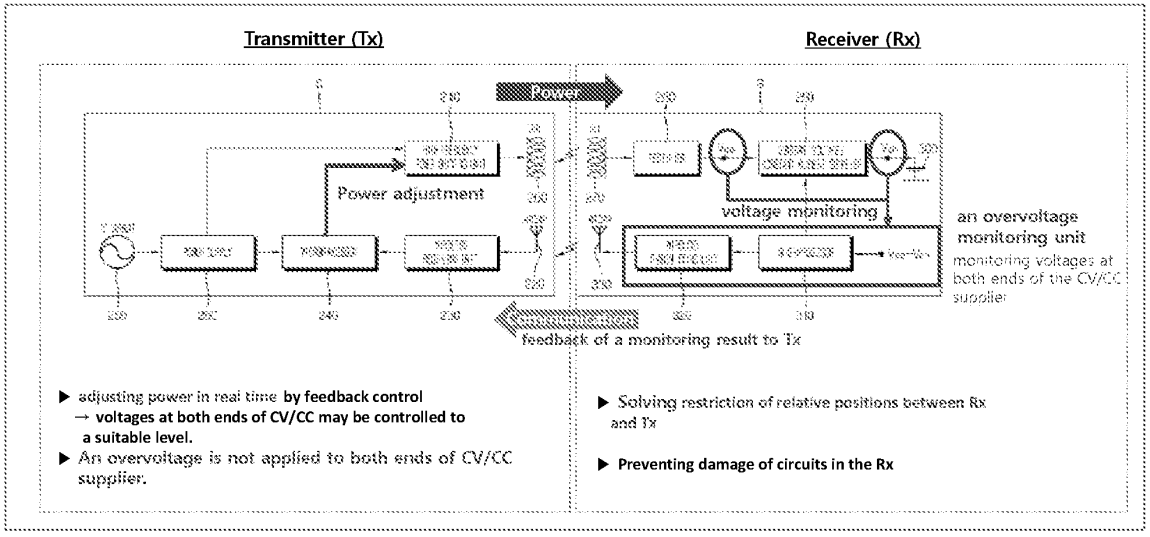
November 8, 2021

Agenda

- Neither Chung-Sik nor Kaite disclose the claimed overvoltage monitoring unit
- Chung-Sik and Kaite both require a fixed relative position between the transmitter and the receiver
- 112

102/103 – Overvoltage Monitoring Unit

Adjusting the power of Tx by feedback control of overvoltage monitoring unit of Rx so that an overvoltage is not applied to both ends of CV/CC supplier



Apple Inc. EX1004B Page 915

102/103 – Overvoltage Monitoring Unit

- Chung-Sik only discloses "off"
- Claim 7 requires an overvoltage monitoring unit for monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field
- The dependent claims provide further clarity
  - Claim 11 – "wherein the monitoring result is a charging power adjustment request signal"
  - Claim 12 – "wherein the monitoring result is . . . a code indicating that the voltages at both ends are in an overvoltage state"
- Kaite and Cho do not remedy this deficiency

Example Amendment Concept

Claim 1 (Amended): A contact-less chargeable battery including a charging circuit for receiving a charging power from an external contact-less charging device and charging an electric energy to a battery cell, the contact-less chargeable battery comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from ~~[[an]]~~ the external contact-less charging device;

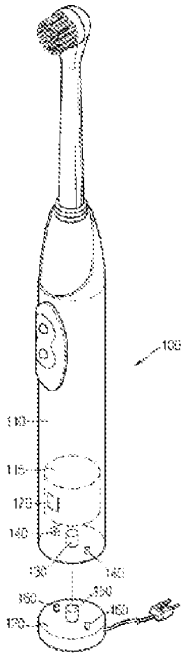
a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier ~~for~~ receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit ~~for~~ monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field, wherein the monitoring result includes a wireless feedback control signal for adjusting the charging power of the external contact-less charging device during the battery charging process.

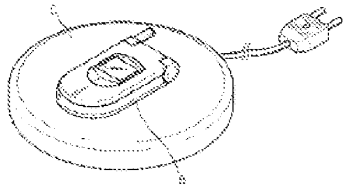
102/103 – Relative Positions of Tx and Rx

- Background Art
  - The relative positions of Transmitter (Tx) and Receiver (Rx) are fixed.
- *See* '568 Patent at 1:64-3:21
  - "an intensity of the high frequency AC current induced to the secondary coil 70 is proportional to an intensity of the magnetic flux linked to the secondary coil 70."
  - "in case the battery 50 is positioned at a position where a large high frequency AC current is induced, overvoltage exceeding the standards may be applied to both ends of the [CVCC] while charging the battery 10, thereby possibly causing a damage on parts."
  - "…The toothbrush body 110 and the charger 120 are closely fixed with each other by means of matching of the grooves 130, 140 and the protrusions 150, 160 and as a result relative positions of the charger 120 and the battery 150 provided to the toothbrush body 110 are closely fixed"
  - ". . . in order to maximize the convenience of the user, a new technical alternative capable of overcoming the restriction of relative positions of the battery 115 and the charger 120 is needed."



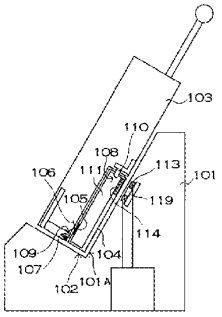
102/103 – Relative Positions of Tx and Rx

- The problem to be solved in the '568 Patent is eliminate issues caused by variations in distance between the transmitter (Tx) and receiver (Rx):
  - '568 Patent at 3:35-39 – "Another object of the present invention is to provide a battery charging control method capable of preventing any damage of an internal battery circuit together with solving a restriction for relative positions between the battery and the charger that employ a contact-less charging method.
- *See, e.g.*, '568 Patent at 9:35-44:
  - "Thus, the contact-less charging device and chargeable battery of the present invention need not be fixed to a certain relative position as in the prior art so as to constantly keep an intensity of magnetic flux linked to the secondary coil 270. In addition, since the charging device C is designed in a pad shape as shown in FIG. 7, a user may conveniently charge a battery just by placing a subject such as a cellular phone coupled with a battery B onto a predetermined position of the pad, thereby allowing to make a convenient charger and battery set."



102/103 – Relative Positions of Tx and Rx

- In Chung-Sik, the positions of Tx and Rx are fixed
  - Chung-Sik at page 8-2, lines 59-60 – "the battery may be recharged only when the portable device 18 is installed on the baes unit 12."
  - Page 8-2, line 62 to page 8-3, line 2 – "when a portion of the contactless charging unit 38 of the portable device 18 is mounted (positioned) on the power transmitter 28 of the base unit 12, a charge switch 30 of the base unit 12 is started (turned "on") by the mounting of the portable device 18."
  - Page 8-3, lines 11-14 – "when the portable device 18 is separated from the base unit 12, the charge switch 30 is "turned off"."
  - Page 8-4, lines 20-25 - "when the two devices are coupled to each other, the core 78 of the induced voltage detecting unit 81 installed on the contactless charging unit 38 in the portable device 18 is positioned on an opposite surface of the core 76 of the induced voltage generating unit 46 in the power transmitter 28 and is space-coupled thereto."
- In Kaite, the positions of Tx and Rx are fixed
  - Kaite at 4:60-62 and Fig. 1 - ""The charging stand 101 has an attachment section 101A for attaching the portable electrical equipment 103 with battery pack 102 connected at a specific position."



Example Amendment Concept

Claim 1 (Amended): A contact-less chargeable battery including a charging circuit for receiving a charging power from an external contact-less charging device and charging an electric energy to a battery cell, the contact-less chargeable battery comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from ~~[[an]]~~ the external contact-less charging device that includes a primary coil;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier ~~for~~ receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit ~~for~~ monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result includes a wireless feedback control signal for adjusting the charging power of the external contact-less charging device during the battery charging process based on the relative position of the primary coil to the secondary coil.

112

- A constant voltage/constant current supplier is a well-known circuit element
  - *See, e.g.*
    - '568 Patent at 2:13-20, 7:33-42
      - "Here, the constant voltage/constant current supplier 90 is a well-known circuit element widely used in a battery charging device. The constant voltage/constant current supplier 90 plays a role of supplying current to the battery cell 60 constantly at an initial charging stage, and then decreasing supply of current but keeping voltage constantly if a charging voltage of the battery cell 60 slowly increases and then exceeds a certain criterion level."
      - "The constant voltage/constant current supplier 290 applies the rectified DC current to the battery cell 300 according to the control of the microprocessor 310 so as to charge the battery cell 300. At this time, the constant voltage/constant current supplier 290 charges the battery cell 300 in a constant current mode at an initial charging stage, but, if a charging voltage exceeds a predetermined criterion, the constant voltage/constant current supplier 290 charges the battery cell 300 in a constant voltage mode, which keeps a charging voltage constantly instead of decreasing a current."
    - Kaite at 6:40-64
      - "the charging control station 123 is provided with a constant current constant voltage circuit to stabilize output from the rectifying circuit 122... A lithium ion rechargeable battery is charged to full charge initially by constant current charging and subsequently by constant voltage charging."
    - U.S. Patent No. 7,098,627 at 1:28-30, 6:27-42
      - "charging apparatus 1 includes ... a CCCV (constant-current constant-voltage) charging circuit 4 ... The CCCV charging circuit 4 charges the lithium ion battery 11 with a constant-current constant-voltage charge."
    - U.S. Patent No. 5,955,867 at 5:23-35
      - "charger 211 is a constant current constant voltage (CCCV) type of charger that has two charging modes in charging a battery pack. In the first mode, the constant current charging mode, the battery charger 211 supplies current to a battery pack at a constant current level ... Once the battery pack being charged reaches a specific level of charge, the battery charger goes into a second mode, the constant voltage charging mode. In this second mode, the voltage of the charger's output is constant with the amount of current supplied to the battery pack decreasing in proportion to the percentage of full charge of the battery pack."

112 (Con.)

- The overvoltage monitoring unit is clearly described in the specification of the '568 Patent. *Furthermore overvoltage monitoring unit connotes sufficiently definite structure to those skilled in the art.*
  - *See, e.g.,* '568 Patent at 4:28-37
    - "Preferably, the overvoltage monitoring unit includes a wireless transmitting unit for wirelessly propagating the monitoring result through an antenna; first and second voltage detectors for respectively detecting Voltages at front and rear ends of the constant voltage/constant current supplier; a voltage comparator for comparing first and second voltages detected by the first and second Voltage detectors and outputs a voltage comparison result; and a microprocessor for outputting a monitoring result according to the Voltage comparison result to the wireless transmitting unit."
  - Claim 3 (and others)
    - The contact-less chargeable battery according to claim 1, wherein the overvoltage monitoring unit includes: a wireless transmitting unit for wirelessly propagating the monitoring result through an antenna; first and second voltage detectors for respectively detecting voltages at front and rear ends of the constant voltage/constant current supplier; a voltage comparator for comparing first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result; and a microprocessor for outputting the monitoring result according to the voltage comparison result to the wireless transmitting unit.

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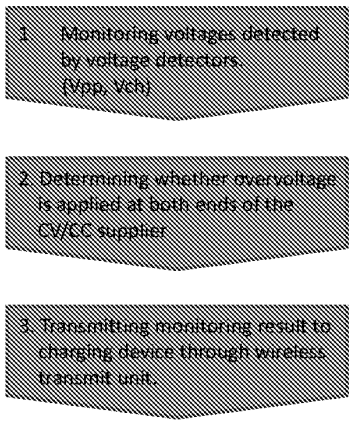
112 (Con.)

– *Algorithm of the microprocessor is clearly described in the specification of the '568 patent. Furthermore the microprocessor connotes sufficiently definite structure to those skilled in the art.*

· '568 Patent at 4: 30-32: first and second voltage detectors for respectively detecting voltages at front and rear ends of the constant voltage/constant current supplier;

· '568 Patent at 10: 56-58: the microprocessor 310 monitors whether an overvoltage is applied to both ends of the constant voltage/constant current supplier 290.

· '568 Patent at 8:48-53: if it is determined that an overvoltage is applied after monitoring voltages at both ends of the constant voltage/constant current supplier 290, the microprocessor 310 uses the wireless transmitting unit 320 to transfer an adjustment request signal of the charging power to the charging device C in wireless.



112 (Con.)

- Potential Amendment Concepts
  - *See, e.g.,* claim 25 added in first response
    - The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier and the overvoltage monitoring unit include circuitry controlled by at least one microprocessor.
  - Removal of "for"
  - Specify structural elements from, *e.g.,* claim 3
  - "a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant current mode at an initial charging stage and in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level at a later charging stage"
  - "an overvoltage monitoring unit including voltage detectors . . . and a microprocessor. . ."

112 (Con.)

- Potential Amendment Concepts - Alternative 1
  - Removal of “for”
  - Specify structural elements from specification

Claim 1 (Amended): A contact-less chargeable battery including a charging circuit for charging an electric energy to a battery cell, the contact-less chargeable battery comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit for including a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication through a wireless transmitting unit so as to induce a change of intensity of the magnetic field,

wherein the overvoltage monitoring unit includes at least one voltage detector detecting voltages at both ends of the constant voltage/constant current supplier.

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112 (Con.)

- Potential Amendment Concepts – Alternative 2
  - Removal of "for"
  - Specify structural elements from specification

Claim 1 (Amended): A contact-less chargeable battery including a charging circuit for charging an electric energy to a battery cell, the contact-less chargeable battery comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

a rectifier ~~for~~ receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier ~~for~~ receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit ~~for~~ including voltage detection measuring monitoring voltages at both ends of the constant voltage/constant current supplier and a microprocessor outputting a monitoring result based on the measured voltages and transmitting [[a]] the monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field.

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	3	"8013568".pn.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/18 01:26 PM
L2	5	"100451606".pn.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/18 01:26 PM
L3	5058	320/108.ccls.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/21 11:25 AM
L4	261	L3 AND (constant ADJ current)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/21 11:27 AM
L5	197	L4 AND (constant ADJ voltage)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/21 11:30 AM
L6	197	L4 AND L5	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/21 11:30 AM
L7	94	L6 AND h02j50/10.cpc.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD,	OR	ON	ON	2021/09/21 11:34 AM

			DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L8	89	L7 AND ((charger charging) near3 battery)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/21 11:35 AM
L9	25	L8 AND @pd<"20110906"	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/21 11:39 AM
L10	5	L9 AND @pd<"20050729"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/21 11:41 AM
L11	5	"6,184,651".pn.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/21 09:04 PM
L12	0	L10 AND (wireless wirelessly)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/22 12:15 PM
L13	215303	battery ADJ (charger charging charged) AND (wireless wirelessly)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/22 12:17 PM
L14	215303	(battery ADJ (charger charging charged)) AND (wireless	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD,	OR	ON	ON	2021/09/22 12:17 PM

		wirelessly)	DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L15	10395	L14 AND @pd<"20050729"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/22 12:18 PM
L16	4392	L15 AND antenna	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/22 12:19 PM
L17	625	L16 AND feedback	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/22 12:20 PM
L18	62	L17 AND (contactless (contact ADJ less))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/22 12:25 PM
L19	0	L18 AND ((constant ADJ current) near3 (constant ADJ voltage))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/22 06:28 PM
L20	0	L18 AND ((constant ADJ current) AND (constant ADJ voltage))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/22 06:28 PM
L21	22	L17 AND ((constant ADJ current) AND	(US-PGPUB; USPAT; USOCR; FIT (AU, AP,	OR	ON	ON	2021/09/22 06:29 PM

		(constant ADJ voltage))	AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

Ex Parte Reexamination Interview Summary	Control No. 96/000,355	Patent Under Reexamination 8013568	
	Examiner ANJAN K DEB	Art Unit 3992	AIA (FITF) Status No

All participants (USPTO personnel, patent owner, patent owner's representative):

(1) ANJAN DEB	(3) Fred Ferris
(2) Hetul Patel	(4) Matthew S. Dicke & Sherif Mahmoud

Date of Interview: 08 November 2021

Type: a) ☐ Telephonic b) ☑ Video Conference
c) ☐ Personal (copy given to: 1) ☐ patent owner 2) ☐ patent owners representative)

Exhibit shown or demonstration conducted: d) ☐ Yes e) ☑ No.
If Yes, brief description: _____

Agreement with respect to the claims f) ☐ was reached. g) ☑ was not reached. h) ☐ N/A.
Any other agreement(s) are set forth below under "Description of the general nature of what was agreed to..."

Claim(s) discussed: 1-15 and 19-48 .

Identification of prior art discussed: Chung-Sik(KR 950005819BI), Kaite et al. (US 6,016,046), .

Description of the general nature of what was agreed to if an agreement was reached, or any other comments:
See Continuation Sheet .

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims patentable, if available, must be attached. Also, where no copy of the amendments that would render the claims patentable is available, a summary thereof must be attached.)

A FORMAL WRITTEN RESPONSE TO THE LAST OFFICE ACTION MUST INCLUDE PATENT OWNER'S STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. (See MPEP § 2281). IF A RESPONSE TO THE LAST OFFICE ACTION HAS ALREADY BEEN FILED, THEN PATENT OWNER IS GIVEN **ONE MONTH** FROM THIS INTERVIEW DATE TO PROVIDE THE MANDATORY STATEMENT OF THE SUBSTANCE OF THE INTERVIEW
(37 CFR 1.560(b)). THE REQUIREMENT FOR PATENT OWNERS STATEMENT CAN NOT BE WAIVED.
EXTENSIONS OF TIME ARE GOVERNED BY 37 CFR 1.550(c).

/ANJAN K DEB/ Primary Examiner, Art Unit 3992		

cc: Requester (if third party requester)

Continuation of Description of the general nature of what was agreed to if an agreement was reached, or any other comments:

Regarding claims rejected under 35 USC 112 1st and 2nd paragraph Applicant proposed amendment to the claims to overcome the rejections (see attached).

Regarding rejection of claims 1-15, and 19-48 rejected under 35 USC 102(b) as being anticipated by Chung-Sik, Applicant discussed proposed amendment to the claims (see attached) and discussed how the claims distinguished over the prior art (Chung-Sik). Specifically, Applicant argued Chung-Sik fails to disclose adjusting battery charging based on the relative position of the primary coil to the secondary coil as proposed in the amended claim 1.

Regarding rejection of claims 1-15, and 19-48 rejected under 35 USC 103(a) as being obvious over Chung-Sik and Kaite, Applicant discussed proposed amendment to the claims (see attached) and discussed how the claims distinguished over the prior art combination. Specifically, Applicant argued Chung-Sik and Kaite fails to disclose adjusting battery charging based on the relative position of the primary coil to the secondary coil as proposed in the amended claim 1.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	96/000,355	8013568
	Examiner	Art Unit
	ANJAN K DEB	3992

CPC - Searched*		
Symbol	**Date**	**Examiner**
H02J/00308	09/27/2021	AD
H02J/00308	09/27/2021	AD
H02J50/10	09/27/2021	AD
H02J7/025	09/27/2021	AD

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**
320	108	09/27/2021	AD

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	**Date**	**Examiner**
Searched IDS	06/24/2021	AD
Searched Prosecution History	06/24/2021	AD
Updated PE2E search attached	02/17/2022	AD

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	96/000,355	8013568
	Examiner	Art Unit
	ANJAN K DEB	3992

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

Reexamination	Application/Control No.	Applicant(s)/Patent Under Reexamination
	96/000,355	8013568
	Certificate Date	Certificate Number

Requester Correspondence Address: ☑ Patent Owner ☐ Third Party
K&L Gates LLP-Chicago P.O. Box 1135 Chicago, IL 60690

LITIGATION REVIEW ☑	AD (examiner initials)	22 June 2021 (date)
Case Name		Director Initials

COPENDING OFFICE PROCEEDINGS	
TYPE OF PROCEEDING	NUMBER

Electronic Acknowledgement Receipt	
EFS ID:	45367153
Application Number:	96000355
International Application Number:	
Confirmation Number:	1538
Title of Invention:	CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF
First Named Inventor/Applicant Name:	8013568
Customer Number:	24573
Filer:	Matthew S. Dicke/Meg Boinski
Filer Authorized By:	Matthew S. Dicke
Attorney Docket Number:	0313071.00020
Receipt Date:	31-MAR-2022
Filing Date:	12-MAR-2021
Time Stamp:	15:32:34
Application Type:	Supplemental Examination
Patent Number:	

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Letter Requesting Interview with Examiner	0313071-00020_InterviewRequest.pdf	291238 7dcd3108a676d06ad291c150e1b58fcf62f746f2	no	3
Warnings:					
Information:					
2	Applicant summary of interview with examiner	0313071-00020_InterviewSummary.pdf	136164 ea9e3341f2bec711104327040128597fd3aa4438	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	427402		

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	LS CABLE & SYSTEM LTD.
Appl. No.:	96/000,355
Conf. No.:	1538
Filed:	March 12, 2021
Title:	CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF
Art Unit:	3992
Examiner:	Anjan K Deb
Docket No.:	0313071.00020

STATEMENT OF ISSUES TO BE DISCUSSED IN TELEPHONE INTERVIEW

Dear Examiner Anjan K Deb:

For the telephone interview scheduled on April 5, 2022 at 2:00pm (Eastern), Applicant would like to discuss the Final Office Action mailed March 3, 2022 for *Ex Parte* Reexamination proceeding no. 96/000,355. In particular, Applicant would like to discuss:

1. The 35 U.S.C. 112, 6th paragraph interpretation of certain terms in the pending claims;
2. The claim rejections under 35 U.S.C. 112, 1st paragraph and 2nd paragraph;
3. The rejection of claim 1 under 35 U.S.C. § 103 over Korean Patent No. KR 950005819B1 ("Chung-Sik") in view of Japanese Patent No. JP H0145230 Y2 to Matsuki ("Matsuki") and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of U.S. Pat. No. 6,016,046 to Kaite (hereinafter "Kaite") in view of Matsuki; and
4. The rejection of claim 55 under 35 U.S.C. § 102 as anticipated by Chung-Sik and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite.

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Applicant thanks the Examiner for their time and attention in this matter. The Examiner is invited to call the undersigned should the Examiner wish to re-schedule the telephone interview or if the Examiner has any questions in advance of the telephone interview.

Respectfully submitted,

K&L GATES LLP

BY: /Matthew S. Dicke/
Matthew S. Dicke
Reg. No. 58,819
Customer No. 24573
Phone: 312-578-5415

Dated: March 31, 2022

Doc Code: M865 or FAI.REQ.INTV

PTOL-413A (07-16)
Approved for use through 05/31/2024. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Applicant Initiated Interview Request Form

Application No.: 96/000,355 First Named Applicant: LS Cable & System Ltd.
Examiner: Deb Art Unit: 3992 Status of Application: Pending

Tentative Participants:
(1) Matthew S. Dicke **(2)** Samuel Richey

(3) _____ **(4)** _____

Proposed Date of Interview: 4/5/2022 **Proposed Time:** 2:00 **(** ○AM ◉PM**)**

Type of Interview Requested:
(1) ☑ **Telephonic** **(2)** ☐ **Personal** **(3)** ☐ **Video Conference**

Exhibit To Be Shown or Demonstrated: ☑ **YES** ☐ **NO**
If yes, provide brief description: Powerpoint slides with talking points and illustrative figures

Issues To Be Discussed

Issues (Rej., Obj., etc)	Claims/ Fig. #s	Prior Art	Discussed	Agreed	Not Agreed
(1) 112	1-35, 37-75		☐	☐	☐
(2) 103	1-35, 37-75	Chung-Sik, Matsuki	☐	☐	☐
(3)			☐	☐	☐
(4)			☐	☐	☑

☑ Continuation Sheet Attached ☐ Proposed Amendment or Arguments Attached

Brief Description of Arguments to be Presented: See also separately filed statement of issues to be discussed during interview

An interview was conducted on the above-identified application on _____

NOTE: This form should be completed and filed by applicant in advance of the interview (see MPEP § 713.01). If this form is signed by a registered practitioner not of record, the Office will accept this as an indication that he or she is authorized to conduct an interview on behalf of the principal (37 CFR 1.32(a)(3)) pursuant to 37 CFR 1.34. This is not a power of attorney to any above named practitioner. See the Instruction Sheet for this form, which is incorporated by reference. By signing this form, applicant or practitioner is certifying that he or she has read the Instruction Sheet. After the interview is conducted, applicant is advised to file a statement of the substance of this interview (37 CFR 1.133(b)) as soon as possible. This application will not be delayed from issue because of applicant's failure to submit a written record of this interview.

/Matthew S. Dicke/
Applicant/Applicant's Representative Signature

Examiner/SPE Signature

Matthew S. Dicke
Typed/Printed Name of Applicant or Representative

312-578-5415
Applicant's/Applicant's Representative's Telephone Number

58,819
Registration Number, if applicable

This collection of information is required by 37 CFR 1.133. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 24 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Doc Code: M865 or FAI.REQ.INTV

PTOL-413A (07-16)
Approved for use through 05/31/2024. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Instruction Sheet for:
APPLICANT INITIATED INTERVIEW REQUEST FORM

(Not to be Submitted to the USPTO)

1. If this form is signed by a registered practitioner not of record, the authority to submit the Applicant Initiated Interview Request Form is pursuant to limited authority to act in a representative capacity under 37 CFR 1.34 and further proof of authority to act in a representative capacity may be required. *See* 37 CFR 1.34.

   The Office will accept the signed form as an indication that the registered practitioner not of record is authorized to conduct an interview on behalf of the principal in pursuant to 37 CFR 1.34.

   For more information, see the "Conducting an Interview with a Registered Practitioner Acting in a Representative Capacity" notice which is available on the USPTO Web site at: http://www.uspto.gov/patents/law/notices/2010.jsp.

2. This is not a power of attorney to any named practitioner. Accordingly, any registered practitioner not of record named on the form does not have authority to sign a request to change the correspondence address, a request for express abandonment, a disclaimer, a power of attorney, or other document requiring the signature of the applicant, assignee of the entire interest or an attorney of record. If appropriate, a separate power of attorney to the named practitioner should be executed and filed in the US Patent and Trademark Office.

3. Any interview concerning an unpublished application under 35 U.S.C. § 122(b) with a registered practitioner not of record who obtains authorization through use of the PTOL-413A will be conducted based on the information and files supplied by the practitioner in view of the confidentiality requirements of 35 U.S.C. § 122(a).

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

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3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
96/000,355	03/12/2021	8013568	0313071.00020	1538

24573 7590 04/08/2022

K&L Gates LLP-Chicago
P.O. Box 1135
Chicago, IL 60690

EXAMINER	
DEB, ANJAN K	

ART UNIT	PAPER NUMBER
3992	

MAIL DATE	DELIVERY MODE
04/08/2022	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Ex Parte Reexamination Interview Summary	Control No.	Patent Under Reexamination	
	96/000,355	8013568	
	Examiner	Art Unit	AIA (FITF) Status
	ANJAN K DEB	3992	No

All participants (USPTO personnel, patent owner, patent owner's representative):

(1) ANJAN DEB	(3) Samuel P. Richey
(2) Hetul Patel & James Menefee	(4) Dicke Matthew

Date of Interview: 05 April 2022

Type: a) ☐ Telephonic b) ☑ Video Conference
c) ☐ Personal (copy given to: 1) ☐ patent owner 2) ☐ patent owners representative)

Exhibit shown or demonstration conducted: d) ☐ Yes e) ☑ No.
If Yes, brief description: _____

Agreement with respect to the claims f) ☐ was reached. g) ☑ was not reached. h) ☐ N/A.
Any other agreement(s) are set forth below under "Description of the general nature of what was agreed to..."

Claim(s) discussed: 1 and 55 .

Identification of prior art discussed: Chung-Sik (KR 950005819BI) and Matsuki (JP H0145230 Y2) .

Description of the general nature of what was agreed to if an agreement was reached, or any other comments:
See Continuation Sheet .

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims patentable, if available, must be attached. Also, where no copy of the amendments that would render the claims patentable is available, a summary thereof must be attached.)

A FORMAL WRITTEN RESPONSE TO THE LAST OFFICE ACTION MUST INCLUDE PATENT OWNER'S STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. (See MPEP § 2281). IF A RESPONSE TO THE LAST OFFICE ACTION HAS ALREADY BEEN FILED, THEN PATENT OWNER IS GIVEN **ONE MONTH** FROM THIS INTERVIEW DATE TO PROVIDE THE MANDATORY STATEMENT OF THE SUBSTANCE OF THE INTERVIEW
(37 CFR 1.560(b)). THE REQUIREMENT FOR PATENT OWNERS STATEMENT CAN NOT BE WAIVED.
EXTENSIONS OF TIME ARE GOVERNED BY 37 CFR 1.550(c).

/ANJAN K DEB/ Primary Examiner, Art Unit 3992	/JAMES A MENEFEE/ Reexamination Specialist, Art Unit 399	/HBP/

cc: Requester (if third party requester)

Continuation of Description of the general nature of what was agreed to if an agreement was reached, or any other comments: The Patent Owner (PO) proposed potential amendment to the claims 1 and 55 (see attached) in response to the Final Rejection to overcome claim interpretation under 35 USC 112 6th paragraph. Examiners advised the PO to provide support in the specification for the amendment in their next official response and indicate that the amended claims may be further interpreted under 35 USC 112 6th paragraph. Regarding prior art rejection of claim 1 under 35 USC 103, Applicant proposed amendments to claim 1 and argued that the combination of Chung-Sik (KR 950005819BI) and Matsuki (JP H0145230 Y2) is not operable. No agreement was reached regarding patentability/confirmation of the claims.

Electronic Acknowledgement Receipt	
EFS ID:	45613358
Application Number:	96000355
International Application Number:	
Confirmation Number:	1538
Title of Invention:	CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF
First Named Inventor/Applicant Name:	8013568
Customer Number:	24573
Filer:	Matthew S. Dicke/Meg Boinski
Filer Authorized By:	Matthew S. Dicke
Attorney Docket Number:	0313071.00020
Receipt Date:	02-MAY-2022
Filing Date:	12-MAR-2021
Time Stamp:	15:57:31
Application Type:	Supplemental Examination
Patent Number:	

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1		0313071-00020_RespFinal_ReExam.pdf	377981 069b3d032e75862cb27d80f59137d04495f0dc9e	yes	52

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Reexam Response to Final Rejection	1	1
	Claims	2	23
	Applicant Arguments/Remarks Made in an Amendment	24	52

Warnings:

Information:

2	Reexam Miscellaneous Incoming Letter	TRANS_CERT.pdf	313274 65c856f219e73f2430d4b4d2b7295dc2c82c89c5	no	3

Warnings:

Information:

Total Files Size (in bytes):	691255

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National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

TRANSPERFECT

DATE OF TRANSLATION:	17-March-22
ELECTRONIC FILE NAME:	Pages from 96000355 030322 Office Action
SOURCE LANGUAGE:	Japanese
TARGET LANGUAGE:	English
TRANSPERFECT JOB ID:	US1255558

TransPerfect is globally certified under the standards ISO 9001:2015 and ISO 17100:2015. This Translation Certificate confirms the included documents have been completed in conformance with the Quality Management System documented in its ISO process maps and are, to the best knowledge and belief of all TransPerfect employees engaged on the project, full and accurate translations of the source material.

TCert v. 2.0

(19) **Japan Patent Office** (JP)

(11) Japanese Examined Patent Application Publication Number

(12) **Japanese Examined Utility Model Application Publication** (Y2)

H1-45230

(51) Int. Cl.[4] Identification codes JPO file numbers (24) (44) Publication date December 27, 1989

H 02 J 7/02 8021-5G

(Total of 2 pages)

(54) Title of the invention STORAGE BATTERY

Decision S63-15874 (21) Utility Model Application S59-222 (65) Unexamined Utility Model Application Publication **S59-129349**

(22) Date of Application June 30, 1977 (43) August 30, 1984

Prior patent application filing date cited

(72) Inventor Shigefumi MATSUKI % Shin-Kobe Electric Machinery Co., Ltd. 2-1-1 Nishi-Shinjuku, Shinjuku-ku, Tōkyō-to

(71) Applicant Shin-Kobe Electric Machinery Co., Ltd. 2-1-1 Nishi-Shinjuku, Shinjuku-ku, Tōkyō-to

Deciding body Hirokazu ŌKUBO, Chief Examiner; Takeshi MIYAZONO, Examiner; Kikuo ISHIKAWA, Examiner

(56) Reference literature Unexamined Utility Model Application Publication S51-95735 (JP, U)

1 *2*

(57) SCOPE OF UTILITY MODEL CLAIMS

A storage battery, formed by encapsulating, in a slightly larger storage battery container, a storage battery body and, between positive and negative electrodes of the storage battery body, a resistor, a diode, and an input coil for high-frequency reception that are connected in series so that current flows from the input coil in the direction of charging the storage battery body due to electromagnetic induction caused by high-frequency reception by the coil, with only the input coil extending to the outside, characterized in that: the positive and negative electrodes of the storage battery body are connected to corresponding terminals of the storage battery container; and the input coil is capable of bending, with the lower end of the storage battery container serving as a support point and is formed so as to be able to be stowed so as to enclose a terminal on the lower end of the storage battery container except during charging.

DETAILED DESCRIPTION OF THE INVENTION

The present invention relates to a storage battery that can be charged at high frequency without connection to a charging device.

Conventionally, when a storage battery is to be charged, as shown in Figure 1, an output terminal of a charging device **1** and an electrode terminal of the storage battery **2** must be connected, but in the present invention, as shown in Figure 2, in a storage battery **2'**, a resistor **4**, a diode **5**, and an input coil **6** are connected in series between positive and negative electrodes of a storage battery body **3** so that current flows only in the direction of charging the storage battery body **3**, a charging device **1'** for the storage battery **2'** is a high-frequency oscillation device, provided with an output coil **7**, so just placing the input coil **6** of the storage battery **2'** in the proximity of the output coil **7** of the charging device **1'** and allowing high-frequency current to flow to the output coil **7** causes current to flow to the input coil **6** of the storage battery **2'** through electromagnetic induction, and this current is rectified by the diode of the storage battery **2'** and can charge the storage battery body **3**.

An example of embodiment of the present invention will be described here. As shown in Figure 3, the storage battery **2'**, formed by connecting the resistor **4**, the diode **5**, and the input coil **6** in series between the positive and negative electrodes of the cylindrical nickel-cadmium NR-SC type storage battery body **3** is encapsulated in a slightly larger cylindrical container **8** for an NR-D type storage battery so that only the input coil **6** extends to the outside, the positive and negative electrodes of the storage battery body **3** are connected to respective positive and negative terminals **9, 9'** of the cylindrical container **8**, and the input coil **6**, extending outside the cylindrical container **8**, can bend 180° with a support point **10** at the lower end of the cylindrical container **8** and can be stowed so as to enclose a negative terminal on the lower end of the cylindrical container **8** except during charging.

As shown in Figure 4, the charging device **1'** comprises a high-frequency oscillation device with the output coil **7** built in so as to be in the proximity of an upper surface, and charging is performed by placing the storage battery **2'** on the upper surface of the charging device **1'** with the input coil **6** extended.

Controlling the high-frequency output or changing the distance between the output coil **7** of the charging device **1'** and the input coil **6** of the storage battery **2'** allows the charging current to be adjusted and the charging time of the storage battery **2'** to be changed.

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As explained above, the present invention has the following notable effects: charging can be performed without connection to the charging device; there is no need for the work of connecting lead lines for charging or for providing individual dedicated charging adaptors depending on the size of the storage battery, making charging work exceptionally simple; the input coil is provided on the outer side, so there is no obstruction by a metal storage battery container, unlike when the input coil is built in, enabling more efficient charging; there is no heat generation or the like by the battery during charging due to induction heating and the like, so charging is safe; and the input coil can be bent and stowed when charging is complete, allowing the battery to be used.

BRIEF EXPLANATION OF THE DRAWINGS

Figure 1 is an explanatory diagram showing the charging of a conventional storage battery, Figure 2 is an explanatory diagram of the principle of the present invention, Figure 3 is an explanatory diagram showing an example of embodiment of the present invention, and Figure 4 is an explanatory diagram showing the charging of a storage battery in the example of embodiment of the present invention.

1' is a charging device, **2'** is a storage battery, **3** is a storage battery body, **4** is a resistor, **5** is a diode, **6** is an input coil, and 7 is an output coil.

FIGURE 1

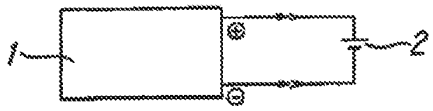


FIGURE 2

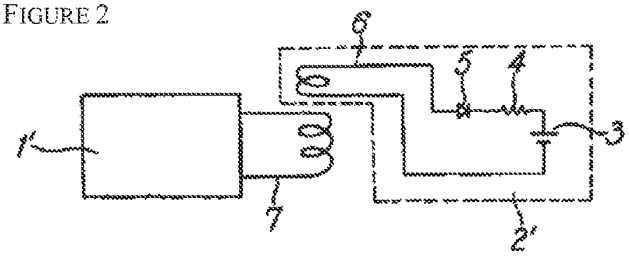


FIGURE 3

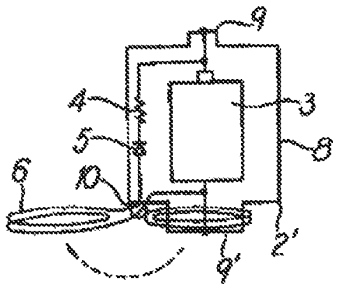
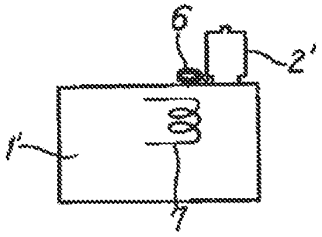


FIGURE 4



Apple Inc. EX1004B Page 951

REMARKS/ARGUMENTS

a. Introduction

Patent Owner submits this response in reply to the Final Office Action mailed March 3, 2022.

In the first Non-Final Office Action mailed June 30, 2021, claims 1-24 of U.S. Patent No. 8,013,568 (hereinafter "the '568 patent") were subject to reexamination. On August 30, 2021, Patent Owner filed a response to the first Non-Final Office Action in which claims 3, 9, 11-12, and 16 were amended and new claims 25-48 were added. In the second Non-Final Office Action mailed September 29, 2021, claims 1-48 were rejected. In the response to the second Non-Final Office Action filed November 29, 2021, claim 36 was cancelled, new claims 49-75 were added, and claims 1-4, 7-10, 13, 15-18, 21, 23, 25, 30, 40-41 and 48 were amended.

A Final Office Action was mailed March 3, 2022. In this After Final Response to the Final Office Action, claims 1, 3, 4, 7, 9, 10, 13, 15, 17, 19, 21, 23, 26, 31, 41, 49, 51, 55, 57, 58, 60, 62, 63, 66, 68, and 75 are amended. No new matter was added with these amendments. These amendments do not enlarge the scope of the original patent claims. Claims 2 and 67 are cancelled in this response. Patent Owner makes no admission regarding the patentability of the cancelled claims.

Patent Owner notes that, as a matter of right, Patent Owner cannot amend any finally rejected claims, add new claims after a final rejection, or reinstate previously cancelled claims unless a showing under 37 C.F.R. § 1.116(b) is made except when an amendment merely cancels claims, adopts examiner's suggestions, removes issues for appeal, or in some other way requires only a cursory review by the Examiner. Patent Owner notes that, in accordance with 37 C.F.R. § 1.116(b), the amendments to claims 1, 3, 4, 7, 9, 10, 13, 15, 17, 19, 21, 23, 26, 31, and 41 present the rejected claims in better form for consideration on appeal, if necessary, and require only a cursory review by the Examiner in-line with the Final Office Action (Examiner's suggestions) to allow the claims. With respect to the amendments to claims 49, 51, 55, 57, 58, 60, 62, 63, 66, 68, and 75, Patent Owner notes that these amendments could not have been presented earlier as the Final Office Action presents the first rejection of these claims. Accordingly, Patent Owner submits the amendments to the claims should be allowed.

Favorable reconsideration of the pending claims and allowance of the new claims is respectfully requested in light of the following remarks.

b. Interview Summary

Patent Owner wishes to thank Examiners Deb, Patel, and Ferris for extending the courtesy of an interview with Matthew Dicke and Samuel Richey (counsel for Patent Owner) on April 5, 2022 (hereinafter "the Interview"). During the Interview, the rejections of claims 1 and 55 were discussed along with the interpretation of the claims under 35 U.S.C. § 112, sixth paragraph. In particular it was discussed how Chung-Sik fails to disclose adjusting a power level during a charging process. Further, it was discussed how the combination of Chung-Sik and Matsuki is improper as being both inoperable and by rendering the device of Chung-Sik unsatisfactory for its intended purpose.

Potential claim amendments were discussed with respect to claim 1 regarding the 35 U.S.C. § 112, sixth paragraph interpretation of "overvoltage monitoring unit" and to the wireless feedback control signal. It was agreed that these amendments would be proper in accordance with 37 C.F.R. § 1.116(b).

Additionally, it was mentioned that the term "microprocessor" could be subject to interpretation under 35 U.S.C. § 112, sixth paragraph in an Advisory Action responsive to this After Final Response. MPEP § 2271 states "[b]oth the patent owner and the examiner should recognize that a reexamination proceeding may result in the final cancellation of claims from the patent and that the patent owner does not have the right to renew or continue the proceedings by refiling under 37 CFR 1.53(b) or 37 CFR 1.53(d) or former 37 CFR 1.60 or 1.62, nor by filing a request for continued examination under 37 CFR 1.114. Complete and thorough actions by the examiner coupled with complete responses by the patent owner, including early presentation of evidence under 37 CFR 1.131(a) or 37 CFR 1.132, will go far in avoiding such problems and reaching a desirable early termination of the reexamination prosecution." MPEP 2272 states "[a]ccordingly, both the examiner and the patent owner should identify and develop all issues prior to the final Office action, including the presentation of evidence under 37 CFR 1.131(a) and 1.132." The second Non-Final Office Action dated September 29, 2021 included an interpretation of "microprocessor" under 35 U.S.C. § 112, sixth paragraph, and in this Office Action that interpretation was withdrawn. In particular, the Office Action states "[i]n response to Patent Owner's arguments and amendment to the claims, **the Examiner withdraws interpretation terms under 35 U.S.C. §112(6th ¶) of the claim** "constant voltage/constant current supplier," and

"microprocessor," as these are terms known in the art and do convey a particular structure. (Remarks pages 25-29)." (Office Action, p. 4, emphasis added).

These claim interpretation issues have already been identified, developed, and withdrawn. Any reintroduction of a previously withdrawn issue after the issuance of this Office Action deprives Patent Owner of any opportunity to provide a response or present evidence. Patent Owner does not introduce any amendments that alter the usage of the term "microprocessor" from the response to the second Non-Final Office Action dated September 29, 2021. Accordingly, it is improper to reintroduce any interpretation of "microprocessor" under 35 U.S.C. § 112, sixth paragraph. Patent Owner requests this Office Action be withdrawn and prosecution be reopened should any interpretation of a term previously withdrawn be reintroduced in an Advisory Action.

No agreement with respect to the patentability of the claims was reached.

2. Status of the Claims

Claims 1, 3-35, 37-66, and 68-75 are currently pending, of which claims 1, 7, 13, 21, 23, 49, 55, 60, 65, 66, 68, 69, 74, and 75 are independent.

In the present response, claims 1, 3, 4, 7, 9, 10, 13, 15, 17, 19, 21, 23, 26, 31, 41, 49, 51, 55, 57, 58, 60, 62, 63, 66, 68, and 75 are amended. Claims 2 and 67 are cancelled.

Independent claim 1 is amended as noted above. Support for these amendments is found at least at column 6, line 66 - column 7, line 4; column 7, lines 43 - 49; column 8, lines 32 - 41; column 11, lines 52 - 61; and previously pending claim 2. Claims 3, 4, and new claim 26 are amended to address typographical issues, formalities, and ensure proper antecedent basis.

Independent claims 7 and 13 are amended as noted above. Support for these amendments is found at least at column 6, line 66 - column 7, line 4 and column 11, lines 62-65. Claims 9, 10, 13, 15, 17, 19, and new claim 31 are amended to address typographical issues, formalities, and ensure proper antecedent basis.

Independent claims 21 and 23 are amended as noted above. Support for these amendments is found at least at column 6, line 66 - column 7, line 4; column 7, lines 43-49; and column 11, lines 52-65. New claims 40 and 41 are amended to address typographical issues, formalities, and ensure proper antecedent basis.

New independent claim 49 is amended as noted above. Support for these amendments is found at least at column 6, line 66 - column 7, line 4. New dependent claim 51 is amended to address typographical issues, formalities, and ensure proper antecedent basis.

New independent claims 55 and 60 are amended as noted above. Support for these amendments is found at least at column 11, lines 23-26 and lines 35-43. New claims 57, 58, 62, and 63 are amended to address typographical issues, formalities, and ensure proper antecedent basis.

New claim 66 is amended as noted above. Support for these amendments is found in at least previously pending claim 67.

New claims 68 and 75 are amended in this response. Support for these amendments is found in at least column 6, line 66 - column 7, line 4; column 7, lines 43-49; column 8, lines 32-1; column 11, lines 52 - 61; and FIG. 3.

3. Response to Claim Interpretation under 35 U.S.C. § 112, Sixth Paragraph

a. overvoltage monitoring unit

In the Final Office Action, the Office invoked an interpretation under 35 U.S.C. § 112, sixth paragraph with respect to claims 1, 4, 7, 9, 10, 21, 26, 31, 41, 49, 52, 55, 58, 60, 62, 63, 65, 66, 68, 69, 71, 72, and 75 for claim term "overvoltage monitoring unit." Patent Owner respectfully disagrees and asserts that the pending claims were not intended to be and should not be interpreted as means-plus-function claims under 35 U.S.C. § 112, sixth paragraph. With respect to claims 7, 9, 10, 21, 26, 31, 41, 58, 60, 62, and 63, Patent Owner has removed the term "overvoltage monitoring unit." Patent Owner notes that this amendment does not broaden the claim as the microprocessor was previously recited in the claims. Accordingly, Patent Owner submits that these claims should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

With respect to claims 1, 4, 49, 52, 55, 65 and 66, Patent Owner submits that the claim recites specific structures for the "overvoltage monitoring unit." For example, claim 1 recites "an overvoltage monitoring unit that includes first and second voltage detectors [...] and a microprocessor." Claim 49 recites "an overvoltage monitoring unit that includes a wireless transmitting unit, first and second voltage detectors [...], and a microprocessor." Claim 55 recites "an overvoltage monitoring unit that includes a wireless transmitter, first and second voltage detectors [...], and the at least one microprocessor." Claim 65 and 66 recite "an overvoltage

monitoring unit that includes: a microprocessor [...] and a wireless transmitting unit." Accordingly, the interpretation of claims 1, 49, 52, 55, 65, 66, and 68 under 35 U.S.C. § 112, sixth paragraph is improper.

With respect to claims 68 and 69, Patent Owner submits that the term "overvoltage monitoring unit," when read by a person having ordinary skill in the art in view of the specification, is understood to have a sufficiently definite meaning as the name for the structure that performs the function. Even when a term covers a broad class of structures or identifies the structures by their function (e.g., "filters," "brakes," "clamp," "screwdriver," and "locks"), 35 U.S.C. § 112 sixth paragraph will not apply. *See* MPEP 2181(I)(A). To determine whether a word, term, or phrase coupled with a function denotes structure, examiners may check whether: (1) the specification provides a description sufficient to inform one of ordinary skill in the art that the term denotes structure; (2) general and subject matter specific dictionaries provide evidence that the term has achieved recognition as a noun denoting structure; and/or (3) the prior art provides evidence that the term is an art-recognized structure to perform the claimed function. *See* MPEP 2181(I)(C); and *Ex parte Rodriguez,* 92 USPQ2d 1395, 1404 (Bd. Pat. App. & Int. 2009) (precedential). Persons of ordinary skill in the art reading the specification of the '568 patent would recognize that the recited claim terms have a sufficient definite meaning as the name for a structure. The recited claim terms are also modified by sufficient structure, material, and/or acts for a person skilled in the art reading the specification to recognize that the recited claim terms, together with the functions, structures, materials, and acts recited in the claims, connote sufficient definite structure. See, for example, claims 1, 4, 7, 9, 10, 21, 26, 31, 41, 49, 52, 55, 58, 60, 62, 63, 65, 66, 68, 71, 72, and 75. Further, with respect to claims 71 and 72, Patent Owner submits that the claims recite specific structures for the "overvoltage monitoring unit." For example, claim 71 recites "wherein the overvoltage monitoring unit includes: a wireless transmitting unit [...] first and second voltage detectors [...] a voltage comparator [...] and a microprocessor." Accordingly, the interpretation of claims 69, 71, and 72 under 35 U.S.C. § 112, sixth paragraph is improper.

The Final Office Action states the "overvoltage monitoring unit" is interpreted to include "a wireless transmitting unit 320 for wirelessly propagating the monitoring result through an antenna 330; first and second voltage detectors (350, 360) for respectively detecting voltages at front and rear ends of the constant voltage/constant current supplier; a voltage comparator 380 for comparing first and second voltages detected by the first and second voltage detectors (350, 360)

and outputs a voltage comparison result; a microprocessor 310 for outputting a monitoring result according to the voltage comparison result to the wireless transmitting unit 320; and charging pause detection unit 390 receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the micro-processor 310 (column 4, lines 28-45) (FIG. 5)." (Final Office Action, pp. 8 - 9). Patent Owner notes that it is improper to read every structure indicated in the specification into the "overvoltage monitoring unit." MPEP § 2181 states (emphasis added):

> If the written description sets forth the corresponding structure, material, or acts in compliance with 35 U.S.C. 112(b) or pre-AIA 35 U.S.C. 112, second paragraph, the claim limitation must "be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof." 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph. However, **functional limitations that are not recited in the claim, or structural limitations from the written description that are unnecessary to perform the claimed function, cannot be imported into the claim**. *Welker Bearing*, 550 F.3d at 1097, 89 USPQ2d at 1294; *Wenger Mfg., Inc. v. Coating Mach. Sys., Inc.*, 239 F.3d 1225, 1233, 57 USPQ2d 1679, 1685 (Fed. Cir. 2001).

Patent Owner notes that the claims recite the necessary structural limitations to perform the claimed functions. Accordingly, Patent Owner submits that, in the event the term "overvoltage monitoring unit" is interpreted under 35 U.S.C. § 112, sixth paragraph, the interpretation of the term articulated in the Final Office Action is improper for at least including functional limitations and/or structure that is unnecessary to perform the claimed functions.

Claim 75 recites "an overvoltage monitoring unit that includes a microprocessor." The microprocessor constitutes specific structure for the "overvoltage monitoring unit." Accordingly, the interpretation of claim 75 under 35 U.S.C. § 112, sixth paragraph is improper.

b. wireless transmitting unit

In the Final Office Action, the Office invoked an interpretation under 35 U.S.C. § 112, sixth paragraph with respect to claim 3 for claim term "wireless transmitting unit." Patent Owner respectfully disagrees and asserts that the pending claims were not intended to be and should not be interpreted as means-plus-function claims under 35 U.S.C. § 112, sixth paragraph. Patent Owner notes that a "wireless transmitting unit," when read by a person having ordinary skill in the

art in view of the specification, is understood to have a sufficiently definite meaning as the name for the structure that performs the function as indicated on page 9 of the Office Action. Accordingly, Patent Owner submits that this claim should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

c. charging pause detecting unit

In the Final Office Action, the Office invoked an interpretation under 35 U.S.C. § 112, sixth paragraph with respect to claims 4, 10, 52, 58, 63, and 72 for claim term "charging pause detecting unit." Patent Owner respectfully disagrees and asserts that the pending claims were not intended to be and should not be interpreted as means-plus-function claims under 35 U.S.C. § 112, sixth paragraph. However, with respect to claims 4, 10, 58, and 63 Patent Owner has removed the term "charging pause detecting unit." Accordingly, Patent Owner submits that these claims should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

With respect to claims 52 and 72, Patent Owner submits that the specification provides a description sufficient to inform one of ordinary skill in the art that the term denotes structure when coupled with its function. For example, support for the claimed "charging pause detecting unit" is found at least at column 8, line 64 to column 9, line 16; column 10, lines 1-4; and Figs. 5-6 (e.g., the charging pause detector 390 measures the high frequency AC current induced in the secondary coil 270 and so as to detect when the induced high frequency AC current is interrupted (the pause region), and that inputs the detection signal to the microprocessor 310). FIG. 5 illustrates a block diagram of an electronic circuit having a variety of electronic components, such as a coil 279, an antenna 330, and a battery cell 300. Accordingly, the figures inform one of ordinary skill in the art that the components shown in the figures, including the "charging pause detecting unit" constitute one or more electronic components coupled together to perform the recited function. Accordingly, Patent Owner submits the three-part test is not met and this claim should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

d. charging power adjustment unit

In the Final Office Action, the Office invoked an interpretation under 35 U.S.C. § 112, sixth paragraph with respect to claims 13, 17, 19, 21, and 74 for claim term "charging power adjustment unit." Patent Owner respectfully disagrees and asserts that the pending claims were not intended to be and should not be interpreted as means-plus-function claims under 35 U.S.C. § 112, sixth paragraph. However, with respect to claims 13, 17, 19, and 21 Patent Owner has removed

the term "charging power adjustment unit." Accordingly, Patent Owner submits that these claims should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

With respect to claim 74, Patent Owner submits that the claim recites specific structures for the "charging power adjustment unit." Specifically, claim 74 recites "a charging power adjusting unit that includes: a wireless receiving unit [...] and a microprocessor." Accordingly, Patent Owner submits the three-part test is not met and this claim should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

The Final Office Action states "the structure of charging power adjustment unit includes a wireless receiver and a microprocessor." (Final Office Action, p. 10). Patent Owner notes that it is improper to read every structure indicated in the specification into the "charging power adjustment unit" in accordance with MPEP § 2181. Accordingly, Patent Owner submits that, in the event the term "charging power adjustment unit" is interpreted under 35 U.S.C. § 112, sixth paragraph, the interpretation of the term articulated in the Final Office Action is improper for at least including functional limitations and/or structure that are unnecessary to perform the claimed functions.

e. wireless receiving unit

In the Final Office Action, the Office invoked an interpretation under 35 U.S.C. § 112, sixth paragraph, with respect to claims 15 and 74 for claim term "wireless receiving unit." Patent Owner respectfully disagrees and asserts that the pending claims were not intended to be and should not be interpreted as means-plus-function claims under 35 U.S.C. § 112, sixth paragraph. However, with respect to claim 15, Patent Owner has removed the term "wireless receiving unit." Accordingly, Patent Owner submits that this claim should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

With respect to claim 74, Patent Owner submits that the specification provides a description sufficient to inform one of ordinary skill in the art that the term denotes structure when coupled with its function. For example, support for the claimed "wireless receiving unit" is found at least at column 10, lines 14-17 (e.g., [i]f the response signal is wirelessly transmitted, the wireless receiving unit 230 of the charging device C demodulates the response signal and then inputs it to the microprocessor 240.) and FIGs. 3 and 4. For example, FIG. 4 illustrates a block diagram of an electronic circuit having a variety of electronic components, such as an AC power source 250, a coil 200, and an antenna 220. Accordingly, the figures inform one of ordinary skill in the art that the components shown in the figures, including the "wireless receiving unit"

constitute one or more electronic components coupled together to perform the recited function. Accordingly, Patent Owner submits the three-part test is not met. Further, "the term "receiver" (i.e., the absence of the term means) presumptively connotes sufficiently definite structure to those of skill in the art. *See Personalized Media*, 161 F.3d at 703–04." (*EnOcean GmbH v. Face Int'l Corp.*, No. 12-1645 at 7 (Fed. Cir. 2014)). Therefore, this claim should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

Conclusion

In view of the foregoing, Patent Owner respectfully asserts that the pending claims are not means-plus-function claims and that each and every word of the claims should be given patentable weight. Furthermore, for at least the reasons stated above, Patent Owner respectfully requests withdrawal of the pending 35 U.S.C. § 112, sixth paragraph, interpretation of the claim terms in the pending claims.

4. Response to Claim Rejections under 35 U.S.C. § 112, First and Second Paragraphs

a. 35 U.S.C § 112, second paragraph

In the Final Office Action, claims 1, 21, and 65 are rejected as being indefinite with respect to "what component of the claimed "overvoltage monitoring unit" recited in claims 1, 21, and 65, is monitoring the voltages at both ends of the constant voltage/constant current supplier." (Final Office Action, p. 11). Patent Owner disagrees, but has amended the claims to advance prosecution. With respect to claim 1, Patent Owner has amended claim 1 to recite "first and second voltage detectors respectively detecting first and second voltages at both ends of the constant voltage/constant current supplier." With respect to claim 21, Patent Owner has amended claim 21 to remove the cited language. With respect to claim 65, Patent Owner notes that it is well specified in the specification that a microprocessor monitors the voltage at both ends of the constant voltage/constant current supplier. See, for example, column 11, lines 52-58 ("in the above embodiment [...] the microprocessor 310 of the battery B monitors voltages measured at both ends of the constant voltage/constant current supplier 290" and column 11, lines 31-35 ("the microprocessor 310 periodically repeats monitoring an overvoltage state at both ends of the constant voltage/constant current supplier 290."

Therefore, Patent Owner submits that the rejections of claims 1, 21, and 65 under 35 U.S.C § 112, second paragraph should be withdrawn.

b. 35 U.S.C § 112, first paragraph

In the Final Office Action, claims 55 and 60 are rejected as failing to comply with the written description requirement with respect to the terms "adjusting a power applied to the primary coil from a first level to a second level" and "adjusting the power applied to the primary coil from the second level to a third level." (Final Office Action, p. 13). Specifically, the Final Office Action states "the first, second, and third level fail to comply with the written description requirement." (Final Office Action, p. 13). Patent Owner respectfully disagrees. Column 11, lines 23-26 state "the microprocessor 240 controls the high frequency power driving unit 210 to lower the power of the high frequency AC current applied to the primary coil 200 as much as a predetermined level." This constitutes adjusting a power applied to the primary coil from a first level (e.g. the power level at which the high frequency power driving unit 210 is operating) to a second level (e.g. the power level lowered by as much as a predetermined level). Similarly, column 11, lines 38-43 state (emphasis added) "the microprocessor 310 wirelessly transmits an adjustment request signal of charging power to the charging device C again **so that the power of high frequency AC current applied to the primary coil 200 is lowered as much as a predetermined level once again.**" This constitutes adjusting the power applied to the primary coil from the second level to a third level (e.g. the second power level lowered by as much as a predetermined level once again). However, despite the clear support in the specification for the cited claim language, Patent Owner has amended claims 55 and 60 to remove the objected to phrases. Therefore, Patent Owner submits that the rejections of claims 55 and 60 under 35 U.S.C § 112, first paragraph should be withdrawn.

Conclusion

Thus, for at least the same reasons stated above, Patent Owner respectfully requests withdrawal of the pending 35 U.S.C. § 112, first and second paragraph rejections.

5. Response to Claim Rejections under 35 U.S.C. § 102 and 35 U.S.C. § 103

The Final Office Action states claims 1 - 15, 19 - 54, 56, 61, 65 - 68, and 73 - 75 are rejected under 35 U.S.C. § 103 as unpatentable over Korean Patent No. KR 950005819B1 (hereinafter "Chung-Sik") in view of Japanese Patent No. JP H0145230 Y2 to Matsuki (hereinafter "Matsuki") and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of U.S. Pat. No. 6,016,046 to Kaite (hereinafter "Kaite") in view of Matsuki. (Final Office Action, p. 14).

The Final Office Action states claims 16-18 are rejected under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Matsuki and in view of Korean Patent No. KR100451606B1 (hereinafter "Cho"). (Final Office Action, p. 115).

The Final Office Action states claims 55, 57-60, 62-64, and 69-72 are rejected under 35 U.S.C. § 102 as anticipated by Chung-Sik and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite. (Final Office Action, p. 124).

Without conceding to these rejections, Patent Owner has amended the claims as noted above. Chung-Sik, Kaite, Matsuki, and Cho, alone or in combination, do not teach or suggest all features of any of independent claims 1, 7, 13, 21, 23, 49, 55, 60, 65, 66, 68, 69, 74, and 75.

a. Overview of Technical Problem

As illustrated in FIG. 1 of the '568 patent (reproduced below), in a conventional contact-less charging method, a charger 10 includes a primary coil 40 supplied with a high frequency AC current to form a magnetic field M, and a battery 50 includes a secondary coil 70 to which a high frequency AC current is induced according to the linkage of the magnetic field M generated in the primary coil 40. *See* FIG. 1 and column 1, line 66 to column 2, line 6.

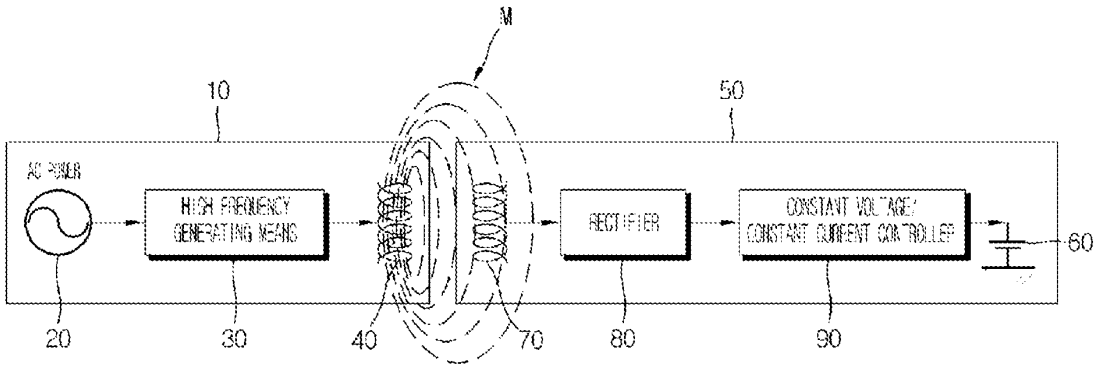


FIG. 1 of the '568 patent

An intensity of the AC current induced in the secondary coil 70 is proportional to an intensity of the magnetic flux linked to the secondary coil 70, which depends on a relative position of the secondary coil 70 and the primary coil 40. *See* column 2, lines 21-27. For example, if the secondary coil 70 is positioned closer to the primary coil 40, the intensity of the magnetic flux linked to the secondary coil 70 will increase, and as a result the intensity of the high frequency AC

current induced in the secondary coil 70 will also increase. *See* column 2, lines 27-32. However, if a large high frequency AC current induced in the secondary coil 70 exceeds standards defined for a circuit part in battery 50 (e.g., constant voltage/constant current supplier 90), then it could cause damage to the circuit part. *See* column 2, lines 42-48.

In order to avoid causing damage, prior art contact-less charging methods typically employ a structure that fixes the relative positions between the charger 10 and the battery 50 to a position where the standards of a circuit part (e.g., the constant voltage/constant current supplier 90) in the battery 50 are defined. *See* column 2, lines 49-53. For example, as illustrated in FIG. 2 of the '568 patent, an electric toothbrush 100 includes a toothbrush body 110 having a battery 115 mounted to its lower end, and a charger 120 for charging the battery 115. *See* FIG. 2 and column 2, lines 54-60.

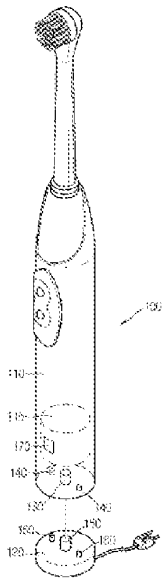


FIG. 2 of the '568 patent

The toothbrush body 110 and the charger 120 are closely fixed with each other by matching the grooves 130, 140 and the protrusions 15, 160, and as a result relative positions of the charger 120 and the battery 150 are also closely fixed. *See* column 2, line 66 to column 3, line 3. Standards of a constant voltage/constant current supplier 170 provided to the battery 115 are defined with the understanding that the toothbrush body 110 and the charger 120 are closely fixed in this manner, and thus damage to the constant voltage/constant current supplier 170 may be prevented

while charging the battery 115 due to an unexpected overvoltage by strictly restricting relative positions of the battery 115 and the charger 120 in this manner. *See* column 3, lines 4-13. That is to say, whenever charging the battery 115, a user should fix the toothbrush body 110 on the charger 120 in this particular fixed relative position. *See* column 3, lines 12-17.

b. Overview of Technical Solution

One object of the disclosure of the '568 patent is to provide a battery charging control method capable of preventing damage of an internal battery circuit together with solving a restriction for relative positions between the battery and the charger. *See* column 3, lines 35-39.

For example, as illustrated in FIG. 7 of the '568 patent (reproduced below), "the contact-less charging device and chargeable battery need not be fixed to a certain relative position as in the prior art so as to constantly keep an intensity of magnetic flux linked to the secondary coil 270" (emphasis added). *See* FIG. 7 and column 9, lines 35-38. For example, where the charging device C is designed in a pad shape as shown in FIG. 7, a user may conveniently charge a battery B just by placing a subject such as a cellular phone coupled with the battery B onto the pad, thereby allowing one to make a convenient charger and battery set. *See* column 9, lines 38-44.

To facilitate this, in one example, a contact-less charging device and chargeable battery may adjust a charging power via wireless feedback control during the battery charging process. *See* column 9, lines 29-32 and column 12, lines 46-51.

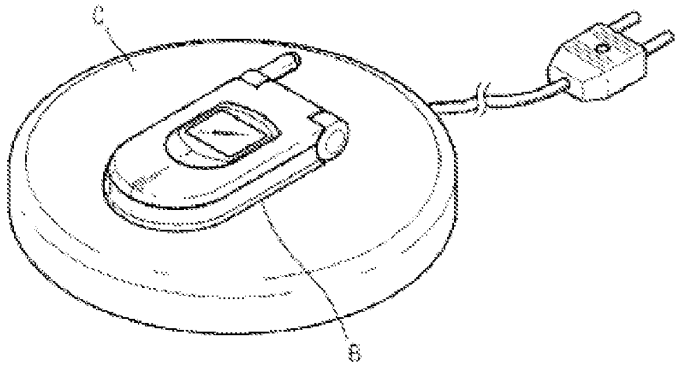


FIG. 7 of the '568 patent

c. Motivation to Combine

Chung-Sik and Matsuki

The Final Office Action states claims 1-54, 56, 61, 65 - 68, and 73-75 are rejected under 35 U.S.C. § 103 as unpatentable over a combination of Chung-Sik and Matsuki. For example, the Final Office Action states "[a]t the time the invention was made it would have been obvious to one of ordinary skill in the art to modify contact-less wireless charging of battery disclosed by Chung-Sik by adding wireless feedback control signal to induce the change of intensity of the magnetic field based on relative positions of the contact-less chargeable battery and the external contact-less charging device disclosed by Matsuki for charging a battery." (Final Office Action, p. 19).

MPEP § 2143.01 states:

> The mere fact that references can be combined or modified does not render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417, 82 USPQ2d 1385, 1396 (2007).
>
> A statement that modifications of the prior art to meet the claimed invention would have been "'well within the ordinary skill of the art at the time the claimed invention was made'" because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a prima facie case of obviousness without some objective reason to combine the teachings of the references. *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993). "'[R]ejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.'" *KSR*, 550 U.S. at 418, 82 USPQ2d at 1396 (quoting *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006)).

Patent Owner notes the Final Office Action simply assumes it would have been obvious to make the modification and provides no justification for the modification or rationale explaining a motivation to combine in violation of the MPEP and case law precedent. Accordingly, Patent Owner submits that the obviousness rejections of the claims cannot be sustained.

MPEP § 2143.02 states "[w]here there is a reason to modify or combine the prior art to achieve the claimed invention, the claims may be rejected as prima facie obvious provided there

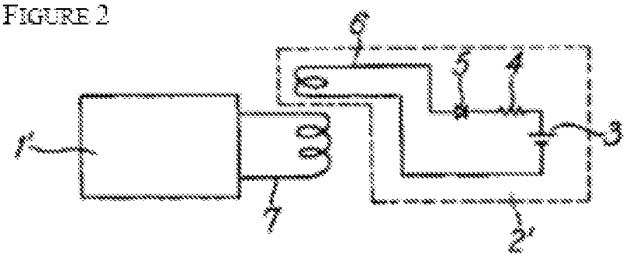
is also a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986)." "An invention 'composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.'" *Volkswagen Grp. of Am., Inc. v. Velocity Patent LLC*, IPR2015-00276, Paper 8, slip op. at 10 (PTAB Jun. 1, 2015) (quoting *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 418 (2007). In order to show that it would be obvious to make a particular combination, "a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.'" *Apotex Inc. v. Wyeth LLC*, IPR2014-00115, Paper 94, slip op. at 11 (Apr. 20, 2015) (quoting *Procter & Gamble Co. v. Teva Pharms. USA, Inc.*, 566 F.3d 989, 994 (Fed. Cir. 2009))." The proposed combination of Chung-Sik and Matsuki fails to meet the requirements of the MPEP and case law precedent as a skilled artisan would not have been motivated to combine the teachings and would not have had a reasonable expectation of success in making the proposed combination.

Chung-Sik teaches "the battery may be recharged only when the portable device 18 is installed on the base unit 12" (emphasis added). (Chung-Sik, page 8-2, lines 59-60). In Chung-Sik, "when the portable device 18 is installed on the base unit 12, the charge switch 30 is switched 'on' according to mechanical input" (emphasis added). (Chung-Sik, page 8-4, lines 30-40). Further, in Chung-Sik, "when a portion of the contactless charging unit 38 of the portable device 18 is mounted (positioned) on the power transmitter 28 of the base unit 12, a charge switch 30 of the base unit 12 is started (turned 'on') by the mounting of the portable device 18." (Chung-Sik, page 8-2, line 62 to page 8-3, line 2). Further, in Chung-Sik "when the portable device 18 is separated from the base unit 12, operation of the contactless charging unit 28 and the power transmitter 28 are stopped to stop charging the battery 32." (Chung-Sik, page 8-3, lines 11-14). Further, in Chung-Sik, "when the two devices are coupled to each other, the core 78 of the induced voltage detecting unit 81 installed on the contactless charging unit 38 in the portable device 18 is positioned on an opposite surface of the core 76 of the induced voltage generating unit 46 in the power transmitter 28 and is space coupled thereto" (emphasis added). (Chung-Sik, page 8-4, lines 20-25).

Patent Owner has obtained a certified translation of Matsuki, a copy of which is submitted along with this After Final Response. Matsuki describes a storage battery that can be charged without connection to a charging device. (Matsuki, column 1, lines 16-17). As shown in FIG. 2 of Matsuki, a storage battery 2' includes a resistor 4, a diode 5, and an input coil 6 connected in series

between positive and negative electrodes of a storage battery body 3 so that current flows only in the direction of charging the storage battery body.

FIGURE 2



Matsuki discloses charging the storage battery using a charging device 1' having an output coil 7, also shown in FIG. 2. Matsuki recognizes that the charging current can be adjusted by changing the distance between the output coil 7 of the charging device 1' and the input coil 6. (Matsuki, column 2, lines 24 - 27). This is not a new disclosure. This is one of the problems recognized in the '568 Patent (column 2, lines 37-41): "However, the intensity of the AC current induced by the secondary coil 70 is changed according to a relative position between the primary coil 40 and the secondary coil 70 as mentioned above." Matsuki does not solve this problem, nor does it disclose circuitry in the battery for causing a change in the charging current. In fact, Matsuki fails to disclose any type of feedback circuitry in the battery or in the charging device. Rather, in Matsuki, although the relative positions of the output coil and the input coil are changed, the *intensity* of the magnetic field does not change. In the '568 Patent, the position of the primary coil and secondary coil remain fixed and the circuitry in the battery causes a change in the charging current. There is no disclosure of this claimed feature of the '568 Patent in any of the art of record.

The combination proposed in the Final Office Action requires modifying the relative positions of the base 12 and the portable device 18 of Chung-Sik, as disclosed in Matsuki, in order to adjust the charging current. See, for example, Final Office Action, pp. 18-19. However, Chung-Sik describes a system where signals transmitted from the portable device 18 to the base 12 will only occur "when the two devices are coupled to each other" in a fixed arrangement at which the core 78 of the portable device 18 is positioned on a surface of the core 76 of the transmitter 28 of the base unit 12. (Chung-Sik, page 8-4, lines 20-25). In fact, Chung-Sik does not teach or suggest making any change to the intensity of the magnetic field based on relative positions of the base 12

and the portable device 18 because Chung-Sik understands that their relative positions are fixed whenever the battery 32 is being charged.

A person having ordinary skill in the art would not be motivated to make the modification proposed in the Final Office Action as this modification would not have a reasonable chance of success as the modified system would be non-operable. *See, e.g.* MPEP § 2143.02 and *In re Merck & Co., Inc.*, 800 F.2d 1091. As described in the instant specification and above, if a high frequency AC current induced in a coil exceeds standards defined for a circuit part in battery, then it could cause damage to the circuit, battery, and other components. The prior art contact-less charging methods, such as those disclosed in Chung-Sik, employ a structure that fixes the relative positions between the charger and the battery so that the induced current remains in a range that prevents damage to the circuit or other components. Accordingly, a person having ordinary skill in the art would understand that varying the distance between the portable device 18 and the base 12, as proposed in the Final Office Action in view of Matsuki, would render Chunk-Sik non-operable. For example, varying the distance between the portable device 18 and the base 12 would damage the circuity, battery, and/or other components of the portable device 18 and/or the base 12. It is for precisely this reason that Chung-Sik describes a system where the portable device 18 and the base 12 operate when the devices are coupled to each other in a fixed arrangement. Therefore, there is no motivation to combine Chung-Sik and Matsuki as proposed in the Final Office Action and the combination of Chung-Sik and Matsuki fails to support a *prima facie* obviousness rejection as required by MPEP § 2143.02 and case law precedent.

However, even if a person having ordinary skill in the art would have been motivated to make the proposed combination (and they would not), the proposed combination of Chung-Sik and Matsuki fails to support a *prima facie* obviousness rejection. MPEP § 2143.01 states "[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious. *In re Ratti*, 270 F.2d 810, 813, 123 USPQ 349, 352 (CCPA 1959)." As described above, Chung-Sik describes a system that operates "when the two devices are coupled to each other" in a fixed arrangement at which the core 78 of the portable device 18 is positioned on a surface of the core 76 of the transmitter 28 of the base unit 12. (Chung-Sik, page 8-4, lines 20-25). This fixed arrangement is critical to the portable device of Chung-Sik as the

monitoring of the battery voltage of the portable device is dependent on a constant reference voltage. Chung-Sik discloses:

> **The first voltage splitter 89 for inputting the rectified voltage IDC splits the voltage IDC into a reference voltage VI at a predetermined level** using internal resistors 88 and 90, and inputs the voltage to an inverse terminal (-) of the comparator [9]6. A charge level detection voltage V2 from a split voltage circuit 93 which is connected between the cathode and ground of the diode 86 and which splits and detects the voltage of an output node of the charging unit 52 is applied to the non-inverting terminal (+) of the comparator 96. **In this case, the reference voltage VI is constant and the charge level detection voltage V2 varies depending on a charge voltage level of the battery 32.** Thus, when the first microcomputer 48 outputs the control signal (SCTL) of 10 KHZ to an output port Pl, a charge voltage via inductive coupling between the induced voltage generating unit 46 and the induced voltage detecting unit 81 is applied to the battery 32 to initiate charge of the battery 32. (Chung-Sik, page 8-5, lines 1-8, emphasis added).

The combination proposed in the Final Office Action requires modifying the relative positions of the base 12 and the portable device 18 of Chung-Sik as allegedly disclosed in Matsuki. This combination changes the principle of operation of the system disclosed in Chung-Sik as the devices would not be coupled to each other in a fixed arrangement. Further, the proposed combination requires varying the charging current, and thereby varying the reference voltage, and as such the reference voltage would not be constant in the system suggested in the Final Office Action. However, if the reference voltage is variable, the comparator will not be able to correctly determine the charge level of the battery as the comparator relies on the reference voltage being constant. Accordingly, the proposed combination changes the principle of operation of the system disclosed in Chung-Sik as the system would not be able to determine the charge level of the battery based on a constant reference voltage. Therefore, for at least these reasons, the proposed combination of Chiung-Sik and Matsuki fails to support a *prima facie* obviousness rejection of the claims.

Chung-Sik and Kaite

The Final Office Action states claims 55, 57-60, 62-64, and 69-72 are rejected under 35 U.S.C. § 102 as anticipated by Chung-Sik and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite. (Final Office Action, p. 124). For example, the Final Office Action states "[t]o the extent that Chung-Sik may not specifically disclose constant voltage/constant

current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode it would have been obvious over Kaite et al." (Final Office Action, p. 126). The Final Office Action does not articulate how the proposed combination of Chung-Sik and Kaite would have been predictable to one of ordinary skill in the art, how the resultant combination would have been predictable, or how a person having ordinary skill in the art would have a reasonable expectation of success in making the proposed combination as required by MPEP § 2143.01, MPEP § 2143.02, and case law precedent. Accordingly, Patent Owner submits that the combination of Chung-Sik and Kaite fails to support a *prima facie* obviousness rejection.

d. Rejection of Claims 1, 3 - 6, and 25 - 29

The Final Office Action states claim 1 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 14). Patent Owner disagrees. Claim 1 recites "wherein the monitoring result includes a wireless feedback control signal to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device." The Final Office Action relies on Chung-Sik and Matsuki to disclose the cited aspect of claim 1. Chung-Sik discloses:

> When the temperature is determined to be normal in operation 106, the first microcomputer 48 scans the input port P3 and searches for the status of the charge switch 30 in the process of operation 108. In operation 108, when the charge switch 30 is switched "off" and the hand-set status signal (HSS) is input as "high", the portable device 18 is determined to be separated and the aforementioned operation 112 is performed. In operation 108, when the charge switch 30 is turned "on", the first microcomputer 48 analyzes the data input to line 49 in operation 110 and searches whether or not the portable device is normal. In this case, the data input to the line 49 is input as data that is wirelessly transmitted from the portable device 18 when the battery 32 is completely charged. If analysis of input data in operation 110 indicates the portable device is abnormal (i.e. charge is incomplete), the first microcomputer 48 jumps to the aforementioned step 106 to continuously generate a charge voltage, and when the portable device is normal, the first microcomputer 48 jumps to operation 112 to stop charging. (Chung-Sik, p. 8-5, lines 22 - 30).

Patent Owner submits that Chung-Sik fails to teach the cited aspect of claim 1. Chung-Sik discloses stopping charging when the battery 32 is completely charged. This does not teach, suggest, or constitute "induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device."

First, stopping charging when a battery is completely charged does not teach, suggest, or constitute "relative positions of the contact-less chargeable battery and the external contact-less charging device" as in claim 1. Second, stopping charging when the battery is completely charged does not teach, suggest, or constitute inducing a change of intensity of a magnetic field as in claim 1. Chung-Sik discloses stopping charging when a battery is completely charged. However, when the charging is stopped, the magnetic field is not present and therefore does not have an intensity. This does not constitute changing the intensity of a magnetic field. That is, Chung-Sik fails to teach, suggest, or disclose a *variable* intensity of a magnetic field or varying the intensity of a magnetic field. Patent Owner cannot locate any teachings in Kaite or Matsuki that cure this deficiency in Chung-Sik. To add to that, stopping charging of Chung-Sik is different from power adjustment and this is the same as simply turning off the light is different from adjusting the intensity of illumination of the light.

The Final Office Action further states Chung-Sik does "not specifically disclose to induce the change of intensity of the magnetic field based on relative positions of the contact-less chargeable battery and the external contact-less charging device." (Final Office Action, p. 18). The Final Office Action relies on Matsuki to teach the cited aspect of claim 1. (Final Office Action, p. 19). Matsuki discloses "[c]ontrolling the high-frequency output or changing the distance between the output coil 7 of the charging device 1′ and the input coil 6 of the storage battery 2′ allow the charging current to be adjusted and the charging time of the storage batter 2′ to be changed." (Matsuki, column 2, lines 24 - 27). This does not teach, suggest, or constitute "induc[ing] the change of intensity of the magnetic field [...] based on relative positions of the contact-less chargeable battery and the external contact-less charging device" as in claim 1. Specifically, Matsuki observes that the distance between the charging device and the storage battery would result in a change in charging time of the storage battery. However, this does not constitute changing the intensity of a magnetic field based on a distance. That is, in Matsuki, the intensity of the magnetic field generated from a primary coil does not change. In fact, if the position of the

output coil and the input coil of Matsuki were to change, no change would be made in the operation of the charging device of Matsuki. This is in contrast to the claimed invention, where a wireless feedback control signal would be transmitted to control the operation of the claimed external contact-less charging device. Accordingly, Matsuki fails to teach the cited aspect of claim 1. Patent Owner cannot locate any teachings in Kaite that cure this deficiency in Matsuki.

Furthermore, the proposed combination of Chung-Sik and Matsuki fails to disclose "wherein the monitoring result includes a wireless feedback control signal to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device." That is, none of the cited references disclose the feedback power adjustment control.

MPEP § 2143.01 states "[t]he mere fact that references can be combined or modified does not render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417, 82 USPQ2d 1385, 1396 (2007)." MPEP § 2143.02 states "[w]here there is a reason to modify or combine the prior art to achieve the claimed invention, the claims may be rejected as prima facie obvious provided there is also a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986)." For reasons including those stated above, Patent Owner notes that the proposed combination of Chung-Sik, Kaite, and/or Matsuki does not support the rejection of claim 1, as the results of the proposed combination would not have been predictable to one of ordinary skill in the art, would not have a reasonable expectation of success, and change the principle of operation of the system disclosed in Chung-Sik in violation of the MPEP and case law precedent.

For reasons including those stated above, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 1 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 1. Therefore, Patent Owner submits the rejection of claim 1 should be withdrawn.

Claims 3-6 and 25-29 depend from claim 1. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

e. Rejection of Claims 7-12 and 30-34

The Final Office Action states claim 7 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 26). Patent Owner disagrees. One element of claim 7 reads "wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 7 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 7. Therefore, Patent Owner submits the rejection of claim 7 should be withdrawn.

Claims 8-12 and 30-34 depend from claim 7. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

f. Rejection of Claims 13-20, 35, and 37-39

The Final Office Action states claim 13 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 36). Patent Owner disagrees. One element of claim 13 reads "wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 13 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 13. Therefore, Patent Owner submits the rejection of claim 13 should be withdrawn.

Claims 14-20, 35, and 37-39 depend from claim 13. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

g. Rejection of Claims 21, 22, and 40-44

The Final Office Action states claim 21 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 44). Patent Owner disagrees. One element of claim 21 reads "wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less

chargeable battery and the contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 21 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 21. Therefore, Patent Owner submits the rejection of claim 21 should be withdrawn.

Claims 22 and 40-44 depend from claim 21. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

h. Rejection of Claims 23, 24, and 45-48

The Final Office Action states claim 23 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 52). Patent Owner disagrees. One element of claim 23 reads "wherein the adjusting the power of the high frequency AC current applied to the primary coil is based on relative positions of the contact-less chargeable battery and the contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 23 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 23. Therefore, Patent Owner submits the rejection of claim 23 should be withdrawn.

Claims 24 and 45-48 depend from claim 23. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

i. Rejection of Claims 49-54

The Final Office Action states claim 49 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 79). Patent Owner disagrees. One element of claim 49 reads "wherein the microprocessor transmits the monitoring result to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device to solve an overvoltage state according to relative positions of the primary coil and the secondary coil." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 49 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki

fails to support a *prima facie* obviousness rejection of claim 49. Therefore, Patent Owner submits the rejection of claim 49 should be withdrawn.

Claims 50-54 depend from claim 49. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

j. Rejection of Claims 55-59

The Final Office Action states claim 55 is rejected under 35 U.S.C. § 102 as anticipated by Chung-Sik and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite. (Final Office Action, p. 124). Patent Owner disagrees. Claim 55 reads, in part "wherein the at least one microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting a power applied to the primary coil by up to a predetermined level" and "wherein the at least one microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the power applied to the primary coil by up to the predetermined level." Chung-Sik discloses:

> When the temperature is determined to be normal in operation 106, the first microcomputer 48 scans the input port P3 and searches for the status of the charge switch 30 in the process of operation 108. In operation 108, when the charge switch 30 is switched "off" and the hand-set status signal (HSS) is input as "high", the portable device 18 is determined to be separated and the aforementioned operation 112 is performed. In operation 108, when the charge switch 30 is turned "on", the first microcomputer 48 analyzes the data input to line 49 in operation 110 and searches whether or not the portable device is normal. In this case, the data input to the line 49 is input as data that is wirelessly transmitted from the portable device 18 when the battery 32 is completely charged. If analysis of input data in operation 110 indicates the portable device is abnormal (i.e. charge is incomplete), the first microcomputer 48 jumps to the aforementioned step 106 to continuously generate a charge voltage, and when the portable device is normal, the first microcomputer 48 jumps to operation 112 to stop charging. (Chung-Sik, p. 8-5, lines 22 - 30).

Patent Owner submits that Chung-Sik fails to teach the cited aspects of claim 55. Chung-Sik discloses stopping charging when the battery 32 is completely charged. This does not teach, suggest, or constitute "a first charging power adjustment request [...] for adjusting a power applied to the primary coil by up to a predetermined level." Stopping charging when a battery is completely charged as disclosed in Chung-Sik does not teach, suggest, or constitute "adjusting a power applied to the primary coil by up to a predetermined level" as in claim 55. Specifically, when charging is

stopped, power is not being applied to the battery. Therefore, stopping the charging as disclosed in Chung-Sik does not constitute "adjusting a power applied to the primary coil" as in claim 55. Patent Owner cannot locate any teachings in Kaite that cure this deficiency in Chung-Sik.

Further, Chung-Sik does not teach, suggest, or disclose "a second charging power adjustment request signal [...] for adjusting the power applied to the primary coil by up to the predetermined level." Even under the (incorrect) interpretation that the first adjustment request signal adjusting the power applied to the primary coil up to a predetermined level is disclosed by stopping charging when a battery is completely charged, Chung-Sik does not teach, suggest, or constitute a *second* adjustment. Chung-Sik discloses two charging modes - on and off. Once the charging has stopped, a second adjustment to the power cannot be made as there is no power to adjust. Therefore, Chung-Sik does not teach the cited aspect of claim 55. Patent Owner cannot locate any teachings in Kaite that cure this deficiency in Chung-Sik.

For reasons including those stated above, Chung-Sik and Kaite, either alone or in combination, fail to teach all aspects of claim 55 and the proposed combination of Chung-Sik and Kaite fails to support a *prima facie* obviousness rejection of claim 55. Therefore, Patent Owner submits the rejection of claim 55 should be withdrawn.

Claims 56-59 depend from claim 55. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

k. Rejection of Claims 60-64

The Final Office Action states claim 60 is rejected under 35 U.S.C. § 102 as anticipated by Chung-Sik and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite. (Final Office Action, p. 135). Patent Owner disagrees. Claim 60 reads, in part, "wherein the microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device by up to a predetermined level" and "wherein the microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device by up to the predetermined level." For reasons including those stated above with respect to claim 55, Chung-Sik and Kaite either alone or in combination, fail to teach all aspects of claim 60 and the proposed combination of Chung-Sik and Kaite fails to support a *prima facie* obviousness rejection of claim 60. Therefore, Patent Owner submits the rejection of claim 60 should be withdrawn.

Claims 61-64 depend from claim 60. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

l. Rejection of Claim 65

The Final Office Action states claim 65 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 93). Patent Owner disagrees. One element of claim 65 reads "wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 65 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 65. Therefore, Patent Owner submits the rejection of claim 65 should be withdrawn.

m. Rejection of Claim 66

The Final Office Action states claim 66 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 97). Patent Owner disagrees. One element of claim 66 reads "wherein the secondary coil is movable relative to the primary coil during the charging of the battery cell by the contact-less charging circuit module, and wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting the intensity of the magnetic field." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 66 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 66. Therefore, Patent Owner submits the rejection of claim 66 should be withdrawn.

n. Rejection of Claim 68

The Final Office Action states claim 68 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 102). Patent Owner disagrees. One element of claim 68 reads "wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting a power

applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 68 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 68. Therefore, Patent Owner submits the rejection of claim 68 should be withdrawn.

o. Rejection of Claims 69-73

The Final Office Action states claim 69 is rejected under 35 U.S.C. § 102 as anticipated by Chung-Sik and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite. (Final Office Action, p. 144). Patent Owner disagrees. One element of claim 69 reads "wherein the monitoring result is a charging power adjustment request signal." For reasons including those stated above with respect to claim 55, Chung-Sik and Kaite, either alone or in combination, fail to teach all aspects of claim 69 and the proposed combination of Chung-Sik and Kaite fails to support a *prima facie* obviousness rejection of claim 69. Therefore, Patent Owner submits the rejection of claim 69 should be withdrawn.

Claims 70 - 73 depend from claim 69. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

p. Rejection of Claim 74

The Final Office Action states claim 74 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 107). Patent Owner disagrees. One element of claim 74 reads "wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 74 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 74. Therefore, Patent Owner submits the rejection of claim 74 should be withdrawn.

q. Rejection of Claim 75

The Final Office Action states claim 75 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-

Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 111). Patent Owner disagrees. One element of claim 75 reads "wherein the change of intensity of the magnetic field includes a change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less charging circuit module and the external contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 75 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 75. Therefore, Patent Owner submits the rejection of claim 75 should be withdrawn.

6. Conclusion

In view of the foregoing remarks, it is respectfully submitted that this application is in condition for allowance. Accordingly, reconsideration of the application and allowance of the claims are respectfully requested. Although the present paper may include a combination of alterations to the application or claims, or characterizations of claim scope or referenced art, Patent Owner is not conceding that previously pending claims in this application are not patentable over the cited references. Rather, any alterations and/or characterizations are made strictly to facilitate prosecution of this reexamination. As such, reviewers of this or any parent, child, or related prosecution history shall not reasonably infer that Patent Owner has made any disclaimers or disavowals of any subject matter supported by the present application. Patent Owner has submitted amendments and arguments believed to be sufficient to overcome all of the outstanding rejections.

Consequently, Patent Owner has not advanced every argument for the allowability of the claims over the references of record. As such, Patent Owner does not acquiesce to any of the statements or characterizations not specifically traversed. If the Examiner should have any remaining questions or objections, a telephone interview to discuss and resolve these issues is respectfully requested.

The Commissioner is hereby authorized to charge Deposit Account No. 02-1818 for any fees which are due and owing. If such a withdrawal is made, please indicate the Attorney Docket No. 0313071.00020 on the account statement.

Respectfully submitted,
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AMENDMENTS TO THE CLAIMS

Claim 1 (Twice Amended): A contact-less chargeable battery including a charging circuit for charging an electric energy to a battery cell, the contact-less chargeable battery comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit [for] that includes first and second voltage detectors respectively detecting first and second voltages at both ends of the constant voltage/constant current supplier and a microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result includes a wireless feedback control signal to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device.

Claim 2 (Cancelled).

Claim 3 (Thrice Amended): The contact-less chargeable battery according to claim 1, wherein:

the overvoltage monitoring unit includes:

a wireless transmitting unit for wirelessly propagating the monitoring result through an antenna; and

[first and second voltage detectors for respectively detecting voltages at front and rear ends of the constant voltage/constant current supplier;]

a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and [outputs] outputting a voltage comparison result;[and]

the [a] microprocessor [for outputting a] outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 4 (Twice Amended): The contact-less chargeable battery according to claim 3, wherein [a] the magnetic field generated by the external contact-less charging device is generated intermittently,

wherein the microprocessor [overvoltage monitoring unit further includes a charging pause detecting unit for receiving the high frequency AC current output from the high frequency AC current inducing unit to detect] receives an end time point signal indicating a time point when the induction of high frequency AC current ends,[and then outputting the end time point to the microprocessor, and] wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 5 (Original): The contact-less chargeable battery according to claim 1, wherein the monitoring result is a charging power adjustment request signal.

Claim 6 (Original): The contact-less chargeable battery according to claim 1, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values of both ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 7 (Twice Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by[means of] a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

[an overvoltage monitoring unit for] a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device[by means of wireless communication] so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 8 (Amended): The contact-less charging circuit module according to claim 7, wherein the high frequency AC current inducing unit is a coil to which a magnetic flux of [a] the magnetic field generated from the external contact-less charging device is linked.

Claim 9 (Thrice Amended): The contact-less charging circuit module according to claim 7,[wherein the overvoltage monitoring unit includes] further comprising:

[a wireless transmitting unit for wirelessly propagating the monitoring result through]an antenna;

first and second voltage detectors for respectively detecting first and second voltages at front and rear ends of the constant voltage/constant current supplier; and

a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and [outputs] outputting a voltage comparison result, [;] and

wherein the [a] microprocessor [for outputting a] outputs the monitoring result according to the voltage comparison result[to the wireless transmitting unit] using the antenna.

Claim 10 (Twice Amended): The contact-less charging circuit module according to claim 9, wherein [a] the magnetic field generated by the external contact-less charging device is generated intermittently,

wherein the[overvoltage monitoring unit further includes a charging pause detecting unit for receiving the high frequency AC current output from the high frequency AC current inducing unit to detect] microprocessor receives a time point indicating when the induction of high frequency AC current ends, and then [outputting] outputs the end time point to the microprocessor, and

wherein the monitoring result is wirelessly transmitted to the external contact-less charging device[by means of wireless communication] while a high frequency AC current is not induced after the end time point is input.

Claim 11 (Amended): The contact-less charging circuit module according to claim [1] 7, wherein the monitoring result is a charging power adjustment request signal.

Claim 12 (Amended): The contact-less charging circuit module according to claim [1] 7, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 13 (Twice Amended): A contact-less charging device for transmitting a charging power by[means of] electromagnetic induction[phenomenon] to a contact-less chargeable battery that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode and wirelessly transmits a monitoring result for voltages at both ends of the constant voltage/constant current supplier, the contact-less charging device comprising:

a magnetic field generating unit for receiving an AC current and forming a magnetic field in an outer space;

a high frequency power driving unit for applying a high frequency AC current to the magnetic field generating unit; and

a[charging power adjusting unit for] microprocessor wirelessly receiving the monitoring result from the contact-less chargeable battery[by means of wireless communication] and

controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that [a] the charging power transmitted to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 14 (Original): The contact-less charging device according to claim 13, wherein the magnetic field generating unit is a coil to both sides of which a high frequency AC current is applied.

Claim 15 (Twice Amended): The contact-less charging device according to claim 13, [wherein the charging power adjusting unit includes]further comprising:

[a wireless receiving unit for wirelessly receiving the monitoring result through]an antenna coupled to the microprocessor and used to receive the monitoring result.[; and

a microprocessor for receiving the monitoring result from the wireless receiving unit and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit.]

Claim 16 (Twice Amended): The contact-less [chargeable battery] charging device according to claim 15, further comprising a [constant voltage supplier for] power supply [converting] receiving a common AC current, converting the common AC current into a DC current, and then supplying a constant-voltage current to the high frequency power driving unit, wherein the high frequency power driving unit includes:

a pulse signal generator for receiving a pulse driving signal from the microprocessor and outputting a pulse signal; and

a power driving part for receiving the pulse signal to rapidly switch the constant-voltage current input from the constant voltage supplier, thereby generating a high frequency AC current in a pulse pattern.

Claim 17 (Twice Amended): The contact-less charging device according to claim 16, wherein the[charging power adjusting unit] microprocessor adjusts [a] the charging power by modulating a width of a pulse current, a frequency of the pulse current, an amplitude of a pulse, or [the] a number of pulses.

Claim 18 (Amended): The contact-less charging device according to claim 16, wherein the [constant voltage supplier] power supply includes:

an overvoltage filter for receiving a common AC current and intercepting an overvoltage current;

a rectifier for rectifying the AC current passing through the filter to convert the AC current into a DC current; and

a constant voltage [supplying part for receiving] supplier that receives the converted DC current and outputs a constant voltage current.

Claim 19 (Amended): The contact-less charging device according to claim 13, wherein the high frequency power driving unit intermittently applies a high frequency AC current to the magnetic field generating unit, and

wherein the[charging power adjusting unit] microprocessor receives the monitoring result while a high frequency AC current is not applied to the magnetic field generating unit.

Claim 20 (Original): The contact-less charging device according to claim 13, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 21 (Twice Amended): A battery charging set including a contact-less chargeable battery and a contact-less charging device,

wherein the contact-less chargeable battery includes:

a high frequency AC current inducing unit to which a high frequency AC current is induced by[means of] a magnetic field intermittently generated from an external contactless charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to a battery cell in a constant voltage/constant current mode; and

[an overvoltage monitoring unit for] a first microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device[by means of wireless communication] while a high frequency AC current is not induced,

wherein the contact-less charging device includes:

a magnetic field generating unit for receiving an AC current and forming [a] the magnetic field in an outer space;

a high frequency power driving unit for intermittently applying a high frequency AC current to the magnetic field generating unit; and

a second microprocessor [charging power adjusting unit for], while a high frequency AC current is not applied to the magnetic field generating unit, wirelessly receiving the monitoring result[by means of wireless communication] and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that a charging power transmitted from the contact-less charging device to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 22 (Original): The battery charging set according to claim 21, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 23 (Twice Amended): A method for controlling charging of a contact-less chargeable battery using a contact-less charging device by[means of] electromagnetic induction[phenomenon], the method comprising:

(a) intermittently applying a high frequency AC current to a primary coil provided to the charging device so as to intermittently generate a magnetic field in an outer region;

(b) linking a magnetic flux of the generated magnetic field to a secondary coil provided to the battery so as to intermittently output an electromagnetically-induced high frequency AC current;

(c) rectifying the output high frequency AC current to be converted into a DC current;

(d) applying the DC current to a battery cell through a constant voltage/constant current supplier so as to charge the battery cell in a constant voltage/constant current mode;

(e) monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the charging device[by means of wireless communication] while a high frequency AC current is not induced in the secondary coil; and

(f) adjusting a power of the high frequency AC current applied to the primary coil according to the transmitted monitoring result,

wherein the adjusting the power of the high frequency AC current applied to the primary coil is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Clam 24 (Original): The method according to claim 23, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 25 (New, Amended): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 26 (New, Amended): The contact-less chargeable battery according to claim 1, wherein the microprocessor controls, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 27 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 28 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 29 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 30 (New, Amended): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 31 (New, Amended): The contact-less charging circuit module according to claim 7, wherein the microprocessor controls, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 32 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 33 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 34 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 35 (New): The contact-less chargeable battery according to claim 13, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 36 (Cancelled).

Claim 37 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier has a front end and a rear end, and wherein the constant voltage/constant current supplier receives a DC current from a rectifier at the front end and supplies a charging power at the rear end.

Claim 38 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier charges the battery in a constant current mode at an initial charging stage and then charges the battery in a constant voltage mode at a later charging stage.

Claim 39 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier charges the battery in a constant voltage mode based on a charging voltage of the battery exceeding a predetermined level.

Claim 40 (New, Amended): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 41 (New, Amended): The battery charging set according to claim 21, wherein the microprocessor controls, through wireless feedback control of charging the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 42 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 43 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 44 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 45 (New): The method of claim 23, further comprising:

receiving, by the constant voltage/constant current supplier, the DC current at a front end of the constant voltage/constant current supplier; and

supplying, by the constant voltage/constant current supplier, the DC current at a rear end of the constant voltage/constant current supplier to the battery cell.

Claim 46 (New): The method of claim 23, further comprising:

supplying, by the constant voltage/constant current supplier, the DC current to the battery cell in a constant current mode during an initial charging stage and then in a constant voltage mode at a later charging stage.

Claim 47 (New): The method of claim 23, further comprising:

charging, by the constant voltage/constant current supplier, the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 48 (New, Amended): The method of claim 23, further comprising:

controlling, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing a change of intensity of the magnetic field.

Claim 49 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage; and

an overvoltage monitoring unit that includes first and second voltage detectors respectively detecting voltages at both ends of the constant voltage/constant current supplier, and a microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the microprocessor transmits the monitoring result to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device to solve an overvoltage state according to relative positions of the primary coil and the secondary coil.

Claim 50 (New): The contact-less charging circuit module according to claim 49, wherein a magnetic flux of the magnetic field generated from the external contact-less charging device is linked to the secondary coil of the high frequency AC current inducing unit.

Claim 51 (New, Amended): The contact-less charging circuit module according to claim 49, wherein:

the overvoltage monitoring unit further comprises:

a wireless transmitting unit wirelessly propagating the monitoring result through an antenna; and

a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

the microprocessor outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 52 (New): The contact-less charging circuit module according to claim 51, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the overvoltage monitoring unit further includes a charging pause detecting unit receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, and

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 53 (New): The contact-less charging circuit module according to claim 49, wherein the monitoring result is a charging power adjustment request signal.

Claim 54 (New): The contact-less charging circuit module according to claim 49, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 55 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier that includes circuitry controlled by at least one microprocessor, the constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage; and

an overvoltage monitoring unit that includes a wireless transmitter, first and second voltage detectors respectively detecting voltages at both ends of the constant voltage/constant current supplier, and the at least one microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the

external contact-less charging device using the wireless transmitter so as to induce a change of intensity of the magnetic field,

wherein the at least one microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting a power applied to the primary coil by up to a predetermined level,

wherein the at least one microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the power applied to the primary coil by up to the predetermined level.

Claim 56 (New): The contact-less charging circuit module according to claim 55, wherein at least one of the first charging power adjustment request signal and the second charging power adjustment request signal is based on relative positions of the primary coil and the secondary coil.

Claim 57 (New, Amended): The contact-less charging circuit module according to claim 55, wherein the wireless transmitter wirelessly propagates the monitoring result through an antenna,

wherein the overvoltage monitoring unit includes a voltage comparator comparing first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

wherein the at least one microprocessor outputs the monitoring result according to the voltage comparison result to the wireless transmitter.

Claim 58 (New, Amended): The contact-less charging circuit module according to claim 55, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the microprocessor receives an indication of a time point when the induction of high frequency AC current ends, and

wherein the monitoring result is wirelessly transmitted to the external contact-less charging device while a high frequency AC current is not induced after the end time point is input.

Claim 59 (New): The contact-less charging circuit module according to claim 55, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 60 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for receiving a charging power from an external contact-less charging device and charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by a magnetic field generated from the external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

a microprocessor monitoring the voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device so as to induce a change of intensity of the magnetic field,

wherein the microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device by up to a predetermined level, and

wherein the microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device by up to the predetermined level.

Claim 61 (New): The contact-less charging circuit module according to claim 60, wherein at least one of the first charging power adjustment request signal and the second charging power adjustment request signal is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 62 (New, Amended): The contact-less charging circuit module according to claim 60, wherein the overvoltage monitoring unit includes:

an antenna;

first and second voltage detectors respectively detecting first and second voltages at front and rear ends of the constant voltage/constant current supplier; and

a voltage comparator comparing the first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

wherein the microprocessor outputs the monitoring result according to the voltage comparison result using the antenna.

Claim 63 (New, Amended): The contact-less charging circuit module according to claim 60, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the microprocessor receives an indication of a time point when the induction of high frequency AC current ends, and

wherein the monitoring result is wirelessly transmitted to the external contact-less charging device while a high frequency AC current is not induced after the end time point is input.

Claim 64 (New): The contact-less charging circuit module according to claim 60, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 65 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting unit transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 66 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit including a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting unit transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the secondary coil is movable relative to the primary coil during the charging of the battery cell by the contact-less charging circuit module, and

wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting the intensity of the magnetic field.

Claim 67 (Cancelled).

Claim 68 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit including a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit detecting first and second voltages at both ends of the constant voltage/constant current supplier, monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device.

Claim 69 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit for monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result is a charging power adjustment request signal.

Claim 70 (New): The contact-less charging circuit module according to claim 69, wherein the high frequency AC current inducing unit is a coil to which a magnetic flux of the magnetic field generated from the external contact-less charging device is linked.

Claim 71 (New): The contact-less charging circuit module according to claim 69, wherein the overvoltage monitoring unit includes:

a wireless transmitting unit for wirelessly propagating the monitoring result through an antenna;

first and second voltage detectors for respectively detecting voltages at front and rear ends of the constant voltage/constant current supplier;

a voltage comparator for comparing first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result; and

a microprocessor for outputting the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 72 (New): The contact-less charging circuit module according to claim 71, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the overvoltage monitoring unit further includes a charging pause detecting unit for receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, and

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 73 (New): The contact-less charging circuit module according to claim 69, wherein the charging power adjustment request signal is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 74 (New): A contact-less charging device for transmitting a charging power by means of electromagnetic induction phenomenon to a contact-less chargeable battery that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode and wirelessly transmits a monitoring result for voltages at both ends of the constant voltage/constant current supplier, the contact-less charging device comprising:

a magnetic field generating unit for receiving an AC current and forming a magnetic field in an outer space;

a high frequency power driving unit for applying a high frequency AC current to the magnetic field generating unit; and

a charging power adjusting unit that includes: a wireless receiving unit receiving the monitoring result from the contact-less chargeable battery by means of wireless communication, and a microprocessor controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that the charging power transmitted to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 75 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes a microprocessor, the microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field includes a change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Owner:	LS CABLE & SYSTEM LTD.
Reexam Control No.:	96/000,355
Conf. No.:	1538
Art Unit:	3992
Examiner:	Anjan K Deb
Attorney Docket No.:	0313071.00020
Reexam Filing Date:	March 12, 2021
Patent Under Reexam:	8,013,568
Title:	CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF

Mail Stop *Ex Parte* Reexam
Central Reexamination Unit
Commissioner for Patents
United States Patent & Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

AFTER FINAL RESPONSE TO FINAL OFFICE ACTION

This Response is submitted in reply to the Final Office Action dated March 3, 2022. The Patent Owner respectfully requests entry of the following amendments and consideration of the following:

Amendments to the Claims reflected in the listing of claims beginning on page 2 of this paper; and

Remarks/Arguments beginning on page 24 of this paper.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
96/000,355	03/12/2021	8013568	0313071.00020	1538

24573 7590 05/13/2022

K&L Gates LLP-Chicago
P.O. Box 1135
Chicago, IL 60690

EXAMINER	
DEB, ANJAN K	

ART UNIT	PAPER NUMBER
3992	

MAIL DATE	DELIVERY MODE
05/13/2022	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice Of Defective Paper In Ex Parte Reexamination Patent Owner Requested	Control Number	Patent Under Reexamination	
	96/000,355	8013568	
	Examiner	Art Unit	AIA (FITF) Status
	ANJAN K DEB	3992	No

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address.--

1. ☐ The paper filed on _____ is unsigned. A duplicate paper or ratification, properly signed, is required within TWO (2) MONTHS from the mailing date of this letter. Failure to comply with this requirement will result in the paper not being considered. If the failure to comply results in a patent owner failure to file a timely and appropriate response to any Office action or any written statement of an interview required under 37 CFR1.560(b), the prosecution of the reexamination proceeding will be terminated under 37 CFR 1.550(d).

2. ☐ The paper filed on _____ is signed by _____, who is not of record. A duplicate paper or ratification signed by a person of record, a person made of record by way of a new power of attorney, is required within TWO (2) MONTHS from the mailing date of this letter. Failure to comply with this requirement will result in the paper not being considered. If the failure to comply results in a patent owner failure to file a timely and appropriate response to any Office action or any written statement of an interview required under 1.560(b), the prosecution of the reexamination proceeding will be terminated under 37 CFR 1.550(d).

3. ☑ The Amendment filed on 02 May 2022 does not comply with 37 CFR 1.530(d)-(j). Patent owner is given TWO (2) MONTHS from the mailing date of this letter to correct this informality; otherwise, the prosecution of the the reexamination proceeding will be terminated under (37 CFR 1.550(d)).

4. ☐ The amendment filed by patent owner on _____ , does not comply with 37 CFR ☐1.20(c)(3) and/or ☐ 1.20(c)(4), as to excess claim fees. Patent owner is given a time period of TWO (2) MONTHS from the mailing date of this letter to correct this fee deficiency, or the prosecution of the reexamination proceeding will be terminated under 37 CFR 1.550(d), to effect the abandonment set forth in 37 CFR 1.20(c)(5).

5. ☑ Other:

Claims 1, 3, 4, 7, 9, 10, 13, 15, 17, 19, 21, 23, 26, 31, 41, 49, 51, 55, 57, 58, 60, 62, 63, 66, 68, and 75 are amended. Patent Owner did not provide markup of changes in the amended claims with respect to previous version of the claims and failed to provide an explanation of the support in the disclosure of the patent for the changes to the claims made by the amendment paper as required under 37 C.F.R. 1.530(e).

NOTE: EXTENSIONS OF TIME ARE GOVERNED BY 37 CFR 1.550(c). See 37 CFR 1.550(c)(1) and (c)(3).

/ANJAN K DEB/
Primary Examiner, Art Unit 3992

Electronic Acknowledgement Receipt	
EFS ID:	45776556
Application Number:	96000355
International Application Number:	
Confirmation Number:	1538
Title of Invention:	CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF
First Named Inventor/Applicant Name:	8013568
Customer Number:	24573
Filer:	Matthew S. Dicke/Meg Boinski
Filer Authorized By:	Matthew S. Dicke
Attorney Docket Number:	0313071.00020
Receipt Date:	23-MAY-2022
Filing Date:	12-MAR-2021
Time Stamp:	13:20:26
Application Type:	Supplemental Examination
Patent Number:	

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1		0313071-00020_SupplRespFinal_Re-Exam.pdf	468702 a773a74c1349594199344222750972 7c5b758bf9	yes	74

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Supplemental Response or Supplemental Amendment	1	1
	Claims	2	22
	Applicant Arguments/Remarks Made in an Amendment	23	52
	Claims	53	74

Warnings:	
Information:	
Total Files Size (in bytes):	468702

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
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If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

EXHIBIT A

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AMENDMENTS TO THE CLAIMS

Claim 1 (Twice Amended): A contact-less chargeable battery including a charging circuit for charging an electric energy to a battery cell, the contact-less chargeable battery comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from ~~[~~a primary coil of an~~]~~ ~~the~~ external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit [for] that includes ~~a microprocessor monitoring~~first and second voltage detectors respectively detecting first and second voltages at both ends of the constant voltage/constant current supplier and a microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result includes a wireless feedback control signal to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device.

Claim 2 (Cancelled).

Claim 3 (Thrice Amended): The contact-less chargeable battery according to claim 1, wherein:

the overvoltage monitoring unit includes:

a wireless transmitting unit for wirelessly propagating the monitoring result through an antenna; and

[first and second voltage detectors for respectively detecting ~~first and second~~ voltages at front and rear ends of the constant voltage/constant current supplier~~; and~~;]

a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and [outputs] outputting a voltage comparison result~~, [;],~~ and

~~wherein~~ the [a] microprocessor [for outputting a] outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 4 (Twice Amended): The contact-less chargeable battery according to claim 3, wherein [a] the magnetic field generated by the external contact-less charging device is generated intermittently,

wherein the microprocessor [overvoltage monitoring unit further includes a charging pause detecting unit ~~[~~for receiving~~]~~ ~~that receives~~ the high frequency AC current output from the high frequency AC current inducing unit to detect] receives an end time point signal indicating a time point when the induction of high frequency AC current ends~~;~~,[and then ~~[~~outputting~~]~~ ~~outputs~~ the end time point to the microprocessor, and] wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 5 (Original): The contact-less chargeable battery according to claim 1, wherein the monitoring result is a charging power adjustment request signal.

Claim 6 (Original): The contact-less chargeable battery according to claim 1, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values of both ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 7 (Twice Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by[means of] a magnetic field generated from ~~[an]~~ ~~the~~ external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

[an overvoltage monitoring unit ~~[~~for]~~ that includes~~ a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device[by means of wireless communication] so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 8 (Amended): The contact-less charging circuit module according to claim 7, wherein the high frequency AC current inducing unit is a coil to which a magnetic flux of [a] the magnetic field generated from the external contact-less charging device is linked.

Claim 9 (Thrice Amended): The contact-less charging circuit module according to claim 7~~,~~,[wherein the overvoltage monitoring unit includes] further comprising:

[a wireless transmitting unit for wirelessly propagating the monitoring result through]an antenna;

first and second voltage detectors for respectively detecting first and second voltages at front and rear ends of the constant voltage/constant current supplier; and

a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and [outputs] outputting a voltage comparison result, [;] and

wherein the [a] microprocessor [for outputting a] outputs the monitoring result according to the voltage comparison result[to the wireless transmitting unit] using the antenna.

Claim 10 (Twice Amended): The contact-less charging circuit module according to claim 9, wherein [a] the magnetic field generated by the external contact-less charging device is generated intermittently,

wherein the[overvoltage monitoring unit further includes a charging pause detecting unit ~~[for]~~ receiving the high frequency AC current output from the high frequency AC current inducing unit to detect] microprocessor receives a time point indicating when the induction of high frequency AC current ends, and then [outputting] outputs the end time point to the microprocessor, and

wherein the monitoring result is wirelessly transmitted to the external contact-less charging device[by means of wireless communication] while a high frequency AC current is not induced after the end time point is input.

Claim 11 (Amended): The contact-less charging circuit module according to claim [1] 7, wherein the monitoring result is a charging power adjustment request signal.

Claim 12 (Amended): The contact-less charging circuit module according to claim [1] 7, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 13 (Twice Amended): A contact-less charging device for transmitting a charging power by[means of] electromagnetic induction[phenomenon] to a contact-less chargeable battery that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode and wirelessly transmits a monitoring result for voltages at both ends of the constant voltage/constant current supplier, the contact-less charging device comprising:

a magnetic field generating unit for receiving an AC current and forming a magnetic field in an outer space;

a high frequency power driving unit for applying a high frequency AC current to the magnetic field generating unit; and

a[charging power adjusting unit for] microprocessor wirelessly receiving the monitoring result from the contact-less chargeable battery[by means of wireless communication] and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that [a] the charging power transmitted to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 14 (Original): The contact-less charging device according to claim 13, wherein the magnetic field generating unit is a coil to both sides of which a high frequency AC current is applied.

Claim 15 (Twice Amended): The contact-less charging device according to claim 13, [wherein the charging power adjusting unit includes]further comprising:

[a wireless receiving unit for wirelessly receiving the monitoring result through]an antenna~~;~~ coupled to the microprocessor and used to receive the monitoring result.[; and

a microprocessor for receiving the monitoring result from the wireless receiving unit and controlling the high frequency power driving unit to adjust ~~[a]~~ ~~the~~ power of the high frequency AC current applied to the magnetic field generating unit~~.~~.]

Claim 16 (Twice Amended): The contact-less [chargeable battery] charging device according to claim 15, further comprising a [constant voltage supplier for] power supply [converting] receiving a common AC current, converting the common AC current into a DC current, and then supplying a constant-voltage current to the high frequency power driving unit, wherein the high frequency power driving unit includes:

a pulse signal generator for receiving a pulse driving signal from the microprocessor and outputting a pulse signal; and

a power driving part for receiving the pulse signal to rapidly switch the constant-voltage current input from the constant voltage supplier, thereby generating a high frequency AC current in a pulse pattern.

Claim 17 (Twice Amended): The contact-less charging device according to claim 16, wherein the[charging power adjusting unit] microprocessor adjusts [a] the charging power by modulating a width of a pulse current, a frequency of the pulse current, an amplitude of a pulse, or [the] a number of pulses.

Claim 18 (Amended): The contact-less charging device according to claim 16, wherein the [constant voltage supplier] power supply includes:

an overvoltage filter for receiving a common AC current and intercepting an overvoltage current;

a rectifier for rectifying the AC current passing through the filter to convert the AC current into a DC current; and

a constant voltage [supplying part for receiving] supplier that receives the converted DC current and outputs a constant voltage current.

Claim 19 (Amended): The contact-less charging device according to claim 13, wherein the high frequency power driving unit intermittently applies a high frequency AC current to the magnetic field generating unit, and

wherein the[charging power adjusting unit] microprocessor receives the monitoring result while a high frequency AC current is not applied to the magnetic field generating unit.

Claim 20 (Original): The contact-less charging device according to claim 13, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 21 (Twice Amended): A battery charging set including a contact-less chargeable battery and a contact-less charging device,

wherein the contact-less chargeable battery includes:

a high frequency AC current inducing unit to which a high frequency AC current is induced by[means of] a magnetic field intermittently generated from an external contactless charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to a battery cell in a constant voltage/constant current mode; and

[an overvoltage monitoring unit [for] ~~that includes~~ a first microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device[by means of wireless communication] while a high frequency AC current is not induced,

wherein the contact-less charging device includes:

a magnetic field generating unit for receiving an AC current and forming [a] the magnetic field in an outer space;

a high frequency power driving unit for intermittently applying a high frequency AC current to the magnetic field generating unit; and

a second microprocessor [charging power adjusting unit for~~,~~], while a high frequency AC current is not applied to the magnetic field generating unit, wirelessly receiving the monitoring result[by means of wireless communication] and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that a charging power transmitted from the contact-less charging device to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 22 (Original): The battery charging set according to claim 21, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 23 (Twice Amended): A method for controlling charging of a contact-less chargeable battery using a contact-less charging device by[means of] electromagnetic induction[phenomenon,], the method comprising:

(a) intermittently applying a high frequency AC current to a primary coil provided to the charging device so as to intermittently generate a magnetic field in an outer region;

(b) linking a magnetic flux of the generated magnetic field to a secondary coil provided to the battery so as to intermittently output an electromagnetically-induced high frequency AC current;

(c) rectifying the output high frequency AC current to be converted into a DC current;

(d) applying the DC current to a battery cell through a constant voltage/constant current supplier so as to charge the battery cell in a constant voltage/constant current mode;

(e) monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the charging device[by means of wireless communication] while a high frequency AC current is not induced in the secondary coil; and

(f) adjusting a power of the high frequency AC current applied to the primary coil according to the transmitted monitoring result,

wherein the adjusting the power of the high frequency AC current applied to the primary coil is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Clam 24 (Original): The method according to claim 23, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 25 (New, Amended): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 26 (New, Amended): The contact-less chargeable battery according to claim 1, wherein the ~~overvoltage monitoring unit~~microprocessor controls, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 27 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 28 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 29 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 30 (New, Amended): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 31 (New, Amended): The contact-less charging circuit module according to claim 7, wherein the ~~overvoltage monitoring unit~~microprocessor controls, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 32 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 33 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 34 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 35 (New): The contact-less chargeable battery according to claim 13, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 36 (Cancelled).

Claim 37 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier has a front end and a rear end, and wherein the constant voltage/constant current supplier receives a DC current from a rectifier at the front end and supplies a charging power at the rear end.

Claim 38 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier charges the battery in a constant current mode at an initial charging stage and then charges the battery in a constant voltage mode at a later charging stage.

Claim 39 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier charges the battery in a constant voltage mode based on a charging voltage of the battery exceeding a predetermined level.

Claim 40 (New, Amended): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 41 (New, Twice Amended): The battery charging set according to claim 21, wherein the ~~overvoltage monitoring unit~~microprocessor controls, through wireless feedback control of charging the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 42 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 43 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 44 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 45 (New): The method of claim 23, further comprising:

receiving, by the constant voltage/constant current supplier, the DC current at a front end of the constant voltage/constant current supplier; and

supplying, by the constant voltage/constant current supplier, the DC current at a rear end of the constant voltage/constant current supplier to the battery cell.

Claim 46 (New): The method of claim 23, further comprising:

supplying, by the constant voltage/constant current supplier, the DC current to the battery cell in a constant current mode during an initial charging stage and then in a constant voltage mode at a later charging stage.

Claim 47 (New): The method of claim 23, further comprising:

charging, by the constant voltage/constant current supplier, the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 48 (New, Amended): The method of claim 23, further comprising:

controlling, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing a change of intensity of the magnetic field.

Claim 49 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage; and

an overvoltage monitoring unit that includes ~~a wireless transmitting unit,~~ first and second voltage detectors respectively detecting voltages at both ends of the constant voltage/constant current supplier, and a microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication ~~through the wireless transmitting unit~~ so as to induce a change of intensity of the magnetic field,

wherein the microprocessor transmits the monitoring result to induce the change of intensity of the magnetic field ~~is based on~~by adjusting a power applied to the primary coil of the external contact-less charging device to solve an overvoltage state according to relative positions of the primary coil and the secondary coil.

Claim 50 (New): The contact-less charging circuit module according to claim 49, wherein a magnetic flux of the magnetic field generated from the external contact-less charging device is linked to the secondary coil of the high frequency AC current inducing unit.

Claim 51 (New, Amended): The contact-less charging circuit module according to claim 49, wherein ~~the~~:

the overvoltage monitoring unit further comprises:

a wireless transmitting unit wirelessly ~~propagates~~propagating the monitoring result through an antenna~~,~~; and

w~~herein the overvoltage monitoring unit includes~~ a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

~~wherein~~ the microprocessor outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 52 (New): The contact-less charging circuit module according to claim 51, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the overvoltage monitoring unit further includes a charging pause detecting unit receiving the high frequency AC current output from the high frequency AC current inducing unit

to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, and

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 53 (New): The contact-less charging circuit module according to claim 49, wherein the monitoring result is a charging power adjustment request signal.

Claim 54 (New): The contact-less charging circuit module according to claim 49, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 55 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by ~~means of~~ a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier that includes circuitry controlled by at least one microprocessor, the constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage; and

an overvoltage monitoring unit that includes a wireless ~~transmitting unit~~transmitter, first and second voltage detectors respectively detecting voltages at both ends of the constant voltage/constant current supplier, and the at least one microprocessor monitoring the detected

voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device ~~by means of wireless communication through~~using the wireless ~~transmitting unit~~transmitter so as to induce a change of intensity of the magnetic field,

wherein the at least one microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting a power applied to the primary coil ~~from a first level~~by up to a ~~second~~predetermined level,

wherein the at least one microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the power applied to the primary coil ~~from~~by up to the ~~second level to a third~~predetermined level.

Claim 56 (New): The contact-less charging circuit module according to claim 55, wherein at least one of the first charging power adjustment request signal and the second charging power adjustment request signal is based on relative positions of the primary coil and the secondary coil.

Claim 57 (New, Amended): The contact-less charging circuit module according to claim 55, wherein the wireless ~~transmitting unit~~transmitter wirelessly propagates the monitoring result through an antenna,

wherein the overvoltage monitoring unit includes a voltage comparator comparing first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

wherein the at least one microprocessor outputs the monitoring result according to the voltage comparison result to the wireless ~~transmitting unit~~transmitter.

Claim 58 (New, Amended): The contact-less charging circuit module according to claim 55, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the ~~overvoltage monitoring unit further includes a charging pause detecting unit receiving the high frequency AC current output from the high frequency AC current inducing unit to detect~~microprocessor receives an indication of a time point when the induction of high

frequency AC current ends, and ~~then outputting the end time point to the at least one microprocessor, and~~

wherein the monitoring result is wirelessly transmitted to the external contact-less charging device ~~by means of wireless communication~~ while a high frequency AC current is not induced after the end time point is input.

Claim 59 (New): The contact-less charging circuit module according to claim 55, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 60 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for receiving a charging power from an external contact-less charging device and charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by ~~means of~~ a magnetic field generated from the external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

~~an overvoltage monitoring unit that includes~~ a microprocessor monitoring the voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device ~~by means of wireless communication~~ so as to induce a change of intensity of the magnetic field,

~~w~~herein the microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device ~~from~~by up to a ~~first~~predetermined level ~~to a second level~~, and

wherein the microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device ~~from~~by up to the ~~second level to a third~~predetermined level.

Claim 61 (New): The contact-less charging circuit module according to claim 60, wherein at least one of the first charging power adjustment request signal and the second charging power adjustment request signal is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 62 (New, Amended): The contact-less charging circuit module according to claim 60, wherein the overvoltage monitoring unit includes:

~~a wireless transmitting unit wirelessly propagating the monitoring result through an antenna;~~

an antenna;

first and second voltage detectors respectively detecting first and second voltages at front and rear ends of the constant voltage/constant current supplier; and

a voltage comparator comparing the first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

wherein the microprocessor outputs the monitoring result according to the voltage comparison result ~~to~~using the ~~wireless transmitting unit~~antenna.

Claim 63 (New, Amended): The contact-less charging circuit module according to claim 60, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the ~~overvoltage monitoring unit further includes a charging pause detecting unit receiving the high frequency AC current output from the high frequency AC current inducing unit to detect~~microprocessor receives an indication of a time point when the induction of high frequency AC current ends, and ~~then outputting the end time point to the microprocessor, and~~

wherein the monitoring result is wirelessly transmitted to the external contact-less charging device ~~by means of wireless communication~~ while a high frequency AC current is not induced after the end time point is input.

Claim 64 (New): The contact-less charging circuit module according to claim 60, wherein the monitoring result is a difference of voltages at front and rear ends of the constant

voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 65 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting unit transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 66 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit including a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting unit transmitting

a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the secondary coil is movable relative to the primary coil during the charging of the battery cell by the contact-less charging circuit module~~.~~, and

wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting the intensity of the magnetic field.

Claim 67 (Cancelled).

Claim 68 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit including a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit ~~that includes: a microprocessor monitoring~~ detecting first and second voltages at both ends of the constant voltage/constant current supplier, ~~and a wireless transmitting unit~~monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the ~~contact-less~~ monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging ~~circuit module is movable relative~~ process for adjusting a power applied to the primary coil of the external contact-less charging device ~~during the charging~~based on relative positions of the contact-less chargeable battery ~~cell by~~and the external contact-less charging ~~circuit module~~device.

Claim 69 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit for monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result is a charging power adjustment request signal.

Claim 70 (New): The contact-less charging circuit module according to claim 69, wherein the high frequency AC current inducing unit is a coil to which a magnetic flux of the magnetic field generated from the external contact-less charging device is linked.

Claim 71 (New): The contact-less charging circuit module according to claim 69, wherein the overvoltage monitoring unit includes:

a wireless transmitting unit for wirelessly propagating the monitoring result through an antenna;

first and second voltage detectors for respectively detecting voltages at front and rear ends of the constant voltage/constant current supplier;

a voltage comparator for comparing first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result; and

a microprocessor for outputting the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 72 (New): The contact-less charging circuit module according to claim 71, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the overvoltage monitoring unit further includes a charging pause detecting unit for receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, and

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 73 (New): The contact-less charging circuit module according to claim 69, wherein the charging power adjustment request signal is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 74 (New): A contact-less charging device for transmitting a charging power by means of electromagnetic induction phenomenon to a contact-less chargeable battery that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode and wirelessly transmits a monitoring result for voltages at both ends of the constant voltage/constant current supplier, the contact-less charging device comprising:

a magnetic field generating unit for receiving an AC current and forming a magnetic field in an outer space;

a high frequency power driving unit for applying a high frequency AC current to the magnetic field generating unit; and

a charging power adjusting unit that includes: a wireless receiving unit receiving the monitoring result from the contact-less chargeable battery by means of wireless communication, and a microprocessor controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that the charging power transmitted to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 75 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes a microprocessor, the microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field includes a change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

REMARKS/ARGUMENTS

1. Introduction

a. Summary

Patent Owner submits this response in reply to the Final Office Action mailed March 3, 2022 (the "Final Office Action") and the Notice of Defective Paper in *Ex Parte* Reexamination Patent Owner Requested dated May 13, 2022 (the "Notice of Defective Paper").

In the first Non-Final Office Action mailed June 30, 2021, claims 1-24 of U.S. Patent No. 8,013,568 (hereinafter "the '568 patent") were subject to reexamination. On August 30, 2021, Patent Owner filed a response to the first Non-Final Office Action in which claims 3, 9, 11-12, and 16 were amended and new claims 25-48 were added. In the second Non-Final Office Action mailed September 29, 2021, claims 1-48 were rejected. In the response to the second Non-Final Office Action filed November 29, 2021, claim 36 was cancelled, new claims 49-75 were added, and claims 1-4, 7-10, 13, 15-18, 21, 23, 25, 30, 40, 41 and 48 were amended.

The Final Office Action was mailed March 3, 2022. In this After Final Response to the Final Office Action, claims 1, 3, 4, 7, 9, 10, 13, 15, 17, 19, 21, 23, 26, 31, 41, 49, 51, 55, 57, 58, 60, 62, 63, 66, 68, and 75 are amended. No new matter was added with these amendments. These amendments do not enlarge the scope of the original patent claims. Claims 2 and 67 are cancelled in this response. Patent Owner makes no admission regarding the patentability of the cancelled claims.

Patent Owner notes that, as a matter of right, Patent Owner cannot amend any finally rejected claims, add new claims after a final rejection, or reinstate previously cancelled claims unless a showing under 37 C.F.R. § 1.116(b) is made except when an amendment merely cancels claims, adopts examiner's suggestions, removes issues for appeal, or in some other way requires only a cursory review by the examiner. Patent Owner notes that, in accordance with 37 C.F.R. § 1.116(b), the amendments to claims 1, 3, 4, 7, 9, 10, 13, 15, 17, 19, 21, 23, 26, 31, and 41 present the rejected claims in better form for consideration on appeal, if necessary, and require only a cursory review by the Examiner in-line with the Final Office Action (Examiner's suggestions) to allow the claims. With respect to the amendments to claims 49, 51, 55, 57, 58, 60, 62, 63, 66, 68, and 75, Patent Owner notes that these amendments could not have been presented earlier as the Final Office Action presents the first rejection of these claims. Accordingly, Patent Owner submits the amendments to the claims should be allowed.

Favorable reconsideration of the pending claims and allowance of the new claims is respectfully requested in light of the following remarks.

b. Interview Summary

Patent Owner wishes to thank Examiners Deb, Patel, and Ferris for extending the courtesy of an interview with Matthew Dicke and Samuel Richey (counsel for Patent Owner) on April 5, 2022 (hereinafter "the Interview"). During the Interview, the rejections of claims 1 and 55 were discussed along with the interpretation of the claims under 35 U.S.C. § 112, sixth paragraph. In particular it was discussed how Chung-Sik fails to disclose adjusting a power level during a charging process. Further, it was discussed how the combination of Chung-Sik and Matsuki is improper as being both inoperable and by rendering the device of Chung-Sik unsatisfactory for its intended purpose.

Potential claim amendments were discussed with respect to claim 1 regarding the 35 U.S.C. § 112, sixth paragraph interpretation of "overvoltage monitoring unit" and to the wireless feedback control signal. It was agreed that these amendments would be proper in accordance with 37 C.F.R. § 1.116(b).

Additionally, it was mentioned that the term "microprocessor" could be subject to interpretation under 35 U.S.C. § 112, sixth paragraph in an Advisory Action responsive to this After Final Response. MPEP § 2271 states "[b]oth the patent owner and the examiner should recognize that a reexamination proceeding may result in the final cancellation of claims from the patent and that the patent owner does not have the right to renew or continue the proceedings by refiling under 37 CFR 1.53(b) or 37 CFR 1.53(d) or former 37 CFR 1.60 or 1.62, nor by filing a request for continued examination under 37 CFR 1.114. Complete and thorough actions by the examiner coupled with complete responses by the patent owner, including early presentation of evidence under 37 CFR 1.131(a) or 37 CFR 1.132, will go far in avoiding such problems and reaching a desirable early termination of the reexamination prosecution." MPEP 2272 states "[a]ccordingly, both the examiner and the patent owner should identify and develop all issues prior to the final Office action, including the presentation of evidence under 37 CFR 1.131(a) and 1.132." The second Non-Final Office Action dated September 29, 2021 included an interpretation of "microprocessor" under 35 U.S.C. § 112, sixth paragraph, and in this Office Action that interpretation was withdrawn. In particular, the Office Action states "[i]n response to Patent

Owner's arguments and amendment to the claims, t**he Examiner withdraws interpretation terms under 35 U.S.C. §112(6th ¶) of the claim** "constant voltage/constant current supplier," and **"microprocessor," as these are terms known in the art and do convey a particular structure**. (Remarks pages 25-29)." (Office Action, p. 4, emphasis added).

These claim interpretation issues have already been identified, developed, and withdrawn. Any reintroduction of a previously withdrawn issue after the issuance of this Office Action deprives Patent Owner of any opportunity to provide a response or present evidence. Patent Owner does not introduce any amendments that alter the usage of the term "microprocessor" from the response to the second Non-Final Office Action dated September 29, 2021. Accordingly, it is improper to reintroduce any interpretation of "microprocessor" under 35 U.S.C. § 112, sixth paragraph. Patent Owner requests this Office Action be withdrawn and prosecution be reopened should any interpretation of a term previously withdrawn be reintroduced in an Advisory Action.

No agreement with respect to the patentability of the claims was reached.

c. Response to Notice of Defective Paper

The Notice of Defective Paper states "Patent Owner did not provide markup of changes in the amended claims with respect to previous version of the claims and failed to provide an explanation of the support in the disclosure of the patent for the changes to the claims made by the amendment paper as required under 37 C.F.R. 1.530(e)." (Notice of Defective Paper, p. 2). Patent Owner respectfully disagrees and notes that this response as previously filed conforms to the requirements of 37 C.F.R. 1.530. Patent Owner provided an explanation of the support in the disclosure of the patent for the changes to the claims made by the amendment paper as required under 37 C.F.R. 1.530(e) in Section 2 of the previously filed response and the listing of claims conforms to the requirements of 37 C.F.R. 1.530(f) and (i). However, in order to facilitate these proceedings and as discussed with Examiner Deb on May 17, 2022, Patent Owner has included a marked copy of the listing of claims (see Exhibit A) showing the amendments to the claims. Patent Owner notes that the listing of claims provided in Exhibit A is provided for the convenience of the Examiners only and no admissions are made with respect to any amendment shown in Exhibit A.

2. <u>Status of the Claims</u>

Claims 1, 3-35, 37-66, and 68-75 are currently pending, of which claims 1, 7, 13, 21, 23, 49, 55, 60, 65, 66, 68, 69, 74, and 75 are independent.

In the present response, claims 1, 3, 4, 7, 9, 10, 13, 15, 17, 19, 21, 23, 26, 31, 41, 49, 51, 55, 57, 58, 60, 62, 63, 66, 68, and 75 are amended. Claims 2 and 67 are cancelled.

Independent claim 1 is amended as noted above. Support for these amendments is found at least at column 6, line 66 - column 7, line 4; column 7, lines 43 - 49; column 8, lines 32 - 41; column 11, lines 52 - 61; and previously pending claim 2. Claims 3, 4, and new claim 26 are amended to address typographical issues, formalities, and ensure proper antecedent basis.

Independent claims 7 and 13 are amended as noted above. Support for these amendments is found at least at column 6, line 66 - column 7, line 4 and column 11, lines 62-65. Claims 9, 10, 13, 15, 17, 19, and new claim 31 are amended to address typographical issues, formalities, and ensure proper antecedent basis.

Independent claims 21 and 23 are amended as noted above. Support for these amendments is found at least at column 6, line 66 - column 7, line 4; column 7, lines 43-49; and column 11, lines 52-65. New claims 40 and 41 are amended to address typographical issues, formalities, and ensure proper antecedent basis.

New independent claim 49 is amended as noted above. Support for these amendments is found at least at column 6, line 66 - column 7, line 4. New dependent claim 51 is amended to address typographical issues, formalities, and ensure proper antecedent basis.

New independent claims 55 and 60 are amended as noted above. Support for these amendments is found at least at column 11, lines 23-26 and lines 35-43. New claims 57, 58, 62, and 63 are amended to address typographical issues, formalities, and ensure proper antecedent basis.

New claim 66 is amended as noted above. Support for these amendments is found in at least previously pending claim 67.

New claims 68 and 75 are amended in this response. Support for these amendments is found in at least column 6, line 66 - column 7, line 4; column 7, lines 43-49; column 8, lines 32-41; column 11, lines 52 - 61; and FIG. 3.

For completeness, claims 8, 11, 12, 16, 18, 25, 30, 40, and 48 were amended in the response to the second Non-Final Office Action filed November 29, 2021 and not further amended in this response. Further, new claims 49-75 were added in the second Non-Final Office Action filed

November 29, 2021. Support for these previously presented amendments and the new claims can be found in the response to the second Non-Final Office Action filed November 29, 2021.

3. Response to Claim Interpretation under 35 U.S.C. § 112, Sixth Paragraph

a. overvoltage monitoring unit

In the Final Office Action, the Office invoked an interpretation under 35 U.S.C. § 112, sixth paragraph with respect to claims 1, 4, 7, 9, 10, 21, 26, 31, 41, 49, 52, 55, 58, 60, 62, 63, 65, 66, 68, 69, 71, 72, and 75 for claim term "overvoltage monitoring unit." Patent Owner respectfully disagrees and asserts that the pending claims were not intended to be and should not be interpreted as means-plus-function claims under 35 U.S.C. § 112, sixth paragraph. With respect to claims 7, 9, 10, 21, 26, 31, 41, 58, 60, 62, and 63, Patent Owner has removed the term "overvoltage monitoring unit." Patent Owner notes that this amendment does not broaden the claim as the microprocessor was previously recited in the claims. Accordingly, Patent Owner submits that these claims should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

With respect to claims 1, 4, 49, 52, 55, 65 and 66, Patent Owner submits that the claim recites specific structures for the "overvoltage monitoring unit." For example, claim 1 recites "an overvoltage monitoring unit that includes first and second voltage detectors [...] and a microprocessor." Claim 49 recites "an overvoltage monitoring unit that includes a wireless transmitting unit, first and second voltage detectors [...], and a microprocessor." Claim 55 recites "an overvoltage monitoring unit that includes a wireless transmitter, first and second voltage detectors [...], and the at least one microprocessor." Claim 65 and 66 recite "an overvoltage monitoring unit that includes: a microprocessor [...] and a wireless transmitting unit." Accordingly, the interpretation of claims 1, 49, 52, 55, 65, 66, and 68 under 35 U.S.C. § 112, sixth paragraph is improper.

With respect to claims 68 and 69, Patent Owner submits that the term "overvoltage monitoring unit," when read by a person having ordinary skill in the art in view of the specification, is understood to have a sufficiently definite meaning as the name for the structure that performs the function. Even when a term covers a broad class of structures or identifies the structures by their function (e.g., "filters," "brakes," "clamp," "screwdriver," and "locks"), 35 U.S.C. § 112 sixth paragraph will not apply. *See* MPEP 2181(I)(A). To determine whether a word, term, or phrase coupled with a function denotes structure, examiners may check whether: (1) the specification

provides a description sufficient to inform one of ordinary skill in the art that the term denotes structure; (2) general and subject matter specific dictionaries provide evidence that the term has achieved recognition as a noun denoting structure; and/or (3) the prior art provides evidence that the term is an art-recognized structure to perform the claimed function. *See* MPEP 2181(I)(C); and *Ex parte Rodriguez,* 92 USPQ2d 1395, 1404 (Bd. Pat. App. & Int. 2009) (precedential). Persons of ordinary skill in the art reading the specification of the '568 patent would recognize that the recited claim terms have a sufficient definite meaning as the name for a structure. The recited claim terms are also modified by sufficient structure, material, and/or acts for a person skilled in the art reading the specification to recognize that the recited claim terms, together with the functions, structures, materials, and acts recited in the claims, connote sufficient definite structure. See, for example, claims 1, 4, 7, 9, 10, 21, 26, 31, 41, 49, 52, 55, 58, 60, 62, 63, 65, 66, 68, 71, 72, and 75. Further, with respect to claims 71 and 72, Patent Owner submits that the claims recite specific structures for the "overvoltage monitoring unit." For example, claim 71 recites "wherein the overvoltage monitoring unit includes: a wireless transmitting unit [...] first and second voltage detectors [...] a voltage comparator [...] and a microprocessor." Accordingly, the interpretation of claims 69, 71, and 72 under 35 U.S.C. § 112, sixth paragraph is improper.

The Final Office Action states the "overvoltage monitoring unit" is interpreted to include "a wireless transmitting unit 320 for wirelessly propagating the monitoring result through an antenna 330; first and second voltage detectors (350, 360) for respectively detecting voltages at front and rear ends of the constant voltage/constant current supplier; a voltage comparator 380 for comparing first and second voltages detected by the first and second voltage detectors (350, 360) and outputs a voltage comparison result; a microprocessor 310 for outputting a monitoring result according to the voltage comparison result to the wireless transmitting unit 320; and charging pause detection unit 390 receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the micro-processor 310 (column 4, lines 28-45) (FIG. 5)." (Final Office Action, pp. 8 - 9). Patent Owner notes that it is improper to read every structure indicated in the specification into the "overvoltage monitoring unit." MPEP § 2181 states (emphasis added):

> If the written description sets forth the corresponding structure, material, or acts in compliance with 35 U.S.C. 112(b) or pre-AIA 35 U.S.C. 112, second paragraph, the claim limitation must "be construed to cover the corresponding

> structure, material, or acts described in the specification and equivalents thereof." 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph. However, **functional limitations that are not recited in the claim, or structural limitations from the written description that are unnecessary to perform the claimed function, cannot be imported into the claim**. *Welker Bearing*, 550 F.3d at 1097, 89 USPQ2d at 1294; *Wenger Mfg., Inc. v. Coating Mach. Sys., Inc.*, 239 F.3d 1225, 1233, 57 USPQ2d 1679, 1685 (Fed. Cir. 2001).

Patent Owner notes that the claims recite the necessary structural limitations to perform the claimed functions. Accordingly, Patent Owner submits that, in the event the term "overvoltage monitoring unit" is interpreted under 35 U.S.C. § 112, sixth paragraph, the interpretation of the term articulated in the Final Office Action is improper for at least including functional limitations and/or structure that is unnecessary to perform the claimed functions.

Claim 75 recites "an overvoltage monitoring unit that includes a microprocessor." The microprocessor constitutes specific structure for the "overvoltage monitoring unit." Accordingly, the interpretation of claim 75 under 35 U.S.C. § 112, sixth paragraph is improper.

b. wireless transmitting unit

In the Final Office Action, the Office invoked an interpretation under 35 U.S.C. § 112, sixth paragraph with respect to claim 3 for claim term "wireless transmitting unit." Patent Owner respectfully disagrees and asserts that the pending claims were not intended to be and should not be interpreted as means-plus-function claims under 35 U.S.C. § 112, sixth paragraph. Patent Owner notes that a "wireless transmitting unit," when read by a person having ordinary skill in the art in view of the specification, is understood to have a sufficiently definite meaning as the name for the structure that performs the function as indicated on page 9 of the Office Action. Accordingly, Patent Owner submits that this claim should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

c. charging pause detecting unit

In the Final Office Action, the Office invoked an interpretation under 35 U.S.C. § 112, sixth paragraph with respect to claims 4, 10, 52, 58, 63, and 72 for claim term "charging pause detecting unit." Patent Owner respectfully disagrees and asserts that the pending claims were not intended to be and should not be interpreted as means-plus-function claims under 35 U.S.C. § 112, sixth paragraph. However, with respect to claims 4, 10, 58, and 63 Patent Owner has removed the

term "charging pause detecting unit." Accordingly, Patent Owner submits that these claims should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

With respect to claims 52 and 72, Patent Owner submits that the specification provides a description sufficient to inform one of ordinary skill in the art that the term denotes structure when coupled with its function. For example, support for the claimed "charging pause detecting unit" is found at least at column 8, line 64 to column 9, line 16; column 10, lines 1-4; and Figs. 5-6 (e.g., the charging pause detector 390 measures the high frequency AC current induced in the secondary coil 270 and so as to detect when the induced high frequency AC current is interrupted (the pause region), and that inputs the detection signal to the microprocessor 310). FIG. 5 illustrates a block diagram of an electronic circuit having a variety of electronic components, such as a coil 279, an antenna 330, and a battery cell 300. Accordingly, the figures inform one of ordinary skill in the art that the components shown in the figures, including the "charging pause detecting unit" constitute one or more electronic components coupled together to perform the recited function. Accordingly, Patent Owner submits the three-part test is not met and this claim should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

d. charging power adjustment unit

In the Final Office Action, the Office invoked an interpretation under 35 U.S.C. § 112, sixth paragraph with respect to claims 13, 17, 19, 21, and 74 for claim term "charging power adjustment unit." Patent Owner respectfully disagrees and asserts that the pending claims were not intended to be and should not be interpreted as means-plus-function claims under 35 U.S.C. § 112, sixth paragraph. However, with respect to claims 13, 17, 19, and 21 Patent Owner has removed the term "charging power adjustment unit." Accordingly, Patent Owner submits that these claims should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

With respect to claim 74, Patent Owner submits that the claim recites specific structures for the "charging power adjustment unit." Specifically, claim 74 recites "a charging power adjusting unit that includes: a wireless receiving unit [...] and a microprocessor." Accordingly, Patent Owner submits the three-part test is not met and this claim should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

The Final Office Action states "the structure of charging power adjustment unit includes a wireless receiver and a microprocessor." (Final Office Action, p. 10). Patent Owner notes that it is improper to read every structure indicated in the specification into the "charging power adjustment

unit" in accordance with MPEP § 2181. Accordingly, Patent Owner submits that, in the event the term "charging power adjustment unit" is interpreted under 35 U.S.C. § 112, sixth paragraph, the interpretation of the term articulated in the Final Office Action is improper for at least including functional limitations and/or structure that are unnecessary to perform the claimed functions.

e. wireless receiving unit

In the Final Office Action, the Office invoked an interpretation under 35 U.S.C. § 112, sixth paragraph, with respect to claims 15 and 74 for claim term "wireless receiving unit." Patent Owner respectfully disagrees and asserts that the pending claims were not intended to be and should not be interpreted as means-plus-function claims under 35 U.S.C. § 112, sixth paragraph. However, with respect to claim 15, Patent Owner has removed the term "wireless receiving unit." Accordingly, Patent Owner submits that this claim should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

With respect to claim 74, Patent Owner submits that the specification provides a description sufficient to inform one of ordinary skill in the art that the term denotes structure when coupled with its function. For example, support for the claimed "wireless receiving unit" is found at least at column 10, lines 14-17 (e.g., [i]f the response signal is wirelessly transmitted, the wireless receiving unit 230 of the charging device C demodulates the response signal and then inputs it to the microprocessor 240.) and FIGs. 3 and 4. For example, FIG. 4 illustrates a block diagram of an electronic circuit having a variety of electronic components, such as an AC power source 250, a coil 200, and an antenna 220. Accordingly, the figures inform one of ordinary skill in the art that the components shown in the figures, including the "wireless receiving unit" constitute one or more electronic components coupled together to perform the recited function. Accordingly, Patent Owner submits the three-part test is not met. Further, "the term "receiver" (i.e., the absence of the term means) presumptively connotes sufficiently definite structure to those of skill in the art. *See Personalized Media*, 161 F.3d at 703–04." (*EnOcean GmbH v. Face Int'l Corp.*, No. 12-1645 at 7 (Fed. Cir. 2014)). Therefore, this claim should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

f. Conclusion

In view of the foregoing, Patent Owner respectfully asserts that the pending claims are not means-plus-function claims and that each and every word of the claims should be given patentable weight. Furthermore, for at least the reasons stated above, Patent Owner respectfully requests

withdrawal of the pending 35 U.S.C. § 112, sixth paragraph, interpretation of the claim terms in the pending claims.

4. Response to Claim Rejections under 35 U.S.C. § 112, First and Second Paragraphs

a. 35 U.S.C § 112, second paragraph

In the Final Office Action, claims 1, 21, and 65 are rejected as being indefinite with respect to "what component of the claimed "overvoltage monitoring unit" recited in claims 1, 21, and 65, is monitoring the voltages at both ends of the constant voltage/constant current supplier." (Final Office Action, p. 11). Patent Owner disagrees, but has amended the claims to advance prosecution. With respect to claim 1, Patent Owner has amended claim 1 to recite "first and second voltage detectors respectively detecting first and second voltages at both ends of the constant voltage/constant current supplier." With respect to claim 21, Patent Owner has amended claim 21 to remove the cited language. With respect to claim 65, Patent Owner notes that it is well specified in the specification that a microprocessor monitors the voltage at both ends of the constant voltage/constant current supplier. See, for example, column 11, lines 52-58 ("in the above embodiment [...] the microprocessor 310 of the battery B monitors voltages measured at both ends of the constant voltage/constant current supplier 290" and column 11, lines 31-35 ("the microprocessor 310 periodically repeats monitoring an overvoltage state at both ends of the constant voltage/constant current supplier 290."

Therefore, Patent Owner submits that the rejections of claims 1, 21, and 65 under 35 U.S.C § 112, second paragraph should be withdrawn.

b. 35 U.S.C § 112, first paragraph

In the Final Office Action, claims 55 and 60 are rejected as failing to comply with the written description requirement with respect to the terms "adjusting a power applied to the primary coil from a first level to a second level" and "adjusting the power applied to the primary coil from the second level to a third level." (Final Office Action, p. 13). Specifically, the Final Office Action states "the first, second, and third level fail to comply with the written description requirement." (Final Office Action, p. 13). Patent Owner respectfully disagrees. Column 11, lines 23-26 state "the microprocessor 240 controls the high frequency power driving unit 210 to lower the power of the high frequency AC current applied to the primary coil 200 as much as a predetermined level." This constitutes adjusting a power applied to the primary coil from a first level (e.g. the power

level at which the high frequency power driving unit 210 is operating) to a second level (e.g. the power level lowered by as much as a predetermined level). Similarly, column 11, lines 38-43 state (emphasis added) "the microprocessor 310 wirelessly transmits an adjustment request signal of charging power to the charging device C again **so that the power of high frequency AC current applied to the primary coil 200 is lowered as much as a predetermined level once again.**" This constitutes adjusting the power applied to the primary coil from the second level to a third level (e.g. the second power level lowered by as much as a predetermined level once again). However, despite the clear support in the specification for the cited claim language, Patent Owner has amended claims 55 and 60 to remove the objected to phrases. Therefore, Patent Owner submits that the rejections of claims 55 and 60 under 35 U.S.C § 112, first paragraph should be withdrawn.

Conclusion

Thus, for at least the same reasons stated above, Patent Owner respectfully requests withdrawal of the pending 35 U.S.C. § 112, first and second paragraph rejections.

5. Response to Claim Rejections under 35 U.S.C. § 102 and 35 U.S.C. § 103

The Final Office Action states claims 1 - 15, 19 - 54, 56, 61, 65 - 68, and 73 - 75 are rejected under 35 U.S.C. § 103 as unpatentable over Korean Patent No. KR 950005819B1 (hereinafter "Chung-Sik") in view of Japanese Patent No. JP H0145230 Y2 to Matsuki (hereinafter "Matsuki") and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of U.S. Pat. No. 6,016,046 to Kaite (hereinafter "Kaite") in view of Matsuki. (Final Office Action, p. 14).

The Final Office Action states claims 16-18 are rejected under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Matsuki and in view of Korean Patent No. KR100451606B1 (hereinafter "Cho"). (Final Office Action, p. 115).

The Final Office Action states claims 55, 57-60, 62-64, and 69-72 are rejected under 35 U.S.C. § 102 as anticipated by Chung-Sik and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite. (Final Office Action, p. 124).

Without conceding to these rejections, Patent Owner has amended the claims as noted above. Chung-Sik, Kaite, Matsuki, and Cho, alone or in combination, do not teach or suggest all features of any of independent claims 1, 7, 13, 21, 23, 49, 55, 60, 65, 66, 68, 69, 74, and 75.

a. Overview of Technical Problem

As illustrated in FIG. 1 of the '568 patent (reproduced below), in a conventional contact-less charging method, a charger 10 includes a primary coil 40 supplied with a high frequency AC current to form a magnetic field M, and a battery 50 includes a secondary coil 70 to which a high frequency AC current is induced according to the linkage of the magnetic field M generated in the primary coil 40. *See* FIG. 1 and column 1, line 66 to column 2, line 6.

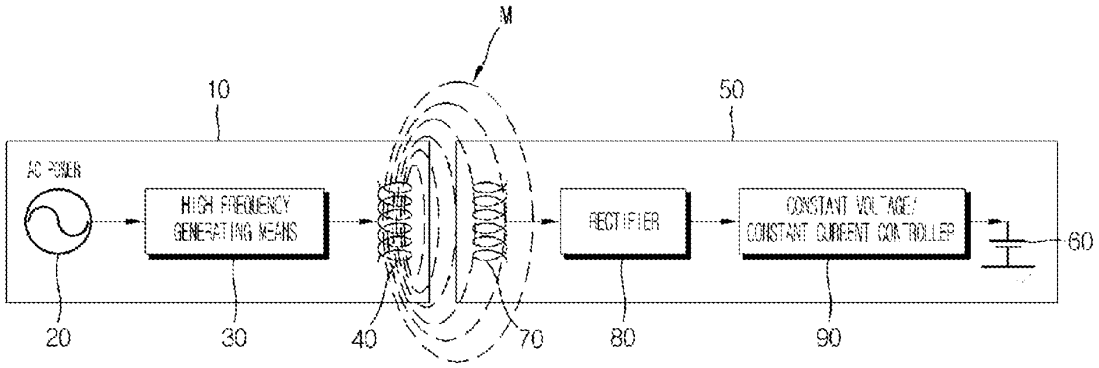


FIG. 1 of the '568 patent

An intensity of the AC current induced in the secondary coil 70 is proportional to an intensity of the magnetic flux linked to the secondary coil 70, which depends on a relative position of the secondary coil 70 and the primary coil 40. *See* column 2, lines 21-27. For example, if the secondary coil 70 is positioned closer to the primary coil 40, the intensity of the magnetic flux linked to the secondary coil 70 will increase, and as a result the intensity of the high frequency AC current induced in the secondary coil 70 will also increase. *See* column 2, lines 27-32. However, if a large high frequency AC current induced in the secondary coil 70 exceeds standards defined for a circuit part in battery 50 (e.g., constant voltage/constant current supplier 90), then it could cause damage to the circuit part. *See* column 2, lines 42-48.

In order to avoid causing damage, prior art contact-less charging methods typically employ a structure that fixes the relative positions between the charger 10 and the battery 50 to a position where the standards of a circuit part (e.g., the constant voltage/constant current supplier 90) in the battery 50 are defined. *See* column 2, lines 49-53. For example, as illustrated in FIG. 2 of the '568 patent, an electric toothbrush 100 includes a toothbrush body 110 having a battery 115 mounted

to its lower end, and a charger 120 for charging the battery 115. *See* FIG. 2 and column 2, lines 54-60.

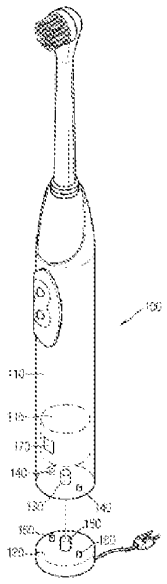


FIG. 2 of the '568 patent

The toothbrush body 110 and the charger 120 are closely fixed with each other by matching the grooves 130, 140 and the protrusions 15, 160, and as a result relative positions of the charger 120 and the battery 150 are also closely fixed. *See* column 2, line 66 to column 3, line 3. Standards of a constant voltage/constant current supplier 170 provided to the battery 115 are defined with the understanding that the toothbrush body 110 and the charger 120 are closely fixed in this manner, and thus damage to the constant voltage/constant current supplier 170 may be prevented while charging the battery 115 due to an unexpected overvoltage by strictly restricting relative positions of the battery 115 and the charger 120 in this manner. *See* column 3, lines 4-13. That is to say, whenever charging the battery 115, a user should fix the toothbrush body 110 on the charger 120 in this particular fixed relative position. *See* column 3, lines 12-17.

b. Overview of Technical Solution

One object of the disclosure of the '568 patent is to provide a battery charging control method capable of preventing damage of an internal battery circuit together with solving a restriction for relative positions between the battery and the charger. *See* column 3, lines 35-39.

For example, as illustrated in FIG. 7 of the '568 patent (reproduced below), "the contact-less charging device and chargeable battery need not be fixed to a certain relative position as in the prior art so as to constantly keep an intensity of magnetic flux linked to the secondary coil 270" (emphasis added). *See* FIG. 7 and column 9, lines 35-38. For example, where the charging device C is designed in a pad shape as shown in FIG. 7, a user may conveniently charge a battery B just by placing a subject such as a cellular phone coupled with the battery B onto the pad, thereby allowing one to make a convenient charger and battery set. *See* column 9, lines 38-44.

To facilitate this, in one example, a contact-less charging device and chargeable battery may adjust a charging power via wireless feedback control during the battery charging process. *See* column 9, lines 29-32 and column 12, lines 46-51.

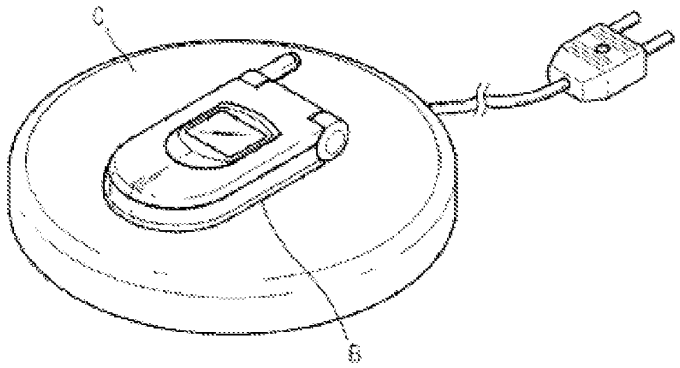


FIG. 7 of the '568 patent

c. Motivation to Combine

Chung-Sik and Matsuki

The Final Office Action states claims 1-54, 56, 61, 65 - 68, and 73-75 are rejected under 35 U.S.C. § 103 as unpatentable over a combination of Chung-Sik and Matsuki. For example, the Final Office Action states "[a]t the time the invention was made it would have been obvious to one of ordinary skill in the art to modify contact-less wireless charging of battery disclosed by Chung-Sik by adding wireless feedback control signal to induce the change of intensity of the magnetic field based on relative positions of the contact-less chargeable battery and the external contact-less charging device disclosed by Matsuki for charging a battery." (Final Office Action, p. 19).

MPEP § 2143.01 states:

> The mere fact that references can be combined or modified does not render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417, 82 USPQ2d 1385, 1396 (2007).
>
> A statement that modifications of the prior art to meet the claimed invention would have been "'well within the ordinary skill of the art at the time the claimed invention was made'" because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a prima facie case of obviousness without some objective reason to combine the teachings of the references. *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993). "'[R]ejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.'" *KSR*, 550 U.S. at 418, 82 USPQ2d at 1396 (quoting *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006)).

Patent Owner notes the Final Office Action simply assumes it would have been obvious to make the modification and provides no justification for the modification or rationale explaining a motivation to combine in violation of the MPEP and case law precedent. Accordingly, Patent Owner submits that the obviousness rejections of the claims cannot be sustained.

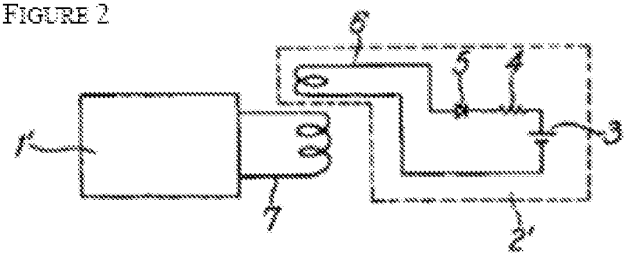
MPEP § 2143.02 states "[w]here there is a reason to modify or combine the prior art to achieve the claimed invention, the claims may be rejected as prima facie obvious provided there is also a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986)." "An invention 'composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.'" *Volkswagen Grp. of Am., Inc. v. Velocity Patent LLC*, IPR2015-00276, Paper 8, slip op. at 10 (PTAB Jun. 1, 2015) (quoting *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 418 (2007). In order to show that it would be obvious to make a particular combination, "a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.'" *Apotex Inc. v. Wyeth LLC*, IPR2014-00115, Paper 94, slip op. at 11 (Apr. 20, 2015) (quoting *Procter & Gamble Co. v. Teva Pharms. USA, Inc.*, 566 F.3d 989, 994 (Fed. Cir. 2009))." The proposed combination of Chung-Sik and Matsuki fails to meet the requirements of the MPEP and

case law precedent as a skilled artisan would not have been motivated to combine the teachings and would not have had a reasonable expectation of success in making the proposed combination.

Chung-Sik teaches "the battery may be recharged only when the portable device 18 is installed on the base unit 12" (emphasis added). (Chung-Sik, page 8-2, lines 59-60). In Chung-Sik, "when the portable device 18 is installed on the base unit 12, the charge switch 30 is switched 'on' according to mechanical input" (emphasis added). (Chung-Sik, page 8-4, lines 30-40). Further, in Chung-Sik, "when a portion of the contactless charging unit 38 of the portable device 18 is mounted (positioned) on the power transmitter 28 of the base unit 12, a charge switch 30 of the base unit 12 is started (turned 'on') by the mounting of the portable device 18." (Chung-Sik, page 8-2, line 62 to page 8-3, line 2). Further, in Chung-Sik "when the portable device 18 is separated from the base unit 12, operation of the contactless charging unit 28 and the power transmitter 28 are stopped to stop charging the battery 32." (Chung-Sik, page 8-3, lines 11-14). Further, in Chung-Sik, "when the two devices are coupled to each other, the core 78 of the induced voltage detecting unit 81 installed on the contactless charging unit 38 in the portable device 18 is positioned on an opposite surface of the core 76 of the induced voltage generating unit 46 in the power transmitter 28 and is space coupled thereto" (emphasis added). (Chung-Sik, page 8-4, lines 20-25).

Patent Owner has obtained a certified translation of Matsuki, a copy of which is submitted along with this After Final Response. Matsuki describes a storage battery that can be charged without connection to a charging device. (Matsuki, column 1, lines 16-17). As shown in FIG. 2 of Matsuki, a storage battery 2' includes a resistor 4, a diode 5, and an input coil 6 connected in series between positive and negative electrodes of a storage battery body 3 so that current flows only in the direction of charging the storage battery body.

FIGURE 2



Matsuki discloses charging the storage battery using a charging device 1' having an output coil 7, also shown in FIG. 2. Matsuki recognizes that the charging current can be adjusted by

changing the distance between the output coil 7 of the charging device 1' and the input coil 6. (Matsuki, column 2, lines 24 - 27). This is not a new disclosure. This is one of the problems recognized in the '568 Patent (column 2, lines 37-41): "However, the intensity of the AC current induced by the secondary coil 70 is changed according to a relative position between the primary coil 40 and the secondary coil 70 as mentioned above." Matsuki does not solve this problem, nor does it disclose circuitry in the battery for causing a change in the charging current. In fact, Matsuki fails to disclose any type of feedback circuitry in the battery or in the charging device. Rather, in Matsuki, although the relative positions of the output coil and the input coil are changed, the *intensity* of the magnetic field does not change. In the '568 Patent, the position of the primary coil and secondary coil remain fixed and the circuitry in the battery causes a change in the charging current. There is no disclosure of this claimed feature of the '568 Patent in any of the art of record.

The combination proposed in the Final Office Action requires modifying the relative positions of the base 12 and the portable device 18 of Chung-Sik, as disclosed in Matsuki, in order to adjust the charging current. See, for example, Final Office Action, pp. 18-19. However, Chung-Sik describes a system where signals transmitted from the portable device 18 to the base 12 will only occur "when the two devices are coupled to each other" in a fixed arrangement at which the core 78 of the portable device 18 is positioned on a surface of the core 76 of the transmitter 28 of the base unit 12. (Chung-Sik, page 8-4, lines 20-25). In fact, Chung-Sik does not teach or suggest making any change to the intensity of the magnetic field based on relative positions of the base 12 and the portable device 18 because Chung-Sik understands that their relative positions are fixed whenever the battery 32 is being charged.

A person having ordinary skill in the art would not be motivated to make the modification proposed in the Final Office Action as this modification would not have a reasonable chance of success as the modified system would be non-operable. *See, e.g.* MPEP § 2143.02 and *In re Merck & Co., Inc.*, 800 F.2d 1091. As described in the instant specification and above, if a high frequency AC current induced in a coil exceeds standards defined for a circuit part in battery, then it could cause damage to the circuit, battery, and other components. The prior art contact-less charging methods, such as those disclosed in Chung-Sik, employ a structure that fixes the relative positions between the charger and the battery so that the induced current remains in a range that prevents damage to the circuit or other components. Accordingly, a person having ordinary skill in the art would understand that varying the distance between the portable device 18 and the base 12, as

proposed in the Final Office Action in view of Matsuki, would render Chunk-Sik non-operable. For example, varying the distance between the portable device 18 and the base 12 would damage the circuity, battery, and/or other components of the portable device 18 and/or the base 12. It is for precisely this reason that Chung-Sik describes a system where the portable device 18 and the base 12 operate when the devices are coupled to each other in a fixed arrangement. Therefore, there is no motivation to combine Chung-Sik and Matsuki as proposed in the Final Office Action and the combination of Chung-Sik and Matsuki fails to support a *prima facie* obviousness rejection as required by MPEP § 2143.02 and case law precedent.

However, even if a person having ordinary skill in the art would have been motivated to make the proposed combination (and they would not), the proposed combination of Chung-Sik and Matsuki fails to support a *prima facie* obviousness rejection. MPEP § 2143.01 states "[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious. *In re Ratti*, 270 F.2d 810, 813, 123 USPQ 349, 352 (CCPA 1959)." As described above, Chung-Sik describes a system that operates "when the two devices are coupled to each other" in a fixed arrangement at which the core 78 of the portable device 18 is positioned on a surface of the core 76 of the transmitter 28 of the base unit 12. (Chung-Sik, page 8-4, lines 20-25). This fixed arrangement is critical to the portable device of Chung-Sik as the monitoring of the battery voltage of the portable device is dependent on a constant reference voltage. Chung-Sik discloses:

> **The first voltage splitter 89 for inputting the rectified voltage IDC splits the voltage IDC into a reference voltage VI at a predetermined level** using internal resistors 88 and 90, and inputs the voltage to an inverse terminal (-) of the comparator [9]6. A charge level detection voltage V2 from a split voltage circuit 93 which is connected between the cathode and ground of the diode 86 and which splits and detects the voltage of an output node of the charging unit 52 is applied to the non-inverting terminal (+) of the comparator 96. **In this case, the reference voltage VI is constant and the charge level detection voltage V2 varies depending on a charge voltage level of the battery 32.** Thus, when the first microcomputer 48 outputs the control signal (SCTL) of 10 KHZ to an output port Pl, a charge voltage via inductive coupling between the induced voltage generating unit 46 and the induced voltage detecting unit 81 is applied to the battery 32 to initiate charge of the battery 32. (Chung-Sik, page 8-5, lines 1-8, emphasis added).

The combination proposed in the Final Office Action requires modifying the relative positions of the base 12 and the portable device 18 of Chung-Sik as allegedly disclosed in Matsuki. This combination changes the principle of operation of the system disclosed in Chung-Sik as the devices would not be coupled to each other in a fixed arrangement. Further, the proposed combination requires varying the charging current, and thereby varying the reference voltage, and as such the reference voltage would not be constant in the system suggested in the Final Office Action. However, if the reference voltage is variable, the comparator will not be able to correctly determine the charge level of the battery as the comparator relies on the reference voltage being constant. Accordingly, the proposed combination changes the principle of operation of the system disclosed in Chung-Sik as the system would not be able to determine the charge level of the battery based on a constant reference voltage. Therefore, for at least these reasons, the proposed combination of Chiung-Sik and Matsuki fails to support a *prima facie* obviousness rejection of the claims.

Chung-Sik and Kaite

The Final Office Action states claims 55, 57-60, 62-64, and 69-72 are rejected under 35 U.S.C. § 102 as anticipated by Chung-Sik and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite. (Final Office Action, p. 124). For example, the Final Office Action states "[t]o the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode it would have been obvious over Kaite et al." (Final Office Action, p. 126). The Final Office Action does not articulate how the proposed combination of Chung-Sik and Kaite would have been predictable to one of ordinary skill in the art, how the resultant combination would have been predictable, or how a person having ordinary skill in the art would have a reasonable expectation of success in making the proposed combination as required by MPEP § 2143.01, MPEP § 2143.02, and case law precedent. Accordingly, Patent Owner submits that the combination of Chung-Sik and Kaite fails to support a *prima facie* obviousness rejection.

d. Rejection of Claims 1, 3 - 6, and 25 - 29

The Final Office Action states claim 1 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 14). Patent Owner disagrees.

Claim 1 recites "wherein the monitoring result includes a wireless feedback control signal to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device." The Final Office Action relies on Chung-Sik and Matsuki to disclose the cited aspect of claim 1. Chung-Sik discloses:

> When the temperature is determined to be normal in operation 106, the first microcomputer 48 scans the input port P3 and searches for the status of the charge switch 30 in the process of operation 108. In operation 108, when the charge switch 30 is switched "off" and the hand-set status signal (HSS) is input as "high", the portable device 18 is determined to be separated and the aforementioned operation 112 is performed. In operation 108, when the charge switch 30 is turned "on", the first microcomputer 48 analyzes the data input to line 49 in operation 110 and searches whether or not the portable device is normal. In this case, the data input to the line 49 is input as data that is wirelessly transmitted from the portable device 18 when the battery 32 is completely charged. If analysis of input data in operation 110 indicates the portable device is abnormal (i.e. charge is incomplete), the first microcomputer 48 jumps to the aforementioned step 106 to continuously generate a charge voltage, and when the portable device is normal, the first microcomputer 48 jumps to operation 112 to stop charging. (Chung-Sik, p. 8-5, lines 22 - 30).

Patent Owner submits that Chung-Sik fails to teach the cited aspect of claim 1. Chung-Sik discloses stopping charging when the battery 32 is completely charged. This does not teach, suggest, or constitute "induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device."

First, stopping charging when a battery is completely charged does not teach, suggest, or constitute "relative positions of the contact-less chargeable battery and the external contact-less charging device" as in claim 1. Second, stopping charging when the battery is completely charged does not teach, suggest, or constitute inducing a change of intensity of a magnetic field as in claim 1. Chung-Sik discloses stopping charging when a battery is completely charged. However, when the charging is stopped, the magnetic field is not present and therefore does not have an intensity. This does not constitute changing the intensity of a magnetic field. That is, Chung-Sik fails to teach, suggest, or disclose a *variable* intensity of a magnetic field or varying the intensity of a magnetic field. Patent Owner cannot locate any teachings in Kaite or Matsuki that cure this

deficiency in Chung-Sik. To add to that, stopping charging of Chung-Sik is different from power adjustment and this is the same as simply turning off the light is different from adjusting the intensity of illumination of the light.

The Final Office Action further states Chung-Sik does "not specifically disclose to induce the change of intensity of the magnetic field based on relative positions of the contact-less chargeable battery and the external contact-less charging device." (Final Office Action, p. 18). The Final Office Action relies on Matsuki to teach the cited aspect of claim 1. (Final Office Action, p. 19). Matsuki discloses "[c]ontrolling the high-frequency output or changing the distance between the output coil 7 of the charging device 1′ and the input coil 6 of the storage battery 2′ allows the charging current to be adjusted and the charging time of the storage battery 2′ to be changed." (Matsuki, column 2, lines 24 - 27). This does not teach, suggest, or constitute "induc[ing] the change of intensity of the magnetic field [...] based on relative positions of the contact-less chargeable battery and the external contact-less charging device" as in claim 1. Specifically, Matsuki observes that the distance between the charging device and the storage battery would result in a change in charging time of the storage battery. However, this does not constitute changing the intensity of a magnetic field based on a distance. That is, in Matsuki, the intensity of the magnetic field generated from a primary coil does not change. In fact, if the position of the output coil and the input coil of Matsuki were to change, no change would be made in the operation of the charging device of Matsuki. This is in contrast to the claimed invention, where a wireless feedback control signal would be transmitted to control the operation of the claimed external contact-less charging device. Accordingly, Matsuki fails to teach the cited aspect of claim 1. Patent Owner cannot locate any teachings in Kaite that cure this deficiency in Matsuki.

Furthermore, the proposed combination of Chung-Sik and Matsuki fails to disclose "wherein the monitoring result includes a wireless feedback control signal to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device." That is, none of the cited references disclose the feedback power adjustment control.

MPEP § 2143.01 states "[t]he mere fact that references can be combined or modified does not render the resultant combination obvious unless the results would have been predictable to one

of ordinary skill in the art. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417, 82 USPQ2d 1385, 1396 (2007)." MPEP § 2143.02 states "[w]here there is a reason to modify or combine the prior art to achieve the claimed invention, the claims may be rejected as prima facie obvious provided there is also a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986)." For reasons including those stated above, Patent Owner notes that the proposed combination of Chung-Sik, Kaite, and/or Matsuki does not support the rejection of claim 1, as the results of the proposed combination would not have been predictable to one of ordinary skill in the art, would not have a reasonable expectation of success, and change the principle of operation of the system disclosed in Chung-Sik in violation of the MPEP and case law precedent.

For reasons including those stated above, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 1 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 1. Therefore, Patent Owner submits the rejection of claim 1 should be withdrawn.

Claims 3-6 and 25-29 depend from claim 1. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

e. Rejection of Claims 7-12 and 30-34

The Final Office Action states claim 7 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 26). Patent Owner disagrees. One element of claim 7 reads "wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 7 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 7. Therefore, Patent Owner submits the rejection of claim 7 should be withdrawn.

Claims 8-12 and 30-34 depend from claim 7. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

f. Rejection of Claims 13-20, 35, and 37-39

The Final Office Action states claim 13 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 36). Patent Owner disagrees. One element of claim 13 reads "wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 13 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 13. Therefore, Patent Owner submits the rejection of claim 13 should be withdrawn.

Claims 14-20, 35, and 37-39 depend from claim 13. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

g. Rejection of Claims 21, 22, and 40-44

The Final Office Action states claim 21 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 44). Patent Owner disagrees. One element of claim 21 reads "wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 21 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 21. Therefore, Patent Owner submits the rejection of claim 21 should be withdrawn.

Claims 22 and 40-44 depend from claim 21. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

h. Rejection of Claims 23, 24, and 45-48

The Final Office Action states claim 23 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 52). Patent Owner disagrees. One element of claim 23 reads "wherein the adjusting the power of the high frequency AC current applied to the primary coil is based on relative positions of the contact-less chargeable battery and

the contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 23 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 23. Therefore, Patent Owner submits the rejection of claim 23 should be withdrawn.

Claims 24 and 45-48 depend from claim 23. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

i. Rejection of Claims 49-54

The Final Office Action states claim 49 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 79). Patent Owner disagrees. One element of claim 49 reads "wherein the microprocessor transmits the monitoring result to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device to solve an overvoltage state according to relative positions of the primary coil and the secondary coil." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 49 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 49. Therefore, Patent Owner submits the rejection of claim 49 should be withdrawn.

Claims 50-54 depend from claim 49. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

j. Rejection of Claims 55-59

The Final Office Action states claim 55 is rejected under 35 U.S.C. § 102 as anticipated by Chung-Sik and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite. (Final Office Action, p. 124). Patent Owner disagrees. Claim 55 reads, in part "wherein the at least one microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting a power applied to the primary coil by up to a predetermined level" and "wherein the at least one microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the power applied to the primary coil by up to the predetermined level." Chung-Sik discloses:

> When the temperature is determined to be normal in operation 106, the first microcomputer 48 scans the input port P3 and searches for the status of the charge switch 30 in the process of operation 108. In operation 108, when the charge switch 30 is switched "off" and the hand-set status signal (HSS) is input as "high", the portable device 18 is determined to be separated and the aforementioned operation 112 is performed. In operation 108, when the charge switch 30 is turned "on", the first microcomputer 48 analyzes the data input to line 49 in operation 110 and searches whether or not the portable device is normal. In this case, the data input to the line 49 is input as data that is wirelessly transmitted from the portable device 18 when the battery 32 is completely charged. If analysis of input data in operation 110 indicates the portable device is abnormal (i.e. charge is incomplete), the first microcomputer 48 jumps to the aforementioned step 106 to continuously generate a charge voltage, and when the portable device is normal, the first microcomputer 48 jumps to operation 112 to stop charging. (Chung-Sik, p. 8-5, lines 22 - 30).

Patent Owner submits that Chung-Sik fails to teach the cited aspects of claim 55. Chung-Sik discloses stopping charging when the battery 32 is completely charged. This does not teach, suggest, or constitute "a first charging power adjustment request [...] for adjusting a power applied to the primary coil by up to a predetermined level." Stopping charging when a battery is completely charged as disclosed in Chung-Sik does not teach, suggest, or constitute "adjusting a power applied to the primary coil by up to a predetermined level" as in claim 55. Specifically, when charging is stopped, power is not being applied to the battery. Therefore, stopping the charging as disclosed in Chung-Sik does not constitute "adjusting a power applied to the primary coil" as in claim 55. Patent Owner cannot locate any teachings in Kaite that cure this deficiency in Chung-Sik.

Further, Chung-Sik does not teach, suggest, or disclose "a second charging power adjustment request signal [...] for adjusting the power applied to the primary coil by up to the predetermined level." Even under the (incorrect) interpretation that the first adjustment request signal adjusting the power applied to the primary coil up to a predetermined level is disclosed by stopping charging when a battery is completely charged, Chung-Sik does not teach, suggest, or constitute a *second* adjustment. Chung-Sik discloses two charging modes - on and off. Once the charging has stopped, a second adjustment to the power cannot be made as there is no power to adjust. Therefore, Chung-Sik does not teach the cited aspect of claim 55. Patent Owner cannot locate any teachings in Kaite that cure this deficiency in Chung-Sik.

For reasons including those stated above, Chung-Sik and Kaite, either alone or in combination, fail to teach all aspects of claim 55 and the proposed combination of Chung-Sik and Kaite fails to support a *prima facie* obviousness rejection of claim 55. Therefore, Patent Owner submits the rejection of claim 55 should be withdrawn.

Claims 56-59 depend from claim 55. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

k. Rejection of Claims 60-64

The Final Office Action states claim 60 is rejected under 35 U.S.C. § 102 as anticipated by Chung-Sik and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite. (Final Office Action, p. 135). Patent Owner disagrees. Claim 60 reads, in part, "wherein the microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device by up to a predetermined level" and "wherein the microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device by up to the predetermined level." For reasons including those stated above with respect to claim 55, Chung-Sik and Kaite either alone or in combination, fail to teach all aspects of claim 60 and the proposed combination of Chung-Sik and Kaite fails to support a *prima facie* obviousness rejection of claim 60. Therefore, Patent Owner submits the rejection of claim 60 should be withdrawn.

Claims 61-64 depend from claim 60. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

l. Rejection of Claim 65

The Final Office Action states claim 65 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 93). Patent Owner disagrees. One element of claim 65 reads "wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 65 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness

rejection of claim 65. Therefore, Patent Owner submits the rejection of claim 65 should be withdrawn.

m. Rejection of Claim 66

The Final Office Action states claim 66 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 97). Patent Owner disagrees. One element of claim 66 reads "wherein the secondary coil is movable relative to the primary coil during the charging of the battery cell by the contact-less charging circuit module, and wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting the intensity of the magnetic field." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 66 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 66. Therefore, Patent Owner submits the rejection of claim 66 should be withdrawn.

n. Rejection of Claim 68

The Final Office Action states claim 68 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 102). Patent Owner disagrees. One element of claim 68 reads "wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 68 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 68. Therefore, Patent Owner submits the rejection of claim 68 should be withdrawn.

o. Rejection of Claims 69-73

The Final Office Action states claim 69 is rejected under 35 U.S.C. § 102 as anticipated by Chung-Sik and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite. (Final Office Action, p. 144). Patent Owner disagrees. One element of claim 69 reads "wherein the monitoring result is a charging power adjustment request signal." For reasons including those

stated above with respect to claim 55, Chung-Sik and Kaite, either alone or in combination, fail to teach all aspects of claim 69 and the proposed combination of Chung-Sik and Kaite fails to support a *prima facie* obviousness rejection of claim 69. Therefore, Patent Owner submits the rejection of claim 69 should be withdrawn.

Claims 70 - 73 depend from claim 69. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

p. Rejection of Claim 74

The Final Office Action states claim 74 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 107). Patent Owner disagrees. One element of claim 74 reads "wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 74 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 74. Therefore, Patent Owner submits the rejection of claim 74 should be withdrawn.

q. Rejection of Claim 75

The Final Office Action states claim 75 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 111). Patent Owner disagrees. One element of claim 75 reads "wherein the change of intensity of the magnetic field includes a change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less charging circuit module and the external contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 75 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 75. Therefore, Patent Owner submits the rejection of claim 75 should be withdrawn.

6. <u>Conclusion</u>

In view of the foregoing remarks, it is respectfully submitted that this application is in condition for allowance. Accordingly, reconsideration of the application and allowance of the claims are respectfully requested. Although the present paper may include a combination of alterations to the application or claims, or characterizations of claim scope or referenced art, Patent Owner is not conceding that previously pending claims in this application are not patentable over the cited references. Rather, any alterations and/or characterizations are made strictly to facilitate prosecution of this reexamination. As such, reviewers of this or any parent, child, or related prosecution history shall not reasonably infer that Patent Owner has made any disclaimers or disavowals of any subject matter supported by the present application. Patent Owner has submitted amendments and arguments believed to be sufficient to overcome all of the outstanding rejections.

Consequently, Patent Owner has not advanced every argument for the allowability of the claims over the references of record. As such, Patent Owner does not acquiesce to any of the statements or characterizations not specifically traversed. If the Examiner should have any remaining questions or objections, a telephone interview to discuss and resolve these issues is respectfully requested.

The Commissioner is hereby authorized to charge Deposit Account No. 02-1818 for any fees which are due and owing. If such a withdrawal is made, please indicate the Attorney Docket No. 0313071.00020 on the account statement.

Respectfully submitted,
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AMENDMENTS TO THE CLAIMS

Claim 1 (Twice Amended): A contact-less chargeable battery including a charging circuit for charging an electric energy to a battery cell, the contact-less chargeable battery comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit [for] that includes first and second voltage detectors respectively detecting first and second voltages at both ends of the constant voltage/constant current supplier and a microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result includes a wireless feedback control signal to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device.

Claim 2 (Cancelled).

Claim 3 (Thrice Amended): The contact-less chargeable battery according to claim 1, wherein:

the overvoltage monitoring unit includes:

a wireless transmitting unit for wirelessly propagating the monitoring result through an antenna; and

[first and second voltage detectors for respectively detecting voltages at front and rear ends of the constant voltage/constant current supplier;]

a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and [outputs] outputting a voltage comparison result; and

the [a] microprocessor [for outputting a] outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 4 (Twice Amended): The contact-less chargeable battery according to claim 3, wherein [a] the magnetic field generated by the external contact-less charging device is generated intermittently,

wherein the microprocessor [overvoltage monitoring unit further includes a charging pause detecting unit for receiving the high frequency AC current output from the high frequency AC current inducing unit to detect] receives an end time point signal indicating a time point when the induction of high frequency AC current ends,[and then outputting the end time point to the microprocessor, and] wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 5 (Original): The contact-less chargeable battery according to claim 1, wherein the monitoring result is a charging power adjustment request signal.

Claim 6 (Original): The contact-less chargeable battery according to claim 1, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values of both ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 7 (Twice Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by[means of] a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

[an overvoltage monitoring unit for] a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device[by means of wireless communication] so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 8 (Amended): The contact-less charging circuit module according to claim 7, wherein the high frequency AC current inducing unit is a coil to which a magnetic flux of [a] the magnetic field generated from the external contact-less charging device is linked.

Claim 9 (Thrice Amended): The contact-less charging circuit module according to claim 7,[wherein the overvoltage monitoring unit includes] further comprising:

[a wireless transmitting unit for wirelessly propagating the monitoring result through]an antenna;

first and second voltage detectors for respectively detecting first and second voltages at front and rear ends of the constant voltage/constant current supplier; and

a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and [outputs] outputting a voltage comparison result, [;] and

wherein the [a] microprocessor [for outputting a] outputs the monitoring result according to the voltage comparison result[to the wireless transmitting unit] using the antenna.

Claim 10 (Twice Amended): The contact-less charging circuit module according to claim 9, wherein [a] the magnetic field generated by the external contact-less charging device is generated intermittently,

wherein the[overvoltage monitoring unit further includes a charging pause detecting unit for receiving the high frequency AC current output from the high frequency AC current inducing unit to detect] microprocessor receives a time point indicating when the induction of high frequency AC current ends, and then [outputting] outputs the end time point to the microprocessor, and

wherein the monitoring result is wirelessly transmitted to the external contact-less charging device[by means of wireless communication] while a high frequency AC current is not induced after the end time point is input.

Claim 11 (Amended): The contact-less charging circuit module according to claim [1] 7, wherein the monitoring result is a charging power adjustment request signal.

Claim 12 (Amended): The contact-less charging circuit module according to claim [1] 7, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 13 (Twice Amended): A contact-less charging device for transmitting a charging power by[means of] electromagnetic induction[phenomenon] to a contact-less chargeable battery that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode and wirelessly transmits a monitoring result for voltages at both ends of the constant voltage/constant current supplier, the contact-less charging device comprising:

a magnetic field generating unit for receiving an AC current and forming a magnetic field in an outer space;

a high frequency power driving unit for applying a high frequency AC current to the magnetic field generating unit; and

a[charging power adjusting unit for] microprocessor wirelessly receiving the monitoring result from the contact-less chargeable battery[by means of wireless communication] and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that [a] the charging power transmitted to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 14 (Original): The contact-less charging device according to claim 13, wherein the magnetic field generating unit is a coil to both sides of which a high frequency AC current is applied.

Claim 15 (Twice Amended): The contact-less charging device according to claim 13, [wherein the charging power adjusting unit includes]further comprising:

[a wireless receiving unit for wirelessly receiving the monitoring result through]an antenna coupled to the microprocessor and used to receive the monitoring result.[; and

a microprocessor for receiving the monitoring result from the wireless receiving unit and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit.]

Claim 16 (Twice Amended): The contact-less [chargeable battery] charging device according to claim 15, further comprising a [constant voltage supplier for] power supply [converting] receiving a common AC current, converting the common AC current into a DC current, and then supplying a constant-voltage current to the high frequency power driving unit, wherein the high frequency power driving unit includes:

a pulse signal generator for receiving a pulse driving signal from the microprocessor and outputting a pulse signal; and

a power driving part for receiving the pulse signal to rapidly switch the constant-voltage current input from the constant voltage supplier, thereby generating a high frequency AC current in a pulse pattern.

Claim 17 (Twice Amended): The contact-less charging device according to claim 16, wherein the[charging power adjusting unit] microprocessor adjusts [a] the charging power by modulating a width of a pulse current, a frequency of the pulse current, an amplitude of a pulse, or [the] a number of pulses.

Claim 18 (Amended): The contact-less charging device according to claim 16, wherein the [constant voltage supplier] power supply includes:

an overvoltage filter for receiving a common AC current and intercepting an overvoltage current;

a rectifier for rectifying the AC current passing through the filter to convert the AC current into a DC current; and

a constant voltage [supplying part for receiving] supplier that receives the converted DC current and outputs a constant voltage current.

Claim 19 (Amended): The contact-less charging device according to claim 13, wherein the high frequency power driving unit intermittently applies a high frequency AC current to the magnetic field generating unit, and

wherein the[charging power adjusting unit] microprocessor receives the monitoring result while a high frequency AC current is not applied to the magnetic field generating unit.

Claim 20 (Original): The contact-less charging device according to claim 13, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 21 (Twice Amended): A battery charging set including a contact-less chargeable battery and a contact-less charging device,

wherein the contact-less chargeable battery includes:

a high frequency AC current inducing unit to which a high frequency AC current is induced by[means of] a magnetic field intermittently generated from an external contactless charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to a battery cell in a constant voltage/constant current mode; and

[an overvoltage monitoring unit for] a first microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device[by means of wireless communication] while a high frequency AC current is not induced,

wherein the contact-less charging device includes:

a magnetic field generating unit for receiving an AC current and forming [a] the magnetic field in an outer space;

a high frequency power driving unit for intermittently applying a high frequency AC current to the magnetic field generating unit; and

a second microprocessor [charging power adjusting unit for], while a high frequency AC current is not applied to the magnetic field generating unit, wirelessly receiving the monitoring result[by means of wireless communication] and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that a charging power transmitted from the contact-less charging device to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 22 (Original): The battery charging set according to claim 21, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 23 (Twice Amended): A method for controlling charging of a contact-less chargeable battery using a contact-less charging device by[means of] electromagnetic induction[phenomenon], the method comprising:

(a) intermittently applying a high frequency AC current to a primary coil provided to the charging device so as to intermittently generate a magnetic field in an outer region;

(b) linking a magnetic flux of the generated magnetic field to a secondary coil provided to the battery so as to intermittently output an electromagnetically-induced high frequency AC current;

(c) rectifying the output high frequency AC current to be converted into a DC current;

(d) applying the DC current to a battery cell through a constant voltage/constant current supplier so as to charge the battery cell in a constant voltage/constant current mode;

(e) monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the charging device[by means of wireless communication] while a high frequency AC current is not induced in the secondary coil; and

(f) adjusting a power of the high frequency AC current applied to the primary coil according to the transmitted monitoring result,

wherein the adjusting the power of the high frequency AC current applied to the primary coil is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Clam 24 (Original): The method according to claim 23, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 25 (New, Amended): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 26 (New, Amended): The contact-less chargeable battery according to claim 1, wherein the microprocessor controls, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 27 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 28 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 29 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 30 (New, Amended): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 31 (New, Amended): The contact-less charging circuit module according to claim 7, wherein the microprocessor controls, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 32 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 33 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier supplies the charging power in a constant

current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 34 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 35 (New): The contact-less chargeable battery according to claim 13, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 36 (Cancelled).

Claim 37 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier has a front end and a rear end, and wherein the constant voltage/constant current supplier receives a DC current from a rectifier at the front end and supplies a charging power at the rear end.

Claim 38 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier charges the battery in a constant current mode at an initial charging stage and then charges the battery in a constant voltage mode at a later charging stage.

Claim 39 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier charges the battery in a constant voltage mode based on a charging voltage of the battery exceeding a predetermined level.

Claim 40 (New, Amended): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 41 (New, Amended): The battery charging set according to claim 21, wherein the microprocessor controls, through wireless feedback control of charging the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 42 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 43 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 44 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 45 (New): The method of claim 23, further comprising:

receiving, by the constant voltage/constant current supplier, the DC current at a front end of the constant voltage/constant current supplier; and

supplying, by the constant voltage/constant current supplier, the DC current at a rear end of the constant voltage/constant current supplier to the battery cell.

Claim 46 (New): The method of claim 23, further comprising:

supplying, by the constant voltage/constant current supplier, the DC current to the battery cell in a constant current mode during an initial charging stage and then in a constant voltage mode at a later charging stage.

Claim 47 (New): The method of claim 23, further comprising:

charging, by the constant voltage/constant current supplier, the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 48 (New, Amended): The method of claim 23, further comprising:

controlling, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing a change of intensity of the magnetic field.

Claim 49 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage; and

an overvoltage monitoring unit that includes first and second voltage detectors respectively detecting voltages at both ends of the constant voltage/constant current supplier, and a microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the microprocessor transmits the monitoring result to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device to solve an overvoltage state according to relative positions of the primary coil and the secondary coil.

Claim 50 (New): The contact-less charging circuit module according to claim 49, wherein a magnetic flux of the magnetic field generated from the external contact-less charging device is linked to the secondary coil of the high frequency AC current inducing unit.

Claim 51 (New, Amended): The contact-less charging circuit module according to claim 49, wherein:

the overvoltage monitoring unit further comprises:

a wireless transmitting unit wirelessly propagating the monitoring result through an antenna; and

a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

the microprocessor outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 52 (New): The contact-less charging circuit module according to claim 51, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the overvoltage monitoring unit further includes a charging pause detecting unit receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, and

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 53 (New): The contact-less charging circuit module according to claim 49, wherein the monitoring result is a charging power adjustment request signal.

Claim 54 (New): The contact-less charging circuit module according to claim 49, wherein the monitoring result is a difference of voltages at front and rear ends of the constant

voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 55 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier that includes circuitry controlled by at least one microprocessor, the constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage; and

an overvoltage monitoring unit that includes a wireless transmitter, first and second voltage detectors respectively detecting voltages at both ends of the constant voltage/constant current supplier, and the at least one microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device using the wireless transmitter so as to induce a change of intensity of the magnetic field,

wherein the at least one microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting a power applied to the primary coil by up to a predetermined level,

wherein the at least one microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the power applied to the primary coil by up to the predetermined level.

Claim 56 (New): The contact-less charging circuit module according to claim 55, wherein at least one of the first charging power adjustment request signal and the second charging power adjustment request signal is based on relative positions of the primary coil and the secondary coil.

Claim 57 (New, Amended): The contact-less charging circuit module according to claim 55, wherein the wireless transmitter wirelessly propagates the monitoring result through an antenna,

wherein the overvoltage monitoring unit includes a voltage comparator comparing first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

wherein the at least one microprocessor outputs the monitoring result according to the voltage comparison result to the wireless transmitter.

Claim 58 (New, Amended): The contact-less charging circuit module according to claim 55, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the microprocessor receives an indication of a time point when the induction of high frequency AC current ends, and

wherein the monitoring result is wirelessly transmitted to the external contact-less charging device while a high frequency AC current is not induced after the end time point is input.

Claim 59 (New): The contact-less charging circuit module according to claim 55, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 60 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for receiving a charging power from an external contact-less charging device and charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by a magnetic field generated from the external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

a microprocessor monitoring the voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device so as to induce a change of intensity of the magnetic field,

wherein the microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device by up to a predetermined level, and

wherein the microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device by up to the predetermined level.

Claim 61 (New): The contact-less charging circuit module according to claim 60, wherein at least one of the first charging power adjustment request signal and the second charging power adjustment request signal is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 62 (New, Amended): The contact-less charging circuit module according to claim 60, wherein the overvoltage monitoring unit includes:

an antenna;

first and second voltage detectors respectively detecting first and second voltages at front and rear ends of the constant voltage/constant current supplier; and

a voltage comparator comparing the first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

wherein the microprocessor outputs the monitoring result according to the voltage comparison result using the antenna.

Claim 63 (New, Amended): The contact-less charging circuit module according to claim 60, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the microprocessor receives an indication of a time point when the induction of high frequency AC current ends, and

wherein the monitoring result is wirelessly transmitted to the external contact-less charging device while a high frequency AC current is not induced after the end time point is input.

Claim 64 (New): The contact-less charging circuit module according to claim 60, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 65 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting unit transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 66 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit including a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting unit transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the secondary coil is movable relative to the primary coil during the charging of the battery cell by the contact-less charging circuit module, and

wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting the intensity of the magnetic field.

Claim 67 (Cancelled).

Claim 68 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit including a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit detecting first and second voltages at both ends of the constant voltage/constant current supplier, monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device.

Claim 69 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit for monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result is a charging power adjustment request signal.

Claim 70 (New): The contact-less charging circuit module according to claim 69, wherein the high frequency AC current inducing unit is a coil to which a magnetic flux of the magnetic field generated from the external contact-less charging device is linked.

Claim 71 (New): The contact-less charging circuit module according to claim 69, wherein the overvoltage monitoring unit includes:

a wireless transmitting unit for wirelessly propagating the monitoring result through an antenna;

first and second voltage detectors for respectively detecting voltages at front and rear ends of the constant voltage/constant current supplier;

a voltage comparator for comparing first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result; and

a microprocessor for outputting the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 72 (New): The contact-less charging circuit module according to claim 71, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the overvoltage monitoring unit further includes a charging pause detecting unit for receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, and

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 73 (New): The contact-less charging circuit module according to claim 69, wherein the charging power adjustment request signal is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 74 (New): A contact-less charging device for transmitting a charging power by means of electromagnetic induction phenomenon to a contact-less chargeable battery that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode and wirelessly transmits a monitoring result for voltages at both ends of the constant voltage/constant current supplier, the contact-less charging device comprising:

a magnetic field generating unit for receiving an AC current and forming a magnetic field in an outer space;

a high frequency power driving unit for applying a high frequency AC current to the magnetic field generating unit; and

a charging power adjusting unit that includes: a wireless receiving unit receiving the monitoring result from the contact-less chargeable battery by means of wireless communication, and a microprocessor controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that the charging power transmitted to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 75 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes a microprocessor, the microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field includes a change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Owner:	LS CABLE & SYSTEM LTD.
Reexam Control No.:	96/000,355
Conf. No.:	1538
Art Unit:	3992
Examiner:	Anjan K Deb
Attorney Docket No.:	0313071.00020
Reexam Filing Date:	March 12, 2021
Patent Under Reexam:	8,013,568
Title:	CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF

Mail Stop *Ex Parte* Reexam
Central Reexamination Unit
Commissioner for Patents
United States Patent & Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

AFTER FINAL RESPONSE TO FINAL OFFICE ACTION

This Response is submitted in reply to the Final Office Action dated March 3, 2022 and the Notice of Defective Paper in *Ex Parte* Reexamination Patent Owner Requested dated May 13, 2022. The Patent Owner respectfully requests entry of the following amendments and consideration of the following:

Amendments to the Claims reflected in the listing of claims beginning on page 2 of this paper; and

Remarks/Arguments beginning on page 23 of this paper.

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	3	"8013568".pn.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/18 01:26 PM
L2	5	"100451606".pn.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/18 01:26 PM
L3	5058	320/108.ccls.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/21 11:25 AM
L4	261	L3 AND (constant ADJ current)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/21 11:27 AM
L5	197	L4 AND (constant ADJ voltage)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/21 11:30 AM
L6	197	L4 AND L5	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/21 11:30 AM
L7	94	L6 AND h02j50/10.cpc.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD,	OR	ON	ON	2021/09/21 11:34 AM

			DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L8	89	L7 AND ((charger charging) near3 battery)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/21 11:35 AM
L9	25	L8 AND @pd<"20110906"	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/21 11:39 AM
L10	5	L9 AND @pd<"20050729"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/21 11:41 AM
L11	5	"6,184,651".pn.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/21 09:04 PM
L12	0	L10 AND (wireless wirelessly)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/22 12:15 PM
L13	215303	battery ADJ (charger charging charged) AND (wireless wirelessly)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/22 12:17 PM
L14	215303	(battery ADJ (charger charging charged)) AND (wireless	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD,	OR	ON	ON	2021/09/22 12:17 PM

		wirelessly)	DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L15	10395	L14 AND @pd<"20050729"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/22 12:18 PM
L16	4392	L15 AND antenna	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/22 12:19 PM
L17	625	L16 AND feedback	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/22 12:20 PM
L18	62	L17 AND (contactless (contact ADJ less))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/22 12:25 PM
L19	0	L18 AND ((constant ADJ current) near3 (constant ADJ voltage))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/22 06:28 PM
L20	0	L18 AND ((constant ADJ current) AND (constant ADJ voltage))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/22 06:28 PM
L21	22	L17 AND ((constant ADJ current) AND (constant ADJ voltage))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD,	OR	ON	ON	2021/09/22 06:29 PM

			DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L22	12	((KR-100451606-B1 OR EP-1518512-A2 OR JP-H08237941-A OR JP-H09251865-A).did. AND FTDB.dbnm.) OR ((WO-2007013726-A1 OR US-6184651-B1).did. AND DWPI.dbnm.) OR ((US-8013568-B2 OR US-6040680-A OR US-6683438-B2 OR US-6184651-B1 OR US-6016046-A).did. AND USPT.dbnm.) OR ((US-20130293192-A1).did. AND PGPB.dbnm.)	(USPAT; US-PGPUB; FPRS; USOCR; IBM_TDB; EPO; JPO; DERWENT; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN))	OR	ON	ON	2021/09/27 11:39 AM
L23	12	((KR-100451606-B1 OR EP-1518512-A2 OR JP-H08237941-A OR JP-H09251865-A).did. AND FTDB.dbnm.) OR ((WO-2007013726-A1 OR US-6184651-B1).did. AND DWPI.dbnm.) OR ((US-8013568-B2 OR US-6040680-A OR US-6683438-B2 OR US-6184651-B1 OR US-6016046-A).did. AND USPT.dbnm.) OR ((US-20130293192-A1).did. AND PGPB.dbnm.)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/27 11:39 AM
L24	620857	battery ADJ (charging charger)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/27 11:45 AM
L25	61525	(battery ADJ (charging charger)).ti.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/27 11:46 AM
L26	6500	H02J7/00308.cpc.	(US-PGPUB; USPAT;	OR	ON	ON	2021/09/27

			USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				11:49 AM
L27	361	L25 AND L26	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/27 11:50 AM
L28	126	L27 AND @pd<"20050729"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/27 11:50 AM
L29	3123	H02J7/16.cpc.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/27 11:55 AM
L30	18	L28 AND L29	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/27 11:55 AM
L31	12	((KR-100451606-B1 OR EP-1518512-A2 OR JP-H08237941-A OR JP-H09251865-A).did. AND FTDB.dbnm.) OR ((WO-2007013726-A1 OR US-6184651-B1).did. AND DWPI.dbnm.) OR ((US-8013568-B2 OR US-6040680-A OR US-6683438-B2 OR US-6184651-B1 OR US-6016046-A).did. AND USPT.dbnm.) OR ((US-20130293192-A1).did. AND PGPB.dbnm.)	(USPAT; US-PGPUB; FPRS; USOCR; IBM_TDB; EPO; JPO; DERWENT; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN))	OR	ON	ON	2021/09/27 12:01 PM

L32	12	((KR-100451606-B1 OR EP-1518512-A2 OR JP-H08237941-A OR JP-H09251865-A).did. AND FTDB.dbnm.) OR ((WO-2007013726-A1 OR US-6184651-B1).did. AND DWPI.dbnm.) OR ((US-8013568-B2 OR US-6040680-A OR US-6683438-B2 OR US-6184651-B1 OR US-6016046-A).did. AND USPT.dbnm.) OR ((US-20130293192-A1).did. AND PGPB.dbnm.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/09/27 12:01 PM
L33	12	((KR-100451606-B1 OR EP-1518512-A2 OR JP-H08237941-A OR JP-H09251865-A).did. AND FTDB.dbnm.) OR ((WO-2007013726-A1 OR US-6184651-B1).did. AND DWPI.dbnm.) OR ((US-8013568-B2 OR US-6040680-A OR US-6683438-B2 OR US-6184651-B1 OR US-6016046-A).did. AND USPT.dbnm.) OR ((US-20130293192-A1).did. AND PGPB.dbnm.)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/01/28 09:26 AM
L34	23136	(charging ADJ (current power)) near3 (adjust$3 adjustable)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/01/28 09:45 AM
L35	12857	L34 AND (battery ADJ charg$3)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/01/28 09:46 AM
L36	1492	L35 AND @pd<"20050729"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT;	OR	ON	ON	2022/01/28 09:47 AM

			IBM_TDB)				
L37	398	L36 AND (battery ADJ charg$3).ti.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/01/28 09:49 AM
L38	0	L37 AND ((charg$3 ADJ current) near3 distance)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/01/28 09:57 AM
L39	13	(adjust$3 adjustable) WITH ((charg$3 ADJ current) near3 distance)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/01/28 09:58 AM
L40	157	(induction ADJ charging ADJ plate)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/01/28 10:05 AM
L41	85300	(wireless$2 ADJ charg$3) WITH battery	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/01/28 10:10 AM
L42	27	L41 AND ((charg$3 ADJ current) near3 distance)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/01/28 10:12 AM
L43	10	((adjust$3 near3 (charg$3 ADJ current)) near3 distance)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT;	OR	ON	ON	2022/01/28 10:19 AM

			IBM_TDB)				
L44	93	((adjust$3 near3 (charg$3 ADJ current)) WITH distance)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/01/28 10:25 AM
L45	18	(Artificial Intelligence) More Like: JP-H0145230-Y2 Text: (JP-S51102967-U OR JP-S49120682-A OR BG-25855-A1 OR JP-S57192737-U OR DE-2745782-C2 OR JP-S5324430-Y2 OR BG-25881-A1 OR JP-S4939677-U OR JP-S59129349-U OR BG-25810-A1 OR JP-S5142593-Y2 OR BG-25860-A1 OR BG-25853-A1 OR FR-2347499-B1 OR JP-S6057189-B2 OR DE-2747750-C2 OR DE-2825083-C2 OR JP-S5195735-U OR JP-S4913828-U OR JP-S5414334-U).did.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/01/28 03:10 PM
L46	7	L44 AND ((charg$3 ADJ current) WITH feedback)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/01/28 03:32 PM
L47	46	(Artificial Intelligence) More Like: CN-101507091-B Text: (CN-101507091-A OR KR-101050327-B1 OR KR-20090050083-A OR	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS,	OR	ON	ON	2022/01/28 04:10 PM

		KR-101441454-B1 OR WO-2008023679-A1 OR CN-100420136-C OR CN-101777801-A OR JP-2003219644-A OR KR-20070065818-A OR CN-104426226-A OR EP-2221951-B1 OR US-6930896-B2 OR CN-1797921-B OR CN-209675927-U OR US-10263446-B2 OR CN-101771266-B OR KR-101717673-B1 OR US-2014133200-A1 OR CN-102195459-B OR US-2017324266-A1).did.	IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L48	9	L47 AND (current WITH (adjust$3 adjustable))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/01 11:54 AM
L49	4	FR-2983005-$.DID.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/01 02:18 PM
L50	15	((KR-100451606-B1 OR EP-1518512-A2 OR JP-H08237941-A OR JP-H09251865-A OR JP-H0145230-Y2).did. AND FTDB.dbnm.) OR ((WO-2007013726-A1 OR TW-239707-B1 OR US-6184651-B1).did. AND DWPI.dbnm.) OR ((US-8013568-B2 OR US-6040680-A OR US-6683438-B2 OR US-6184651-B1 OR US-6016046-A).did. AND USPT.dbnm.) OR ((JP-S57192737-U).did. AND FPRS.dbnm.) OR ((US-20130293192-A1).did. AND PGPB.dbnm.)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/01 05:07 PM
L51	5045	320/108.ccls.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP,	OR	ON	ON	2022/02/01 05:23 PM

			AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L52	665	363/74.ccls.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/01 05:23 PM
L53	0	lo51 AND L52	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/01 05:23 PM
L54	4	L51 AND (363/74.ccls.)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/01 05:24 PM
L55	676	H02J50/10.cpc. AND H02J7/007182.cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/01 05:26 PM
L56	2	L55 AND @pd<"20050729"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/01 05:27 PM
L57	8	CN ADJ "101507091"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/02 11:03 AM
L58	27	(contact ADJ less) ADJ (battery ADJ charg$3)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT,	OR	ON	ON	2022/02/07 12:44 PM

			AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L59	8	"10195950".pn.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/02/08 04:13 PM
L60	17	(Artificial Intelligence) More Like: JP-H0145230-Y2 Text: (JP-S5324430-Y2 OR JP-S59129349-U OR AR-210643-A1 OR JP-S49120682-A OR JP-S51102967-U OR AU-71461-S OR JP-S5396140-U OR JP-S57192737-U OR JP-S4939677-U OR FR-2347499-B1 OR JP-S6057189-B2 OR AU-3353778-A OR JP-S4913828-U OR JP-S5266935-U OR JP-S4526035-Y1 OR JP-S5195735-U OR JP-S5414334-U OR DE-7706326-U1 OR FR-2376701-B1 OR BE-868323-A).did.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/04/05 09:45 PM
L61	43	(Artificial Intelligence) More Like: US-8013568-B2 Text: (US-20080303479-A1 OR WO-2007013726-A1 OR EP-3477812-A1 OR KR-100853889-B1 OR JP-4695691-B2 OR CN-107623344-A OR WO-2018010416-A1 OR US-20190148981-A1 OR JP-2009504116-A OR JP-2009504117-A OR CN-101233665-A OR CN-101233665-B OR KR-100792311-B1 OR WO-2008133388-A1 OR CN-106208283-	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/06/08 10:15 AM

		A OR KR-100903463-B1 OR CN-103038972-A OR CN-106208283-B OR KR-100903464-B1 OR CN-102694424-A).did.					
L62	0	L61 AND @pd<"20050729"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/06/08 10:33 AM
L63	4	L61 AND distance	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/06/08 10:33 AM
L64	15	L61 AND position	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/06/10 04:17 PM
L65	1262	((charger charging) near3 battery) WITH (relative ADJ position)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/06/10 04:23 PM
L66	81	L65 AND @pd<"20050729"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/06/10 04:24 PM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	96/000,355	8013568
	Examiner	Art Unit
	ANJAN K DEB	3992

CPC - Searched*		
Symbol	**Date**	**Examiner**
H02J/00308	09/27/2021	AD
H02J/00308	09/27/2021	AD
H02J50/10	09/27/2021	AD
H02J7/025	09/27/2021	AD

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**
320	108	09/27/2021	AD

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	**Date**	**Examiner**
Searched IDS	06/24/2021	AD
Searched Prosecution History	06/24/2021	AD
Updated PE2E search attached	02/17/2022	AD
Update PE2E search attached	06/08/2022	AD

/ANJAN K DEB/ Primary Examiner, Art Unit 3992	

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	96/000,355	8013568
	Examiner	Art Unit
	ANJAN K DEB	3992

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/ANJAN K DEB/ Primary Examiner, Art Unit 3992	

Ex Parte Reexamination Advisory Action Before the Filing of an Appeal Brief

(Continuation of PTO-467 Box 11)

RESPONSE TO ARGUMENTS FILED 5/23/2022

Notice of Defective Paper

In response to Notice of Defective Paper, Patent Owner has provided listing of the claims with markup of changes in the amended claims with respect to previous version of the claims. Regarding an explanation of the support in the disclosure for the changes made to the claims made by the amendment paper as required under 37 C.F.R. 1.530(e), Patent Owner argues that such support was provided in Section 2 of the previously filed response (previous response filed 5/2/2022). (Remarks page 25, Section 2 c). The Examiner disagrees, because in Section 2 of previous response filed 5/2/2022, Patent Owner refers to broad sections of the specification of the '568 patent which does meet the requirement for providing support under 37 C.F.R. 1.530(e)[1] because it fails to provide an explanation of the support in the disclosure of the patent for the changes to the claims made by the amendment paper. See for example, the underlined below, copied from Section 2 of the previous response filed 5/2/2022, where the Patent Owner refers to column and line numbers without providing any explanation for the changes to the claims made by the amendment paper.

[1] 37 C.F.R. 1.530(e) Status of claims and support for claim changes. Whenever there is an amendment to the claims pursuant to paragraph (d) of this section, there must also be supplied, on pages separate from the pages containing the changes, the status (i.e., pending or canceled), as of the date of the amendment, of all patent claims and of all added claims, and an explanation of the support in the disclosure of the patent for the changes to the claims made by the amendment paper.

(Section 2 of the previous response filed 5/2/2022 copied below)

> 2. **Status of the Claims**
>
> Claims 1, 3-35, 37-66, and 68-75 are currently pending, of which claims 1, 7, 13, 21, 23, 49, 55, 60, 65, 66, 68, 69, 74, and 75 are independent.
>
> In the present response, claims 1, 3, 4, 7, 9, 10, 13, 15, 17, 19, 21, 23, 26, 31, 41, 49, 51, 55, 57, 58, 60, 62, 63, 66, 68, and 75 are amended. Claims 2 and 67 are cancelled.
>
> Independent claim 1 is amended as noted above. Support for these amendments is found at least at column 6, line 66 - column 7, line 4; column 7, lines 43 - 49; column 8, lines 32 - 41; column 11, lines 52 - 61; and previously pending claim 2. Claims 3, 4, and new claim 26 are amended to address typographical issues, formalities, and ensure proper antecedent basis.

As seen above in Section 2 there is no explanation of the support in the disclosure of the patent for the changes to the claims made by the amendment paper. Patent Owner is advised to provide an explanation of the changes made to the claims. For example, claim 1 has been amended twice by adding, "adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device." Moreover, the cited sections (column 6, line 66 - column 7, line 4; column 7, lines 43 - 49; column 8, lines 32 - 41; column 11, lines 52 - 61; and previously pending claim 2) fail to disclose adjusting a power applied to the primary coil of the external contact-less charging device is based on relative positions of the contact-less chargeable battery and the external contact-less charging device. The specification of the '568 patent at column 6, line 66 - column 7, line 4 it is disclosed to adjust a power of the high frequency AC current applied to the primary coil 200 if an adjustment request signal of the charging power is received from the wireless receiving unit 230. At column 7, line 43 – 49, it is disclosed, "outputs an adjustment request signal of the charging power to the wireless transmitting unit 320 if an excessive voltage is applied." At column 8, lines 32 – 41, it is disclosed, "voltage comparator 380 for inputting a comparison result of a first voltage V_{PP} and a second voltage V_{ch} respectively

measured by the first and second voltage detectors 350, 360 to the microprocessor 310". At column 11, lines 52 – 61, it is disclosed, "if in an overvoltage state, the microprocessor 310 of the battery B transmits a charging power adjustment request signal to the microprocessor 240 of the charging device C by means of wireless communication". Nowhere in the above cited sections it is disclosed that adjusting a power applied to the primary coil of the external contact-less charging device is based on relative positions of the contact-less chargeable battery and the external contact-less charging device. Therefore, claim 1 (Twice Amended) may be subject to a rejection under 35 U.S.C. 251 as being based upon new matter added to the patent for which reissue is sought, and a rejection under 35 U.S.C. § 112, first paragraph as failing to comply with the written description requirement. Similar rejections may apply to independent claims, 7, 13, 21, 23, 49, 65, 68, 74, and 75.

Claim Interpretation Under 35 U.S.C. §112(6th ¶)

a) Overvoltage monitoring unit (claims 1, 4, 7, 9, 10, 21, 26, 31, 41, 49, 52, 55, 58, 60, 62, 63, 65, 66, 68, 69, 71, 72, 75)

Patent Owner has amended the claims and argued that the term "Overvoltage monitoring unit" recites sufficient structure to perform the claimed function, accordingly the interpretation of the term under 35 U.S.C. § 112, sixth paragraph is improper (Remarks pages 27-29).

The amendment of claims after the Final Rejection have not been entered by the Examiner, however if it was entered amended claim 1 includes sufficient structure for the term "overvoltage monitoring unit" by adding overvoltage monitoring unit that includes first and second voltage detectors and a microprocessor. Therefore in claim 1, as amended, the term,

"Overvoltage monitoring unit" includes sufficient structure and the term would not invoke claim interpretation under 35 U.S.C. § 112 6th paragraph.

b) "wireless transmitting unit" (claim 3)

Patent Owner submits that the term "wireless transmitting unit" should not be interpreted under 35 U.S.C. § 112, sixth paragraph because a "wireless transmitting unit," when read by a person having ordinary skill in the art in view of the specification, is understood to have a sufficiently definite meaning as the name for the structure that performs the function. (Remarks page 29-30).

The amendment of claims after the Final Rejection have not been entered by the Examiner, however if it was entered, the Examiner agrees with Patent Owner that the term "wireless transmitting unit" is a term of art that connotates a definite structure to one of ordinary skill in the art. Therefore, the term "wireless transmitting unit" recited in amended claim 3 would not invoke claim interpretation under 35 U.S.C. § 112 6th paragraph.

c) "charging pause detecting unit" (Claims 4, 10, 52, 58, 63, 72)

Patent Owner has amended the claims by removing the term "charging pause detecting unit" from the claims, therefore these claims should not be interpreted under 35 U.S.C. § 112, sixth paragraph. (Remarks page 30). The amendment of claims after the Final Rejection have not been entered by the Examiner, however if it was entered claims 4, 10, 52, 58, 63, 72 as amended would not invoke claim interpretation under 35 U.S.C. § 112 6th paragraph.

d) "charging power adjustment unit" (Claim 13, 17, 19, 21, 74)

Patent Owner has amended claims 13, 17, 19, and 21 by removing the term "charging power adjustment unit." Accordingly, Patent Owner submits that the term should not be interpreted under 35 U.S.C. § 112, sixth paragraph. (Remarks page 30). With respect to claim 74, Patent Owner submits that the claim recites specific structures for the "charging power adjustment unit." Specifically, claim 74 recites charging power adjusting unit includes wireless receiving unit and a microprocessor." Accordingly, Patent Owner submits that "charging power adjustment unit" should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

Amendment of claims after the Final Rejection has not been entered by the Examiner, however if it was entered, claims 13, 17, 19, and 21 as amended would not invoke claim interpretation under 35 U.S.C. § 112 6th paragraph because the term "charging power adjustment unit" is no longer recited in these claims. With respect to claim 74, Examiner disagrees with Patent Owner that the term "charging power adjustment unit" which includes wireless receiving unit and a microprocessor does not invoke 35 U.S.C. § 112 6th paragraph because there is no sufficient definite structure in the claim for the microprocessor to perform the claimed function. Therefore claim 74 if entered would not invoke claim interpretation under 35 U.S.C. § 112 6th paragraph.

e) "wireless receiving unit" (Claims 15, 74)

Patent Owner has amended claim 15 by removing the term "wireless receiving unit." Accordingly, Patent Owner submits that the term should not be interpreted under 35 U.S.C. § 112, sixth paragraph. (Remarks page 31). Regarding claim 74, Patent Owner submits that that the term "receiver" connotes sufficiently definite structure to those of skill in the art therefore the term "wireless receiving unit" should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

Amendment of claims after the Final Rejection has not been entered by the Examiner, however if it was entered the Examiner agrees with Patent Owner that the term "receiver" connotes sufficiently definite structure to those of skill in the art therefore the term "wireless receiving unit" in claims 15 and 74 as amended would not invoke claim interpretation under 35 U.S.C. § 112 6th paragraph.

Claim Rejections under 35 U.S.C. § 112, First and Second Paragraphs

35 U.S.C. § 112, second paragraph:

Regarding the rejection of claims 1, 21, and 65 under 35 U.S.C. § 112, second paragraph, Patent Owner has amended claims 1 and 21 and submits that these claims are no longer subject to rejection under 35 U.S.C. § 112, second paragraph. Regarding claim 65, Patent Owner notes that it is well specified in the specification that a microprocessor monitors the voltage at both ends of the constant voltage/constant current supplier. (See, for example, column 11, lines 52-58 ("in the above embodiment [...] the microprocessor 310 of the battery B monitors voltages measured at both ends of the constant voltage/constant current supplier 290" and column 11, lines 31-35 ("the microprocessor 310 periodically repeats monitoring an overvoltage state at both ends of the constant voltage/constant current supplier 290."). (Remarks page 32).

Amendment of claims after the Final Rejection has not been entered by the Examiner, however if it was entered the Examiner agrees with Patent Owner that claims 1, 21, and 65 are no longer subject to rejection under 35 U.S.C. § 112, second paragraph.

35 U.S.C. § 112, first paragraph:

Regarding the rejection of claims 55 and 60, under 35 U.S.C. § 112 first paragraph, as failing to comply with the written description requirement, Patent Owner has amended claims 55 and 60 to remove the objected to phrases. Therefore, Patent Owner submits that the rejections of claims 55 and 60 under 35 U.S.C § 112, first paragraph should be withdrawn. (Remarks page 32-33).

Amendment of claims after the Final Rejection has not been entered by the Examiner, however if it was entered the Examiner agrees with Patent Owner that claims 55 and 60 are no longer subject to rejection under 35 U.S.C. § 112, first paragraph.

Response to Claim Rejections under 35 U.S.C. § 102 and 35 U.S.C. § 103

Regarding the rejection of claims 1 - 15, 19 - 54, 56, 61, 65 - 68, and 73 - 75 under 35 U.S.C. § 103 as unpatentable over Korean Patent No. KR 950005819Bl (hereinafter "Chung-Sik") in view of Japanese Patent No. JP HO 145230 Y2 to Matsuki (hereinafter "Matsuki") and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of U.S. Pat. No. 6,016,046 to Kaite (hereinafter "Kaite") in view of Matsuki, Patent Owner has amended the claims and submits that Chung-Sik, Kaite, and Matsuki, alone or in combination, do not teach or suggest all features of any of independent claims 1, 7, 13, 21, 23, 49, 55, 60, 65, 66, 68, 69, 74, and 75. (Remarks page 33).

More specifically, Patent Owner argued that there is no motivation to combine Chung-Sik and Matsuki, because Chung-Sik teaches, "the battery may be recharged only when the portable device 18 is installed on the base unit 12" (Remarks page 38). Regarding Matsuki, Patent Owner argued that Matsuki fails to disclose any type of feedback circuitry in the battery or in the charging device. Rather, in Matsuki, although the relative positions of the output coil

and the input coil are changed, the intensity of the magnetic field does not change. (Remarks page 39).

Patent Owner's above argument has been fully considered by the Examiner but is not found convincing because Chung-Sik discloses feedback to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil based on battery voltage monitoring. Although Chung-Sik fixes the relative positions between the charger and the battery, Matsuki, discloses wireless battery charging current can be adjusted based on the distance of output coil 7 of charging equipment 1 and input coil 6 of battery 2' (Matsuki. Fig. 2). Additionally, Matsuki teaches that the charging current can be adjusted by controlling the high-frequency output of coil 7 (See Matsuki, English Translation, column 2, last paragraph copied below).

> Controlling the high-frequency output or changing the distance between the output coil 7 of the charging device 1' and the input coil 6 of the storage battery 2' allows the charging current to be adjusted and the charging time of the storage battery 2' to be changed.

One of ordinary skill in the art would be motivated to combine the charger disclosed by Chung-Sik and Matsuki so that charging can be performed without connection to the charging device or dedicated adaptors, making charging work exceptionally simple that allows the charging current to be adjusted and the charging time of the battery to be changed as required. (See Matsuki, English Translation column 3).

Amendment of claims after the Final Rejection filed on 5/23/2022, if entered, will be subject to the following rejections:

Claim Rejections under 35 U.S.C. § 251

Claims 1, 13, 21, 23, 49, 56, 61, 68, 73, 74, and 75 rejected under 35 U.S.C. 251 as being based upon new matter added to the patent for which reissue is sought. The added material which is not supported by the prior patent is as follows,

"adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device" (recited in claim 1, and similar recitation in claims 13, 21, 23, 49, 56, 61, 68, 73, 74, and 75).

Claim Rejections under 35 U.S.C. § 112, first paragraph:

Claims 1, 13, 21, 23, 49, 56, 61, 68, 73, 74, and 75 will be rejected under 35 U.S.C. § 112, first paragraph as failing to comply with the written description requirement.

The specification fails to disclose "adjusting a power applied to the primary coil of the external contact-less charging device is based on relative positions of the contact-less chargeable battery and the external contact-less charging device," recited in claim 1, and similar recitation in claims 13, 21, 23, 49, 56, 61, 68, 73, 74, and 75.

.

Claim Rejections under 35 U.S.C. § 103

Claims 1, 7, 13, 21, 23, 49, 55, 60, 65, 66, 68, 69, 74, and 75 will be rejected under 35 U.S.C. § 103(a) as being obvious over Chung-Sik (KR 950005819Bl) and Matsuki (JP H0145230 Y2) or in the alternative as being obvious over Chung-Sik (KR 950005819Bl), Kaite et al. (US 6,016,046) and Matsuki (JP H0145230 Y2).

Regarding Claims 1, 7, 13, 21, 23, 49, 55, 60, 65, 66, 68, 69, 74, and 75, Chung-Sik and Matsuki or Chung-Sik, Matsuki, and Kaite disclosed all of the limitations as set forth in the Final Rejection incorporated herein by reference.

Regarding the added limitation "adjusting a power applied to the primary coil of the external contact-less charging device is based on relative positions of the contact-less chargeable battery and the external contact-less charging device" (recited in claim 1, and similar recitation in claims 13, 21, 23, 49, 56, 61, 68, 73, 74, and 75).

Chung-Sik discloses feedback to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil based on battery voltage monitoring. Although Chung-Sik fixes the relative positions between the charger and the battery, Matsuki, discloses wireless battery charging current can be adjusted based on the distance of output coil 7 of charging equipment 1 and input coil 6 of battery 2' (Matsuki. Fig. 2). Additionally, Matsuki teaches that the charging current can be adjusted by controlling the high-frequency output of coil 7 (col. 2 last paragraph copied below).

> Controlling the high-frequency output or changing the distance between the output coil 7 of the charging device 1' and the input coil 6 of the storage battery 2' allows the charging current to be adjusted and the charging time of the storage battery 2' to be changed.

One of ordinary skill in the art would be motivated to combine the charger disclosed by Chung-Sik and Matsuki so that charging can be performed without connection to the charging device making charging work exceptionally simple that allows the charging current to be adjusted and the charging time of the battery to be changed as required.

For the reasons given above, since amendment of claims after the Final-Rejection is not allowable, the Examiner maintains the rejection of claims set forth in the Final-Rejection.

/ANJAN K DEB/
Primary Examiner, Art Unit 3992

/FRED O FERRIS III/
Reexamination Specialist, Art Unit 3992

/H.B.P./
Supervisory Patent Examiner, Art Unit 3992

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
96/000,355	03/12/2021	8013568	0313071.00020	1538

24573 7590 06/15/2022

K&L Gates LLP-Chicago
P.O. Box 1135
Chicago, IL 60690

EXAMINER	
DEB, ANJAN K	

ART UNIT	PAPER NUMBER
3992	

MAIL DATE	DELIVERY MODE
06/15/2022	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Ex Parte Reexamination Advisory Action ***Before the Filing of an Appeal Brief***	**Control No.** 96/000,355	**Patent Under Reexamination** 8013568	
	Examiner ANJAN K DEB	**Art Unit** 3992	**AIA (FITF) Status** No

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

THE PROPOSED RESPONSE FILED 23 May 2022 FAILS TO OVERCOME ALL OF THE REJECTIONS IN THE FINAL REJECTION MAILED 03 March 2022.

1. ☑ Unless a timely appeal is filed, or other appropriate action by the patent owner is taken to overcome all of the outstanding rejection(s), this prosecution of the present *ex parte* reexamination proceeding WILL BE TERMINATED and a Notice of Intent to Issue *Ex Parte* Reexamination Certificate will be mailed in due course. Any finally rejected claims, or claims objected to, will be CANCELLED.
   THE PERIOD FOR RESPONSE IS EXTENDED TO RUN 6 MONTHS FROM THE MAILING DATE OF THE FINAL REJECTION.
   Extensions of time are governed by 37 CFR 1.550(c).

NOTICE OF APPEAL

2. ☐ An Appeal Brief is due two months from the date of the Notice of Appeal filed on _____ to avoid dismissal of the appeal. See 37 CFR 41.37(a). Extensions of time are governed by 37 CFR 1.550(c). See 37 CFR 41.37(e) .

AMENDMENTS

3. ☑ The proposed amendment(s) filed after a final action, but prior to the date of filing a brief, will not be entered because:
   (a) ☑ They raise new issues that would require further consideration and/or search (see NOTE below);
   (b) ☐ They raise the issue of new matter (see NOTE below);
   (c) ☑ They are not deemed to place the proceeding in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
   (d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.
   NOTE: _____ (See 37 CFR 1.116 and 41.33(a)).
4. ☐ Patent owner's proposed response filed _____ has overcome the following rejection(s): _____
5. ☐ The proposed new or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
6. ☑ For purposes of appeal, the proposed amendment(s) a) ☑ will not be entered, or b) ☐ will be entered and an explanation of how the new or amended claim(s) would be rejected is provided below or appended.
   The status of the claim(s) is (or will be) as follows:
   Claim(s) patentable and/or confirmed: _____
   Claim(s) objected to: _____
   Claim(s) rejected: 1-35 and 37-75
   Claim(s) not subject to reexamination: _____

AFFIDAVIT OR OTHER EVIDENCE

7. ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____ .
8. ☐ The affidavit or other evidence filed after a final action, but before or on the date of filing a Notice of Appeal will not be entered because patent owner failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
9. ☐ The affidavit or other evidence filed after the date of filing a Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence fails to overcome all rejections under appeal and/or appellant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
10. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

11. ☑ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: See attached Continuation sheet .
12. ☐ Note the attached Information Disclosure Statement(s), PTO/SB/08, Paper No(s) _____ .
13. ☐ Other: _____ .

/ANJAN K DEB/ Primary Examiner, Art Unit 3992	/F.O.F/ Reexamination Specialist, Art Unit 399	

cc: Requester (if third party requester)

DO NOT ENTER: /A.K.D/

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Owner:	LS CABLE & SYSTEM LTD.
Reexam Control No.:	96/000,355
Conf. No.:	1538
Art Unit:	3992
Examiner:	Anjan K Deb
Attorney Docket No.:	0313071.00020
Reexam Filing Date:	March 12, 2021
Patent Under Reexam:	8,013,568
Title:	CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF

Mail Stop *Ex Parte* Reexam
Central Reexamination Unit
Commissioner for Patents
United States Patent & Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

AFTER FINAL RESPONSE TO FINAL OFFICE ACTION

This Response is submitted in reply to the Final Office Action dated March 3, 2022 and the Notice of Defective Paper in *Ex Parte* Reexamination Patent Owner Requested dated May 13, 2022. The Patent Owner respectfully requests entry of the following amendments and consideration of the following:

Amendments to the Claims reflected in the listing of claims beginning on page 2 of this paper; and

Remarks/Arguments beginning on page 23 of this paper.

Electronic Acknowledgement Receipt	
EFS ID:	46013310
Application Number:	96000355
International Application Number:	
Confirmation Number:	1538
Title of Invention:	CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF
First Named Inventor/Applicant Name:	8013568
Customer Number:	24573
Filer:	Matthew S. Dicke/Meg Boinski
Filer Authorized By:	Matthew S. Dicke
Attorney Docket Number:	0313071.00020
Receipt Date:	22-JUN-2022
Filing Date:	12-MAR-2021
Time Stamp:	10:04:21
Application Type:	Supplemental Examination
Patent Number:	

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Letter Requesting Interview with Examiner	0313071-00020_InterviewRequest.pdf	296393 7ecd64aaefa08881f5a12e921107d21a5ccaed02	no	3
Warnings:					
Information:					
2	Applicant summary of interview with examiner	0313071-00020_InterviewSummary.pdf	119090 03fcf5f469c915e4637cab4594e2b9f72278b692	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	415483		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Owner:	LS CABLE & SYSTEM LTD.
Appl. No.:	96/000,355
Conf. No.:	1538
Filed:	March 12, 2021
Title:	CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF
Art Unit:	3992
Examiner:	Anjan K Deb
Docket No.:	0313071.00020

STATEMENT ACCOMPANYING INTERVIEW REQUEST FORM

Patent Owner thanks the Examiners for their time and attention in this matter. In response to the Advisory Action dated June 15, 2022 (the "Advisory Action"), Patent Owner respectfully requests a second Examiner Interview in accordance with MPEP § 2281. In the second Examiner Interview, Patent Owner proposes the following agenda:

1) Discuss the 35 U.S.C. § 251 rejection indicated in the Advisory Action;
2) Discuss support for the claim language "adjusting a power applied to the primary coil of the external contact-less charging device is based on relative positions of the contact-less chargeable battery and the external contact-less charging device"; and
3) Discuss proposed amendments, to be submitted in a second Response After Final, that are suitable for entry for purposes of appeal for reasons including that the amendments place the proceeding in better form for appeal by materially reducing the issues for appeal.
4) Patent Owner will provide an informal copy of any proposed claims to be discussed at least three days prior to the second Examiner Interview.

Patent Owner requests that the second Examiner Interview be granted as the second Examiner Interview will, at the very least, expedite the issues for appeal in accordance with the requirements of MPEP § 713.09. For example, as outlined in the proposed agenda, Patent Owner intends to discuss modified claim amendments that are suitable for entry for purposes of appeal. These proposed amendments could not have been presented sooner as these amendments are

responsive to the rejection under 35 U.S.C. § 251 first indicated in the Advisory Action. Accordingly, Patent Owner submits that good cause to grant a second Examiner Interview has been shown.

Patent Owner proposes scheduling the second Examiner Interview on July 11, 2022 at 2pm Eastern time. This time is within the deadline for response to the Final Rejection dated March 3, 2022 as granted in the Advisory Action (i.e. six months from March 3, which is September 3, 2022) and provides sufficient time for the Examiners to consider a second Response After Final. However, Patent Owner can be available to conduct the second Examiner Interview at such times, within Office hours, as the Examiners may designate. The Examiner is invited to call the undersigned should the Examiner wish to conduct the second Examiner Interview at a different time or if the Examiner has any questions in advance of the second Examiner Interview.

In the event the deadline for response has not been extended to September 3, 2022 as indicated in the Advisory Action, Patent Owner requests prompt notification so that Patent Owner can promptly file a petition for extension of time under 37 CFR 1.550(c) in order to provide sufficient time for both Patent Owner and the Examiners to prepare and consider the items indicated in the proposed agenda.

Respectfully submitted,

K&L GATES LLP

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Dated: June 22, 2022

Doc Code: M865 or FAI.REQ.INTV

PTOL-413A (07-16)
Approved for use through 05/31/2024. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Applicant Initiated Interview Request Form

Application No.: 96/000,355 First Named Applicant: LS Cable & System Ltd.
Examiner: Deb Art Unit: 3992 Status of Application: Pending

Tentative Participants:
(1) Matthew S. Dicke **(2)** Samuel Richey
(3) _____ **(4)** _____

Proposed Date of Interview: 7/11/2022 **Proposed Time:** 2:00 **(** ○AM ◉PM**)**

Type of Interview Requested:
(1) ☑ **Telephonic** **(2)** ☐ **Personal** **(3)** ☐ **Video Conference**

Exhibit To Be Shown or Demonstrated: ☑ **YES** ☐ **NO**
If yes, provide brief description: Proposed claim amendments

Issues To Be Discussed

Issues (Rej., Obj., etc)	Claims/ Fig. #s	Prior Art	Discussed	Agreed	Not Agreed
(1) 112	1-35, 37-75		☐	☐	☐
(2) 251	1-35, 37-75		☐	☐	☐
(3)			☐	☐	☐
(4)			☐	☐	☑

☑ Continuation Sheet Attached ☐ Proposed Amendment or Arguments Attached

Brief Description of Arguments to be Presented:
See also separately filed statement of issues to be discussed during interview

An interview was conducted on the above-identified application on _____

NOTE: This form should be completed and filed by applicant in advance of the interview (see MPEP § 713.01). If this form is signed by a registered practitioner not of record, the Office will accept this as an indication that he or she is authorized to conduct an interview on behalf of the principal (37 CFR 1.32(a)(3)) pursuant to 37 CFR 1.34. This is not a power of attorney to any above named practitioner. See the Instruction Sheet for this form, which is incorporated by reference. By signing this form, applicant or practitioner is certifying that he or she has read the Instruction Sheet. After the interview is conducted, applicant is advised to file a statement of the substance of this interview (37 CFR 1.133(b)) as soon as possible. This application will not be delayed from issue because of applicant's failure to submit a written record of this interview.

/Matthew S. Dicke/
Applicant/Applicant's Representative Signature

Examiner/SPE Signature

Matthew S. Dicke
Typed/Printed Name of Applicant or Representative

312-578-5415
Applicant's/Applicant's Representative's Telephone Number

58,819
Registration Number, if applicable

This collection of information is required by 37 CFR 1.133. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 24 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS.

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Doc Code: M865 or FAI.REQ.INTV

PTOL-413A (07-16)
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APPLICANT INITIATED INTERVIEW REQUEST FORM

(Not to be Submitted to the USPTO)

1. If this form is signed by a registered practitioner not of record, the authority to submit the Applicant Initiated Interview Request Form is pursuant to limited authority to act in a representative capacity under 37 CFR 1.34 and further proof of authority to act in a representative capacity may be required. *See* 37 CFR 1.34.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Owner:	LS CABLE & SYSTEM LTD.
Reexam Control No.:	96/000,355
Conf. No.:	1538
Art Unit:	3992
Examiner:	Anjan K Deb
Attorney Docket No.:	0313071.00020
Reexam Filing Date:	March 12, 2021
Patent Under Reexam:	8,013,568
Title:	CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF

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Central Reexamination Unit
Commissioner for Patents
United States Patent & Trademark Office
P.O. Box 1450
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PROPOSED SECOND AFTER FINAL RESPONSE TO FINAL OFFICE ACTION

This Response is submitted in reply to the Final Office Action dated March 3, 2022, the Notice of Defective Paper in *Ex Parte* Reexamination Patent Owner Requested dated May 13, 2022, and the Advisory Action dated June 15, 2022. The Patent Owner respectfully requests entry of the following amendments and consideration of the following:

Amendments to the Claims reflected in the listing of claims beginning on page 2 of this paper; and

Remarks/Arguments beginning on page 23 of this paper.

AMENDMENTS TO THE CLAIMS

Claim 1 (Twice Amended): A contact-less chargeable battery including a charging circuit for charging an electric energy to a battery cell, the contact-less chargeable battery comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit [for] that includes first and second voltage detectors respectively detecting first and second voltages at both ends of the constant voltage/constant current supplier and a microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result includes a wireless feedback control signal to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device.

Claim 2 (Cancelled).

Claim 3 (Thrice Amended): The contact-less chargeable battery according to claim 1, wherein:

the overvoltage monitoring unit includes:

a wireless transmitting unit for wirelessly propagating the monitoring result through an antenna; and

[first and second voltage detectors for respectively detecting voltages at front and rear ends of the constant voltage/constant current supplier;]

a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and [outputs] outputting a voltage comparison result; and

the [a] microprocessor [for outputting a] outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 4 (Twice Amended): The contact-less chargeable battery according to claim 3, wherein [a] the magnetic field generated by the external contact-less charging device is generated intermittently,

wherein the microprocessor [overvoltage monitoring unit further includes a charging pause detecting unit for receiving the high frequency AC current output from the high frequency AC current inducing unit to detect] receives an end time point signal indicating a time point when the induction of high frequency AC current ends,[and then outputting the end time point to the microprocessor, and] wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 5 (Original): The contact-less chargeable battery according to claim 1, wherein the monitoring result is a charging power adjustment request signal.

Claim 6 (Original): The contact-less chargeable battery according to claim 1, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values of both ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 7 (Twice Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by[means of] a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

[an overvoltage monitoring unit for] a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device[by means of wireless communication] so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 8 (Amended): The contact-less charging circuit module according to claim 7, wherein the high frequency AC current inducing unit is a coil to which a magnetic flux of [a] the magnetic field generated from the external contact-less charging device is linked.

Claim 9 (Thrice Amended): The contact-less charging circuit module according to claim 7,[wherein the overvoltage monitoring unit includes] further comprising:

[a wireless transmitting unit for wirelessly propagating the monitoring result through]an antenna;

first and second voltage detectors for respectively detecting first and second voltages at front and rear ends of the constant voltage/constant current supplier; and

a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and [outputs] outputting a voltage comparison result, [;] and

wherein the [a] microprocessor [for outputting a] outputs the monitoring result according to the voltage comparison result[to the wireless transmitting unit] using the antenna.

Claim 10 (Twice Amended): The contact-less charging circuit module according to claim 9, wherein [a] the magnetic field generated by the external contact-less charging device is generated intermittently,

wherein the[overvoltage monitoring unit further includes a charging pause detecting unit for receiving the high frequency AC current output from the high frequency AC current inducing unit to detect] microprocessor receives a time point indicating when the induction of high frequency AC current ends, and then [outputting] outputs the end time point to the microprocessor, and

wherein the monitoring result is wirelessly transmitted to the external contact-less charging device[by means of wireless communication] while a high frequency AC current is not induced after the end time point is input.

Claim 11 (Amended): The contact-less charging circuit module according to claim [1] 7, wherein the monitoring result is a charging power adjustment request signal.

Claim 12 (Amended): The contact-less charging circuit module according to claim [1] 7, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 13 (Twice Amended): A contact-less charging device for transmitting a charging power by[means of] electromagnetic induction[phenomenon] to a contact-less chargeable battery that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode and wirelessly transmits a monitoring result for voltages at both ends of the constant voltage/constant current supplier, the contact-less charging device comprising:

a magnetic field generating unit for receiving an AC current and forming a magnetic field in an outer space;

a high frequency power driving unit for applying a high frequency AC current to the magnetic field generating unit; and

a[charging power adjusting unit for] microprocessor wirelessly receiving the monitoring result from the contact-less chargeable battery[by means of wireless communication] and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that [a] the charging power transmitted to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 14 (Original): The contact-less charging device according to claim 13, wherein the magnetic field generating unit is a coil to both sides of which a high frequency AC current is applied.

Claim 15 (Twice Amended): The contact-less charging device according to claim 13, [wherein the charging power adjusting unit includes]further comprising:

[a wireless receiving unit for wirelessly receiving the monitoring result through]an antenna coupled to the microprocessor and used to receive the monitoring result.[; and

a microprocessor for receiving the monitoring result from the wireless receiving unit and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit.]

Claim 16 (Twice Amended): The contact-less [chargeable battery] charging device according to claim 15, further comprising a [constant voltage supplier for] power supply [converting] receiving a common AC current, converting the common AC current into a DC current, and then supplying a constant-voltage current to the high frequency power driving unit, wherein the high frequency power driving unit includes:

a pulse signal generator for receiving a pulse driving signal from the microprocessor and outputting a pulse signal; and

a power driving part for receiving the pulse signal to rapidly switch the constant-voltage current input from the constant voltage supplier, thereby generating a high frequency AC current in a pulse pattern.

Claim 17 (Twice Amended): The contact-less charging device according to claim 16, wherein the[charging power adjusting unit] microprocessor adjusts [a] the charging power by modulating a width of a pulse current, a frequency of the pulse current, an amplitude of a pulse, or [the] a number of pulses.

Claim 18 (Amended): The contact-less charging device according to claim 16, wherein the [constant voltage supplier] power supply includes:

an overvoltage filter for receiving a common AC current and intercepting an overvoltage current;

a rectifier for rectifying the AC current passing through the filter to convert the AC current into a DC current; and

a constant voltage [supplying part for receiving] supplier that receives the converted DC current and outputs a constant voltage current.

Claim 19 (Amended): The contact-less charging device according to claim 13, wherein the high frequency power driving unit intermittently applies a high frequency AC current to the magnetic field generating unit, and

wherein the[charging power adjusting unit] microprocessor receives the monitoring result while a high frequency AC current is not applied to the magnetic field generating unit.

Claim 20 (Original): The contact-less charging device according to claim 13, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 21 (Twice Amended): A battery charging set including a contact-less chargeable battery and a contact-less charging device,

wherein the contact-less chargeable battery includes:

a high frequency AC current inducing unit to which a high frequency AC current is induced by[means of] a magnetic field intermittently generated from an external contactless charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to a battery cell in a constant voltage/constant current mode; and

[an overvoltage monitoring unit for] a first microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device[by means of wireless communication] while a high frequency AC current is not induced,

wherein the contact-less charging device includes:

a magnetic field generating unit for receiving an AC current and forming [a] the magnetic field in an outer space;

a high frequency power driving unit for intermittently applying a high frequency AC current to the magnetic field generating unit; and

a second microprocessor [charging power adjusting unit for], while a high frequency AC current is not applied to the magnetic field generating unit, wirelessly receiving the monitoring result[by means of wireless communication] and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that a charging power transmitted from the contact-less charging device to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 22 (Original): The battery charging set according to claim 21, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 23 (Twice Amended): A method for controlling charging of a contact-less chargeable battery using a contact-less charging device by[means of] electromagnetic induction[phenomenon], the method comprising:

(a) intermittently applying a high frequency AC current to a primary coil provided to the charging device so as to intermittently generate a magnetic field in an outer region;

(b) linking a magnetic flux of the generated magnetic field to a secondary coil provided to the battery so as to intermittently output an electromagnetically-induced high frequency AC current;

(c) rectifying the output high frequency AC current to be converted into a DC current;

(d) applying the DC current to a battery cell through a constant voltage/constant current supplier so as to charge the battery cell in a constant voltage/constant current mode;

(e) monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the charging device[by means of wireless communication] while a high frequency AC current is not induced in the secondary coil; and

(f) adjusting a power of the high frequency AC current applied to the primary coil according to the transmitted monitoring result,

wherein the adjusting the power of the high frequency AC current applied to the primary coil is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Clam 24 (Original): The method according to claim 23, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 25 (New, Amended): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 26 (New, Amended): The contact-less chargeable battery according to claim 1, wherein the microprocessor controls, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 27 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 28 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 29 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 30 (New, Amended): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 31 (New, Amended): The contact-less charging circuit module according to claim 7, wherein the microprocessor controls, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 32 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 33 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier supplies the charging power in a constant

current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 34 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 35 (New): The contact-less chargeable battery according to claim 13, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 36 (Cancelled).

Claim 37 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier has a front end and a rear end, and wherein the constant voltage/constant current supplier receives a DC current from a rectifier at the front end and supplies a charging power at the rear end.

Claim 38 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier charges the battery in a constant current mode at an initial charging stage and then charges the battery in a constant voltage mode at a later charging stage.

Claim 39 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier charges the battery in a constant voltage mode based on a charging voltage of the battery exceeding a predetermined level.

Claim 40 (New, Amended): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 41 (New, Amended): The battery charging set according to claim 21, wherein the microprocessor controls, through wireless feedback control of charging the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 42 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 43 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 44 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 45 (New): The method of claim 23, further comprising:

receiving, by the constant voltage/constant current supplier, the DC current at a front end of the constant voltage/constant current supplier; and

supplying, by the constant voltage/constant current supplier, the DC current at a rear end of the constant voltage/constant current supplier to the battery cell.

Claim 46 (New): The method of claim 23, further comprising:

supplying, by the constant voltage/constant current supplier, the DC current to the battery cell in a constant current mode during an initial charging stage and then in a constant voltage mode at a later charging stage.

Claim 47 (New): The method of claim 23, further comprising:

charging, by the constant voltage/constant current supplier, the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 48 (New, Amended): The method of claim 23, further comprising:

controlling, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing a change of intensity of the magnetic field.

Claim 49 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage; and

an overvoltage monitoring unit that includes first and second voltage detectors respectively detecting voltages at both ends of the constant voltage/constant current supplier, and a microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the microprocessor transmits the monitoring result to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device to solve an overvoltage state according to relative positions of the primary coil and the secondary coil.

Claim 50 (New): The contact-less charging circuit module according to claim 49, wherein a magnetic flux of the magnetic field generated from the external contact-less charging device is linked to the secondary coil of the high frequency AC current inducing unit.

Claim 51 (New, Amended): The contact-less charging circuit module according to claim 49, wherein:

the overvoltage monitoring unit further comprises:

a wireless transmitting unit wirelessly propagating the monitoring result through an antenna; and

a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

the microprocessor outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 52 (New): The contact-less charging circuit module according to claim 51, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the overvoltage monitoring unit further includes a charging pause detecting unit receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, and

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 53 (New): The contact-less charging circuit module according to claim 49, wherein the monitoring result is a charging power adjustment request signal.

Claim 54 (New): The contact-less charging circuit module according to claim 49, wherein the monitoring result is a difference of voltages at front and rear ends of the constant

voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 55 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier that includes circuitry controlled by at least one microprocessor, the constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage; and

an overvoltage monitoring unit that includes a wireless transmitter, first and second voltage detectors respectively detecting voltages at both ends of the constant voltage/constant current supplier, and the at least one microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device using the wireless transmitter so as to induce a change of intensity of the magnetic field,

wherein the at least one microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting a power applied to the primary coil by up to a predetermined level,

wherein the at least one microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the power applied to the primary coil by up to the predetermined level.

Claim 56 (New): The contact-less charging circuit module according to claim 55, wherein at least one of the first charging power adjustment request signal and the second charging power adjustment request signal is based on relative positions of the primary coil and the secondary coil.

Claim 57 (New, Amended): The contact-less charging circuit module according to claim 55, wherein the wireless transmitter wirelessly propagates the monitoring result through an antenna,

wherein the overvoltage monitoring unit includes a voltage comparator comparing first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

wherein the at least one microprocessor outputs the monitoring result according to the voltage comparison result to the wireless transmitter.

Claim 58 (New, Amended): The contact-less charging circuit module according to claim 55, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the microprocessor receives an indication of a time point when the induction of high frequency AC current ends, and

wherein the monitoring result is wirelessly transmitted to the external contact-less charging device while a high frequency AC current is not induced after the end time point is input.

Claim 59 (New): The contact-less charging circuit module according to claim 55, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 60 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for receiving a charging power from an external contact-less charging device and charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by a magnetic field generated from the external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

a microprocessor monitoring the voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device so as to induce a change of intensity of the magnetic field,

wherein the microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device by up to a predetermined level, and

wherein the microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device by up to the predetermined level.

Claim 61 (New): The contact-less charging circuit module according to claim 60, wherein at least one of the first charging power adjustment request signal and the second charging power adjustment request signal is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 62 (New, Amended): The contact-less charging circuit module according to claim 60, wherein the overvoltage monitoring unit includes:

an antenna;

first and second voltage detectors respectively detecting first and second voltages at front and rear ends of the constant voltage/constant current supplier; and

a voltage comparator comparing the first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

wherein the microprocessor outputs the monitoring result according to the voltage comparison result using the antenna.

Claim 63 (New, Amended): The contact-less charging circuit module according to claim 60, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the microprocessor receives an indication of a time point when the induction of high frequency AC current ends, and

wherein the monitoring result is wirelessly transmitted to the external contact-less charging device while a high frequency AC current is not induced after the end time point is input.

Claim 64 (New): The contact-less charging circuit module according to claim 60, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 65 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting unit transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 66 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit including a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting unit transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the secondary coil is movable relative to the primary coil during the charging of the battery cell by the contact-less charging circuit module, and

wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting the intensity of the magnetic field.

Claim 67 (Cancelled).

Claim 68 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit including a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit detecting first and second voltages at both ends of the constant voltage/constant current supplier, monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device.

Claim 69 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit for monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result is a charging power adjustment request signal.

Claim 70 (New): The contact-less charging circuit module according to claim 69, wherein the high frequency AC current inducing unit is a coil to which a magnetic flux of the magnetic field generated from the external contact-less charging device is linked.

Claim 71 (New): The contact-less charging circuit module according to claim 69, wherein the overvoltage monitoring unit includes:

a wireless transmitting unit for wirelessly propagating the monitoring result through an antenna;

first and second voltage detectors for respectively detecting voltages at front and rear ends of the constant voltage/constant current supplier;

a voltage comparator for comparing first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result; and

a microprocessor for outputting the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 72 (New): The contact-less charging circuit module according to claim 71, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the overvoltage monitoring unit further includes a charging pause detecting unit for receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, and

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 73 (New): The contact-less charging circuit module according to claim 69, wherein the charging power adjustment request signal is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 74 (New): A contact-less charging device for transmitting a charging power by means of electromagnetic induction phenomenon to a contact-less chargeable battery that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode and wirelessly transmits a monitoring result for voltages at both ends of the constant voltage/constant current supplier, the contact-less charging device comprising:

a magnetic field generating unit for receiving an AC current and forming a magnetic field in an outer space;

a high frequency power driving unit for applying a high frequency AC current to the magnetic field generating unit; and

a charging power adjusting unit that includes: a wireless receiving unit receiving the monitoring result from the contact-less chargeable battery by means of wireless communication, and a microprocessor controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that the charging power transmitted to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 75 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes a microprocessor, the microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field includes a change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

REMARKS/ARGUMENTS

1. Introduction

a. Summary

Patent Owner submits this response in reply to the Final Office Action mailed March 3, 2022 (the "Final Office Action"),the Notice of Defective Paper in *Ex Parte* Reexamination Patent Owner Requested dated May 13, 2022 (the "Notice of Defective Paper"), and the Advisory Action dated June 15, 2022 (the "Advisory Action").

In the first Non-Final Office Action mailed June 30, 2021, claims 1-24 of U.S. Patent No. 8,013,568 (hereinafter "the '568 patent") were subject to reexamination. On August 30, 2021, Patent Owner filed a response to the first Non-Final Office Action in which claims 3, 9, 11-12, and 16 were amended and new claims 25-48 were added. In the second Non-Final Office Action mailed September 29, 2021, claims 1-48 were rejected. In the response to the second Non-Final Office Action filed November 29, 2021 (the "Second Response"), claim 36 was cancelled, new claims 49-75 were added, and claims 1-4, 7-10, 13, 15-18, 21, 23, 25, 30, 40, 41 and 48 were amended.

The Final Office Action was mailed March 3, 2022. A first After Final Response to the Final Office Action was filed May 23, 2022 (the "first After Final Response"). In the first After Final Response to the Final Office Action, claims 1, 3, 4, 7, 9, 10, 13, 15, 17, 19, 21, 23, 26, 31, 41, 49, 51, 55, 57, 58, 60, 62, 63, 66, 68, and 75 were amended and claims 2 and 67 were cancelled.

An Advisory Action was mailed on June 15, 2022. The Advisory Action states the amendments presented in the first After Final Response were not entered. (Advisory Action, p. 1). Patent Owner has filed this second After Final Response in response to the Advisory Action. In this second After Final Response to the Final Office Action and the Advisory Action, claims 1, 3, 4, 7, 9, 10, 13, 15, 17, 19, 21, 23, 26, 31, 41, 49, 51, 55, 57, 58, 60, 62, 63, 66, 68, and 75 are amended. No new matter was added with these amendments. These amendments do not enlarge the scope of the original patent claims. Claims 2 and 67 are cancelled in this response. Patent Owner makes no admission regarding the patentability of the cancelled claims.

Patent Owner notes that, as a matter of right, Patent Owner cannot amend any finally rejected claims, add new claims after a final rejection, or reinstate previously cancelled claims unless a showing under 37 C.F.R. § 1.116(b) is made except when an amendment merely cancels claims, adopts examiner's suggestions, removes issues for appeal, or in some other way requires

only a cursory review by the examiner. Patent Owner notes that, in accordance with 37 C.F.R. § 1.116(b), the amendments to claims 1, 3, 4, 7, 9, 10, 13, 15, 17, 19, 21, 23, 26, 31, and 41 present the rejected claims in better form for consideration on appeal, if necessary, and require only a cursory review by the Examiner in-line with the Final Office Action (Examiner's suggestions) to allow the claims. With respect to the amendments to claims 49, 51, 55, 57, 58, 60, 62, 63, 66, 68, and 75, Patent Owner notes that these amendments could not have been presented earlier as the Final Office Action presents the first rejection of these claims. Accordingly, Patent Owner submits the amendments to the claims should be allowed.

Favorable reconsideration of the pending claims and allowance of the new claims is respectfully requested in light of the following remarks.

b. April 5, 2022 Interview Summary

Patent Owner wishes to thank Examiners Deb, Patel, and Ferris for extending the courtesy of an interview with Matthew Dicke and Samuel Richey (counsel for Patent Owner) on April 5, 2022 (hereinafter "the Interview"). During the Interview, the rejections of claims 1 and 55 were discussed along with the interpretation of the claims under 35 U.S.C. § 112, sixth paragraph. In particular it was discussed how Chung-Sik fails to disclose adjusting a power level during a charging process. Further, it was discussed how the combination of Chung-Sik and Matsuki is improper as being both inoperable and by rendering the device of Chung-Sik unsatisfactory for its intended purpose.

Potential claim amendments were discussed with respect to claim 1 regarding the 35 U.S.C. § 112, sixth paragraph interpretation of "overvoltage monitoring unit" and to the wireless feedback control signal. It was agreed that these amendments would be proper in accordance with 37 C.F.R. § 1.116(b).

Additionally, it was mentioned that the term "microprocessor" could be subject to interpretation under 35 U.S.C. § 112, sixth paragraph in an Advisory Action responsive to this After Final Response. MPEP § 2271 states "[b]oth the patent owner and the examiner should recognize that a reexamination proceeding may result in the final cancellation of claims from the patent and that the patent owner does not have the right to renew or continue the proceedings by refiling under 37 CFR 1.53(b) or 37 CFR 1.53(d) or former 37 CFR 1.60 or 1.62, nor by filing a request for continued examination under 37 CFR 1.114. Complete and thorough actions by the examiner coupled with complete responses by the patent owner, including early presentation of

evidence under 37 CFR 1.131(a) or 37 CFR 1.132, will go far in avoiding such problems and reaching a desirable early termination of the reexamination prosecution." MPEP 2272 states "[a]ccordingly, both the examiner and the patent owner should identify and develop all issues prior to the final Office action, including the presentation of evidence under 37 CFR 1.131(a) and 1.132." The second Non-Final Office Action dated September 29, 2021 included an interpretation of "microprocessor" under 35 U.S.C. § 112, sixth paragraph, and in this Office Action that interpretation was withdrawn. In particular, the Office Action states "[i]n response to Patent Owner's arguments and amendment to the claims, t**he Examiner withdraws interpretation terms under 35 U.S.C. §112(6th ¶) of the claim** "constant voltage/constant current supplier," and **"microprocessor," as these are terms known in the art and do convey a particular structure**. (Remarks pages 25-29)." (Office Action, p. 4, emphasis added).

These claim interpretation issues have already been identified, developed, and withdrawn. Any reintroduction of a previously withdrawn issue after the issuance of this Office Action deprives Patent Owner of any opportunity to provide a response or present evidence. Patent Owner does not introduce any amendments that alter the usage of the term "microprocessor" from the response to the second Non-Final Office Action dated September 29, 2021. Accordingly, it is improper to reintroduce any interpretation of "microprocessor" under 35 U.S.C. § 112, sixth paragraph. Patent Owner requests this Office Action be withdrawn and prosecution be reopened should any interpretation of a term previously withdrawn be reintroduced in an Advisory Action.

No agreement with respect to the patentability of the claims was reached.

c. Response to Notice of Defective Paper

The Notice of Defective Paper states "Patent Owner did not provide markup of changes in the amended claims with respect to previous version of the claims and failed to provide an explanation of the support in the disclosure of the patent for the changes to the claims made by the amendment paper as required under 37 C.F.R. 1.530(e)." (Notice of Defective Paper, p. 2). Patent Owner respectfully disagrees and notes that this response as previously filed conforms to the requirements of 37 C.F.R. 1.530. Patent Owner provided an explanation of the support in the disclosure of the patent for the changes to the claims made by the amendment paper as required under 37 C.F.R. 1.530(e) in Section 2 of the previously filed response and the listing of claims conforms to the requirements of 37 C.F.R. 1.530(f) and (i). However, in order to facilitate these proceedings and as discussed with Examiner Deb on May 17, 2022, Patent Owner has included a

marked copy of the listing of claims (see Exhibit A) showing the amendments to the claims. Patent Owner notes that the listing of claims provided in Exhibit A is provided for the convenience of the Examiners only and no admissions are made with respect to any amendment shown in Exhibit A.

d. Response to Advisory Action

Patent Owner wishes to thank the Examiners for agreeing that the rejections and interpretations of the claims under 35 U.S.C. § 112 are overcome by the presented claim amendments. (Advisory Action, pp. 10 - 11). The Advisory Action raises two primary issues: (1) a proposed rejection under 35 U.S.C. § 251 and § 112 with respect to the language "adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contactless charging device;" and (2) maintains the rejection of the claims under 35 U.S.C. § 103. (Advisory Action, pp. 9-12). Patent Owner notes that this second After Final Response does not include any new arguments other than those raised with respect to the 35 U.S.C. § 251 and § 112 proposed rejections first stated in the Advisory Action articulated in this section. MPEP § 2272 states:

> Both the examiner and the patent owner should recognize that substantial patent rights will be at issue with no opportunity for the patent owner to refile under 37 CFR 1.53(b), or 1.53(d), and with no opportunity to file a request for continued examination under 37 CFR 1.114. Accordingly, both the examiner and the patent owner should identify and develop all issues prior to the final Office action, including the presentation of evidence under 37 CFR 1.131(a) and 1.132.

MPEP § 2271 states:

> Both the patent owner and the examiner should recognize that a reexamination proceeding may result in the final cancellation of claims from the patent and that the patent owner does not have the right to renew or continue the proceedings by refiling under 37 CFR 1.53(b) or 37 CFR 1.53(d) or former 37 CFR 1.60 or 1.62, nor by filing a request for continued examination under 37 CFR 1.114. Complete and thorough actions by the examiner coupled with complete responses by the patent owner, including early presentation of evidence under 37 CFR 1.131(a) or 37 CFR 1.132, will go far in avoiding such problems and reaching a desirable early termination of the reexamination prosecution.
>
> In making the final rejection, all outstanding grounds of rejection of record should be carefully reviewed and any grounds or rejection relied on should be reiterated. The grounds of rejection must (in the final rejection) be clearly developed to such an extent that the patent owner may readily judge the advisability

> of an appeal. However, where a single previous Office action contains a complete statement of a ground of rejection, the final rejection may refer to such a statement and also should include a rebuttal of any arguments raised in the patent owner's response.

First, the Advisory Action states that the language "adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contactless charging device," recited in claims 1, 13, 21, 23, 49, 56, 61, 68, 73, 74, and 75 is not supported in the prior patent and would be subject to a rejection under 35 U.S.C. § 251 and § 112, first paragraph. (Advisory Action, p. 10). Patent Owner respectfully disagrees. As an initial matter, Patent Owner notes that language similar to the objected to language was first introduced in the Second Response filed November 29, 2021 and the Final Office Action made no objection or rejection to this language. As such, Patent Owner notes that these rejections, if made, would constitute new grounds of rejection and therefore constitute sufficient justification for withdrawing the Final Office Action and reopening prosecution under MPEP § 2275 and 37 CFR § 41.39(b)(1). Further, Patent Owner notes that the cited language is fully supported in the prior patent as described in the Second Response and referenced by the first After Final Response. See, for example, column 3, lines 35-39 (e.g. "Another object of the present invention is to provide a battery charging control method capable of preventing any damage of an internal battery circuit together with solving a restriction for relative positions between the battery and the charger that employ a contact-less charging method"); column 9, lines 29-44 (e.g., "the contact-less charging device and chargeable battery need not be fixed to a certain relative position as in the prior art so as to constantly keep an intensity of magnetic flux linked to the secondary coil"); column 11, lines 13-45; and column 12, lines 46-52. Accordingly, Patent Owner submits that the cited claim language is fully supported in the prior patent and, that if any rejection of this claim language is made, that the Final Office Action should be withdrawn and prosecution should be reopened. Additionally, Patent Owner submits that the amendments presented in the first After Final Response and this Second After Final Response do not raise new issues that would require further consideration and/or search, materially reduce or simply the issues for appeal, and should be entered for purposes of appeal.

Second, Patent Owner notes that the Advisory Action is not responsive to all arguments raised in the first After Final Response, particularly those raised with respect to the rejection of

the claims under 35 U.S.C. § 103. For example, the Advisory Action does not address Section 5(c) of the first After Final Response, including the issues raised with respect to the proposed combination of Chung-Sik and Matsuki being improper for reasons including that the proposed combination does not have a reasonable expectation of success and the proposed combination improperly changes the principle of operation of the device disclosed in Chung-Sik. Patent Owner respectfully requests that the Examiners include a rebuttal to all arguments raised in this second After Final Response so that Patent Owner can adequately just the advisability of an appeal in accordance with MPEP § 2271 and § 2272.

2. Status of the Claims

Claims 1, 3-35, 37-66, and 68-75 are currently pending, of which claims 1, 7, 13, 21, 23, 49, 55, 60, 65, 66, 68, 69, 74, and 75 are independent.

In the present response, claims 1, 3, 4, 7, 9, 10, 13, 15, 17, 19, 21, 23, 26, 31, 41, 49, 51, 55, 57, 58, 60, 62, 63, 66, 68, and 75 are amended. Claims 2 and 67 are cancelled.

Independent claim 1 is amended as noted above. Support for these amendments is found at least at column 6, line 66 - column 7, line 4; column 7, lines 43 - 49; column 8, lines 32 - 41; column 11, lines 52 - 61; column 3, lines 35-39 (e.g. "Another object of the present invention is to provide a battery charging control method capable of preventing any damage of an internal battery circuit together with solving a restriction for relative positions between the battery and the charger that employ a contact-less charging method"); column 9, lines 29-44 (e.g., "the contact-less charging device and chargeable battery need not be fixed to a certain relative position as in the prior art so as to constantly keep an intensity of magnetic flux linked to the secondary coil"); column 11, lines 13-45; column 12, lines 46-52; and previously pending claim 2. Claims 3, 4, and new claim 26 are amended to address typographical issues, formalities, and ensure proper antecedent basis.

Independent claims 7 and 13 are amended as noted above. Support for these amendments is found at least at column 6, line 66 - column 7, line 4; column 11, lines 62-65; column 3, lines 35-39 (e.g. "Another object of the present invention is to provide a battery charging control method capable of preventing any damage of an internal battery circuit together with solving a restriction for relative positions between the battery and the charger that employ a contact-less charging method"); column 9, lines 29-44 (e.g., "the contact-less charging device and chargeable battery

need not be fixed to a certain relative position as in the prior art so as to constantly keep an intensity of magnetic flux linked to the secondary coil"); column 11, lines 13-45; and column 12, lines 46-52. Claims 9, 10, 13, 15, 17, 19, and new claim 31 are amended to address typographical issues, formalities, and ensure proper antecedent basis.

Independent claims 21 and 23 are amended as noted above. Support for these amendments is found at least at column 6, line 66 - column 7, line 4; column 7, lines 43-49; column 11, lines 52-65; column 3, lines 35-39 (e.g. "Another object of the present invention is to provide a battery charging control method capable of preventing any damage of an internal battery circuit together with solving a restriction for relative positions between the battery and the charger that employ a contact-less charging method"); column 9, lines 29-44 (e.g., "the contact-less charging device and chargeable battery need not be fixed to a certain relative position as in the prior art so as to constantly keep an intensity of magnetic flux linked to the secondary coil"); column 11, lines 13-45; and column 12, lines 46-52. New claims 40 and 41 are amended to address typographical issues, formalities, and ensure proper antecedent basis.

New independent claim 49 is amended as noted above. Support for these amendments is found at least at column 6, line 66 - column 7, line 4; column 3, lines 35-39 (e.g. "Another object of the present invention is to provide a battery charging control method capable of preventing any damage of an internal battery circuit together with solving a restriction for relative positions between the battery and the charger that employ a contact-less charging method"); column 9, lines 29-44 (e.g., "the contact-less charging device and chargeable battery need not be fixed to a certain relative position as in the prior art so as to constantly keep an intensity of magnetic flux linked to the secondary coil"); column 11, lines 13-45; and column 12, lines 46-52. New dependent claim 51 is amended to address typographical issues, formalities, and ensure proper antecedent basis.

New independent claims 55 and 60 are amended as noted above. Support for these amendments is found at least at column 11, lines 23-26 and lines 35-43. New claims 57, 58, 62, and 63 are amended to address typographical issues, formalities, and ensure proper antecedent basis.

New claim 66 is amended as noted above. Support for these amendments is found in at least previously pending claim 67.

New claims 68 and 75 are amended in this response. Support for these amendments is found in at least column 6, line 66 - column 7, line 4; column 7, lines 43-49; column 8, lines 32-

41; column 11, lines 52 - 61; FIG. 3; column 3, lines 35-39 (e.g. "Another object of the present invention is to provide a battery charging control method capable of preventing any damage of an internal battery circuit together with solving a restriction for relative positions between the battery and the charger that employ a contact-less charging method"); column 9, lines 29-44 (e.g., "the contact-less charging device and chargeable battery need not be fixed to a certain relative position as in the prior art so as to constantly keep an intensity of magnetic flux linked to the secondary coil"); column 11, lines 13-45; and column 12, lines 46-52.

For completeness, claims 8, 11, 12, 16, 18, 25, 30, 40, and 48 were amended in the response to the second Non-Final Office Action filed November 29, 2021 and not further amended in this response. Further, new claims 49-75 were added in the second Non-Final Office Action filed November 29, 2021. Support for these previously presented amendments and the new claims can be found in the response to the second Non-Final Office Action filed November 29, 2021.

3. Response to Claim Interpretation under 35 U.S.C. § 112, Sixth Paragraph

a. overvoltage monitoring unit

In the Final Office Action, the Office invoked an interpretation under 35 U.S.C. § 112, sixth paragraph with respect to claims 1, 4, 7, 9, 10, 21, 26, 31, 41, 49, 52, 55, 58, 60, 62, 63, 65, 66, 68, 69, 71, 72, and 75 for claim term "overvoltage monitoring unit." Patent Owner respectfully disagrees and asserts that the pending claims were not intended to be and should not be interpreted as means-plus-function claims under 35 U.S.C. § 112, sixth paragraph. With respect to claims 7, 9, 10, 21, 26, 31, 41, 58, 60, 62, and 63, Patent Owner has removed the term "overvoltage monitoring unit." Patent Owner notes that this amendment does not broaden the claim as the microprocessor was previously recited in the claims. Accordingly, Patent Owner submits that these claims should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

With respect to claims 1, 4, 49, 52, 55, 65 and 66, Patent Owner submits that the claim recites specific structures for the "overvoltage monitoring unit." For example, claim 1 recites "an overvoltage monitoring unit that includes first and second voltage detectors [...] and a microprocessor." Claim 49 recites "an overvoltage monitoring unit that includes a wireless transmitting unit, first and second voltage detectors [...], and a microprocessor." Claim 55 recites "an overvoltage monitoring unit that includes a wireless transmitter, first and second voltage detectors [...], and the at least one microprocessor." Claim 65 and 66 recite "an overvoltage

monitoring unit that includes: a microprocessor [...] and a wireless transmitting unit." Accordingly, the interpretation of claims 1, 49, 52, 55, 65, 66, and 68 under 35 U.S.C. § 112, sixth paragraph is improper.

With respect to claims 68 and 69, Patent Owner submits that the term "overvoltage monitoring unit," when read by a person having ordinary skill in the art in view of the specification, is understood to have a sufficiently definite meaning as the name for the structure that performs the function. Even when a term covers a broad class of structures or identifies the structures by their function (e.g., "filters," "brakes," "clamp," "screwdriver," and "locks"), 35 U.S.C. § 112 sixth paragraph will not apply. *See* MPEP 2181(I)(A). To determine whether a word, term, or phrase coupled with a function denotes structure, examiners may check whether: (1) the specification provides a description sufficient to inform one of ordinary skill in the art that the term denotes structure; (2) general and subject matter specific dictionaries provide evidence that the term has achieved recognition as a noun denoting structure; and/or (3) the prior art provides evidence that the term is an art-recognized structure to perform the claimed function. *See* MPEP 2181(I)(C); and *Ex parte Rodriguez,* 92 USPQ2d 1395, 1404 (Bd. Pat. App. & Int. 2009) (precedential). Persons of ordinary skill in the art reading the specification of the '568 patent would recognize that the recited claim terms have a sufficient definite meaning as the name for a structure. The recited claim terms are also modified by sufficient structure, material, and/or acts for a person skilled in the art reading the specification to recognize that the recited claim terms, together with the functions, structures, materials, and acts recited in the claims, connote sufficient definite structure. See, for example, claims 1, 4, 7, 9, 10, 21, 26, 31, 41, 49, 52, 55, 58, 60, 62, 63, 65, 66, 68, 71, 72, and 75. Further, with respect to claims 71 and 72, Patent Owner submits that the claims recite specific structures for the "overvoltage monitoring unit." For example, claim 71 recites "wherein the overvoltage monitoring unit includes: a wireless transmitting unit [...] first and second voltage detectors [...] a voltage comparator [...] and a microprocessor." Accordingly, the interpretation of claims 69, 71, and 72 under 35 U.S.C. § 112, sixth paragraph is improper.

The Final Office Action states the "overvoltage monitoring unit" is interpreted to include "a wireless transmitting unit 320 for wirelessly propagating the monitoring result through an antenna 330; first and second voltage detectors (350, 360) for respectively detecting voltages at front and rear ends of the constant voltage/constant current supplier; a voltage comparator 380 for comparing first and second voltages detected by the first and second voltage detectors (350, 360)

and outputs a voltage comparison result; a microprocessor 310 for outputting a monitoring result according to the voltage comparison result to the wireless transmitting unit 320; and charging pause detection unit 390 receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the micro-processor 310 (column 4, lines 28-45) (FIG. 5)." (Final Office Action, pp. 8 - 9). Patent Owner notes that it is improper to read every structure indicated in the specification into the "overvoltage monitoring unit." MPEP § 2181 states (emphasis added):

> If the written description sets forth the corresponding structure, material, or acts in compliance with 35 U.S.C. 112(b) or pre-AIA 35 U.S.C. 112, second paragraph, the claim limitation must "be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof." 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph. However, **functional limitations that are not recited in the claim, or structural limitations from the written description that are unnecessary to perform the claimed function, cannot be imported into the claim**. *Welker Bearing*, 550 F.3d at 1097, 89 USPQ2d at 1294; *Wenger Mfg., Inc. v. Coating Mach. Sys., Inc.*, 239 F.3d 1225, 1233, 57 USPQ2d 1679, 1685 (Fed. Cir. 2001).

Patent Owner notes that the claims recite the necessary structural limitations to perform the claimed functions. Accordingly, Patent Owner submits that, in the event the term "overvoltage monitoring unit" is interpreted under 35 U.S.C. § 112, sixth paragraph, the interpretation of the term articulated in the Final Office Action is improper for at least including functional limitations and/or structure that is unnecessary to perform the claimed functions.

Claim 75 recites "an overvoltage monitoring unit that includes a microprocessor." The microprocessor constitutes specific structure for the "overvoltage monitoring unit." Accordingly, the interpretation of claim 75 under 35 U.S.C. § 112, sixth paragraph is improper.

b. wireless transmitting unit

In the Final Office Action, the Office invoked an interpretation under 35 U.S.C. § 112, sixth paragraph with respect to claim 3 for claim term "wireless transmitting unit." Patent Owner respectfully disagrees and asserts that the pending claims were not intended to be and should not be interpreted as means-plus-function claims under 35 U.S.C. § 112, sixth paragraph. Patent Owner notes that a "wireless transmitting unit," when read by a person having ordinary skill in the

art in view of the specification, is understood to have a sufficiently definite meaning as the name for the structure that performs the function as indicated on page 9 of the Office Action. Accordingly, Patent Owner submits that this claim should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

c. charging pause detecting unit

In the Final Office Action, the Office invoked an interpretation under 35 U.S.C. § 112, sixth paragraph with respect to claims 4, 10, 52, 58, 63, and 72 for claim term "charging pause detecting unit." Patent Owner respectfully disagrees and asserts that the pending claims were not intended to be and should not be interpreted as means-plus-function claims under 35 U.S.C. § 112, sixth paragraph. However, with respect to claims 4, 10, 58, and 63 Patent Owner has removed the term "charging pause detecting unit." Accordingly, Patent Owner submits that these claims should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

With respect to claims 52 and 72, Patent Owner submits that the specification provides a description sufficient to inform one of ordinary skill in the art that the term denotes structure when coupled with its function. For example, support for the claimed "charging pause detecting unit" is found at least at column 8, line 64 to column 9, line 16; column 10, lines 1-4; and Figs. 5-6 (e.g., the charging pause detector 390 measures the high frequency AC current induced in the secondary coil 270 and so as to detect when the induced high frequency AC current is interrupted (the pause region), and that inputs the detection signal to the microprocessor 310). FIG. 5 illustrates a block diagram of an electronic circuit having a variety of electronic components, such as a coil 279, an antenna 330, and a battery cell 300. Accordingly, the figures inform one of ordinary skill in the art that the components shown in the figures, including the "charging pause detecting unit" constitute one or more electronic components coupled together to perform the recited function. Accordingly, Patent Owner submits the three-part test is not met and this claim should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

d. charging power adjustment unit

In the Final Office Action, the Office invoked an interpretation under 35 U.S.C. § 112, sixth paragraph with respect to claims 13, 17, 19, 21, and 74 for claim term "charging power adjustment unit." Patent Owner respectfully disagrees and asserts that the pending claims were not intended to be and should not be interpreted as means-plus-function claims under 35 U.S.C. § 112, sixth paragraph. However, with respect to claims 13, 17, 19, and 21 Patent Owner has removed

the term "charging power adjustment unit." Accordingly, Patent Owner submits that these claims should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

With respect to claim 74, Patent Owner submits that the claim recites specific structures for the "charging power adjustment unit." Specifically, claim 74 recites "a charging power adjusting unit that includes: a wireless receiving unit [...] and a microprocessor." Accordingly, Patent Owner submits the three-part test is not met and this claim should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

The Final Office Action states "the structure of charging power adjustment unit includes a wireless receiver and a microprocessor." (Final Office Action, p. 10). Patent Owner notes that it is improper to read every structure indicated in the specification into the "charging power adjustment unit" in accordance with MPEP § 2181. Accordingly, Patent Owner submits that, in the event the term "charging power adjustment unit" is interpreted under 35 U.S.C. § 112, sixth paragraph, the interpretation of the term articulated in the Final Office Action is improper for at least including functional limitations and/or structure that are unnecessary to perform the claimed functions.

e. wireless receiving unit

In the Final Office Action, the Office invoked an interpretation under 35 U.S.C. § 112, sixth paragraph, with respect to claims 15 and 74 for claim term "wireless receiving unit." Patent Owner respectfully disagrees and asserts that the pending claims were not intended to be and should not be interpreted as means-plus-function claims under 35 U.S.C. § 112, sixth paragraph. However, with respect to claim 15, Patent Owner has removed the term "wireless receiving unit." Accordingly, Patent Owner submits that this claim should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

With respect to claim 74, Patent Owner submits that the specification provides a description sufficient to inform one of ordinary skill in the art that the term denotes structure when coupled with its function. For example, support for the claimed "wireless receiving unit" is found at least at column 10, lines 14-17 (e.g., [i]f the response signal is wirelessly transmitted, the wireless receiving unit 230 of the charging device C demodulates the response signal and then inputs it to the microprocessor 240.) and FIGs. 3 and 4. For example, FIG. 4 illustrates a block diagram of an electronic circuit having a variety of electronic components, such as an AC power source 250, a coil 200, and an antenna 220. Accordingly, the figures inform one of ordinary skill in the art that the components shown in the figures, including the "wireless receiving unit"

constitute one or more electronic components coupled together to perform the recited function. Accordingly, Patent Owner submits the three-part test is not met. Further, "the term "receiver" (i.e., the absence of the term means) presumptively connotes sufficiently definite structure to those of skill in the art. *See Personalized Media*, 161 F.3d at 703–04." (*EnOcean GmbH v. Face Int'l Corp.*, No. 12-1645 at 7 (Fed. Cir. 2014)). Therefore, this claim should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

f. Conclusion

In view of the foregoing, Patent Owner respectfully asserts that the pending claims are not means-plus-function claims and that each and every word of the claims should be given patentable weight. Furthermore, for at least the reasons stated above, Patent Owner respectfully requests withdrawal of the pending 35 U.S.C. § 112, sixth paragraph, interpretation of the claim terms in the pending claims.

4. Response to Claim Rejections under 35 U.S.C. § 112, First and Second Paragraphs

a. 35 U.S.C § 112, second paragraph

In the Final Office Action, claims 1, 21, and 65 are rejected as being indefinite with respect to "what component of the claimed "overvoltage monitoring unit" recited in claims 1, 21, and 65, is monitoring the voltages at both ends of the constant voltage/constant current supplier." (Final Office Action, p. 11). Patent Owner disagrees, but has amended the claims to advance prosecution. With respect to claim 1, Patent Owner has amended claim 1 to recite "first and second voltage detectors respectively detecting first and second voltages at both ends of the constant voltage/constant current supplier." With respect to claim 21, Patent Owner has amended claim 21 to remove the cited language. With respect to claim 65, Patent Owner notes that it is well specified in the specification that a microprocessor monitors the voltage at both ends of the constant voltage/constant current supplier. See, for example, column 11, lines 52-58 ("in the above embodiment [...] the microprocessor 310 of the battery B monitors voltages measured at both ends of the constant voltage/constant current supplier 290" and column 11, lines 31-35 ("the microprocessor 310 periodically repeats monitoring an overvoltage state at both ends of the constant voltage/constant current supplier 290."

Therefore, Patent Owner submits that the rejections of claims 1, 21, and 65 under 35 U.S.C § 112, second paragraph should be withdrawn.

b. 35 U.S.C § 112, first paragraph

In the Final Office Action, claims 55 and 60 are rejected as failing to comply with the written description requirement with respect to the terms "adjusting a power applied to the primary coil from a first level to a second level" and "adjusting the power applied to the primary coil from the second level to a third level." (Final Office Action, p. 13). Specifically, the Final Office Action states "the first, second, and third level fail to comply with the written description requirement." (Final Office Action, p. 13). Patent Owner respectfully disagrees. Column 11, lines 23-26 state "the microprocessor 240 controls the high frequency power driving unit 210 to lower the power of the high frequency AC current applied to the primary coil 200 as much as a predetermined level." This constitutes adjusting a power applied to the primary coil from a first level (e.g. the power level at which the high frequency power driving unit 210 is operating) to a second level (e.g. the power level lowered by as much as a predetermined level). Similarly, column 11, lines 38-43 state (emphasis added) "the microprocessor 310 wirelessly transmits an adjustment request signal of charging power to the charging device C again **so that the power of high frequency AC current applied to the primary coil 200 is lowered as much as a predetermined level once again.**" This constitutes adjusting the power applied to the primary coil from the second level to a third level (e.g. the second power level lowered by as much as a predetermined level once again). However, despite the clear support in the specification for the cited claim language, Patent Owner has amended claims 55 and 60 to remove the objected to phrases. Therefore, Patent Owner submits that the rejections of claims 55 and 60 under 35 U.S.C § 112, first paragraph should be withdrawn.

Conclusion

Thus, for at least the same reasons stated above, Patent Owner respectfully requests withdrawal of the pending 35 U.S.C. § 112, first and second paragraph rejections.

5. <u>Response to Claim Rejections under 35 U.S.C. § 102 and 35 U.S.C. § 103</u>

The Final Office Action states claims 1 - 15, 19 - 54, 56, 61, 65 - 68, and 73 - 75 are rejected under 35 U.S.C. § 103 as unpatentable over Korean Patent No. KR 950005819B1 (hereinafter "Chung-Sik") in view of Japanese Patent No. JP H0145230 Y2 to Matsuki (hereinafter "Matsuki") and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of U.S. Pat. No. 6,016,046 to Kaite (hereinafter "Kaite") in view of Matsuki. (Final Office Action, p. 14).

The Final Office Action states claims 16-18 are rejected under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Matsuki and in view of Korean Patent No. KR100451606B1 (hereinafter "Cho"). (Final Office Action, p. 115).

The Final Office Action states claims 55, 57-60, 62-64, and 69-72 are rejected under 35 U.S.C. § 102 as anticipated by Chung-Sik and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite. (Final Office Action, p. 124).

Without conceding to these rejections, Patent Owner has amended the claims as noted above. Chung-Sik, Kaite, Matsuki, and Cho, alone or in combination, do not teach or suggest all features of any of independent claims 1, 7, 13, 21, 23, 49, 55, 60, 65, 66, 68, 69, 74, and 75.

a. Overview of Technical Problem

As illustrated in FIG. 1 of the '568 patent (reproduced below), in a conventional contact-less charging method, a charger 10 includes a primary coil 40 supplied with a high frequency AC current to form a magnetic field M, and a battery 50 includes a secondary coil 70 to which a high frequency AC current is induced according to the linkage of the magnetic field M generated in the primary coil 40. *See* FIG. 1 and column 1, line 66 to column 2, line 6.

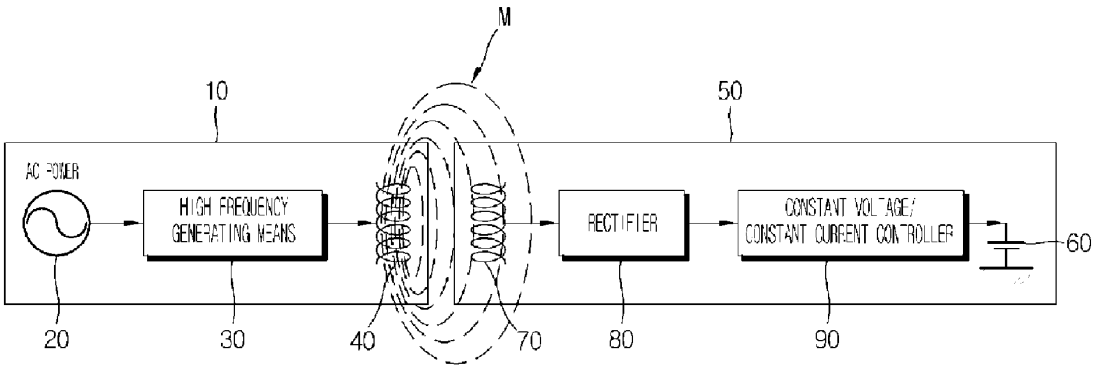


FIG. 1 of the '568 patent

An intensity of the AC current induced in the secondary coil 70 is proportional to an intensity of the magnetic flux linked to the secondary coil 70, which depends on a relative position of the secondary coil 70 and the primary coil 40. *See* column 2, lines 21-27. For example, if the secondary coil 70 is positioned closer to the primary coil 40, the intensity of the magnetic flux linked to the secondary coil 70 will increase, and as a result the intensity of the high frequency AC

current induced in the secondary coil 70 will also increase. *See* column 2, lines 27-32. However, if a large high frequency AC current induced in the secondary coil 70 exceeds standards defined for a circuit part in battery 50 (e.g., constant voltage/constant current supplier 90), then it could cause damage to the circuit part. *See* column 2, lines 42-48.

In order to avoid causing damage, prior art contact-less charging methods typically employ a structure that fixes the relative positions between the charger 10 and the battery 50 to a position where the standards of a circuit part (e.g., the constant voltage/constant current supplier 90) in the battery 50 are defined. *See* column 2, lines 49-53. For example, as illustrated in FIG. 2 of the '568 patent, an electric toothbrush 100 includes a toothbrush body 110 having a battery 115 mounted to its lower end, and a charger 120 for charging the battery 115. *See* FIG. 2 and column 2, lines 54-60.

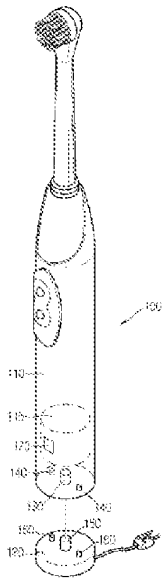


FIG. 2 of the '568 patent

The toothbrush body 110 and the charger 120 are closely fixed with each other by matching the grooves 130, 140 and the protrusions 15, 160, and as a result relative positions of the charger 120 and the battery 150 are also closely fixed. *See* column 2, line 66 to column 3, line 3. Standards of a constant voltage/constant current supplier 170 provided to the battery 115 are defined with the understanding that the toothbrush body 110 and the charger 120 are closely fixed in this manner, and thus damage to the constant voltage/constant current supplier 170 may be prevented

while charging the battery 115 due to an unexpected overvoltage by strictly restricting relative positions of the battery 115 and the charger 120 in this manner. *See* column 3, lines 4-13. That is to say, whenever charging the battery 115, a user should fix the toothbrush body 110 on the charger 120 in this particular fixed relative position. *See* column 3, lines 12-17.

b. Overview of Technical Solution

One object of the disclosure of the '568 patent is to provide a battery charging control method capable of preventing damage of an internal battery circuit together with solving a restriction for relative positions between the battery and the charger. *See* column 3, lines 35-39.

For example, as illustrated in FIG. 7 of the '568 patent (reproduced below), "the contact-less charging device and chargeable battery need not be fixed to a certain relative position as in the prior art so as to constantly keep an intensity of magnetic flux linked to the secondary coil 270" (emphasis added). *See* FIG. 7 and column 9, lines 35-38. For example, where the charging device C is designed in a pad shape as shown in FIG. 7, a user may conveniently charge a battery B just by placing a subject such as a cellular phone coupled with the battery B onto the pad, thereby allowing one to make a convenient charger and battery set. *See* column 9, lines 38-44.

To facilitate this, in one example, a contact-less charging device and chargeable battery may adjust a charging power via wireless feedback control during the battery charging process. *See* column 9, lines 29-32 and column 12, lines 46-52.

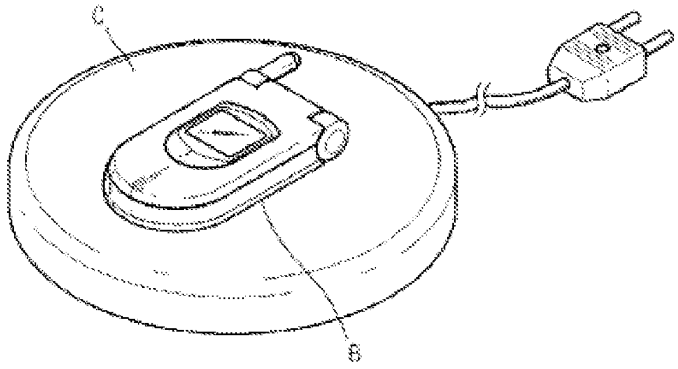


FIG. 7 of the '568 patent

c. Motivation to Combine

Chung-Sik and Matsuki

The Final Office Action states claims 1-54, 56, 61, 65 - 68, and 73-75 are rejected under 35 U.S.C. § 103 as unpatentable over a combination of Chung-Sik and Matsuki. For example, the Final Office Action states "[a]t the time the invention was made it would have been obvious to one of ordinary skill in the art to modify contact-less wireless charging of battery disclosed by Chung-Sik by adding wireless feedback control signal to induce the change of intensity of the magnetic field based on relative positions of the contact-less chargeable battery and the external contact-less charging device disclosed by Matsuki for charging a battery." (Final Office Action, p. 19).

MPEP § 2143.01 states:

> The mere fact that references can be combined or modified does not render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417, 82 USPQ2d 1385, 1396 (2007).
>
> A statement that modifications of the prior art to meet the claimed invention would have been "'well within the ordinary skill of the art at the time the claimed invention was made'" because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a prima facie case of obviousness without some objective reason to combine the teachings of the references. *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993). "'[R]ejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.'" *KSR*, 550 U.S. at 418, 82 USPQ2d at 1396 (quoting *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006)).

Patent Owner notes the Final Office Action simply assumes it would have been obvious to make the modification and provides no justification for the modification or rationale explaining a motivation to combine in violation of the MPEP and case law precedent. Accordingly, Patent Owner submits that the obviousness rejections of the claims cannot be sustained.

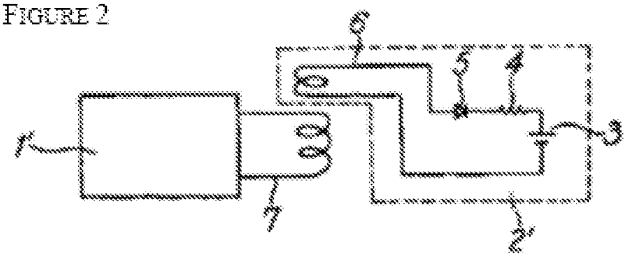
MPEP § 2143.02 states "[w]here there is a reason to modify or combine the prior art to achieve the claimed invention, the claims may be rejected as prima facie obvious provided there is also a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986)." "An invention 'composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.'" *Volkswagen Grp. of Am., Inc. v. Velocity Patent LLC*, IPR2015-00276, Paper 8, slip op. at 10

(PTAB Jun. 1, 2015) (quoting *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 418 (2007). In order to show that it would be obvious to make a particular combination, "a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.'" *Apotex Inc. v. Wyeth LLC*, IPR2014-00115, Paper 94, slip op. at 11 (Apr. 20, 2015) (quoting *Procter & Gamble Co. v. Teva Pharms. USA, Inc.*, 566 F.3d 989, 994 (Fed. Cir. 2009))." The proposed combination of Chung-Sik and Matsuki fails to meet the requirements of the MPEP and case law precedent as a skilled artisan would not have been motivated to combine the teachings and would not have had a reasonable expectation of success in making the proposed combination.

Chung-Sik teaches "the battery may be recharged only when the portable device 18 is installed on the base unit 12" (emphasis added). (Chung-Sik, page 8-2, lines 59-60). In Chung-Sik, "when the portable device 18 is installed on the base unit 12, the charge switch 30 is switched 'on' according to mechanical input" (emphasis added). (Chung-Sik, page 8-4, lines 30-40). Further, in Chung-Sik, "when a portion of the contactless charging unit 38 of the portable device 18 is mounted (positioned) on the power transmitter 28 of the base unit 12, a charge switch 30 of the base unit 12 is started (turned 'on') by the mounting of the portable device 18." (Chung-Sik, page 8-2, line 62 to page 8-3, line 2). Further, in Chung-Sik "when the portable device 18 is separated from the base unit 12, operation of the contactless charging unit 28 and the power transmitter 28 are stopped to stop charging the battery 32." (Chung-Sik, page 8-3, lines 11-14). Further, in Chung-Sik, "when the two devices are coupled to each other, the core 78 of the induced voltage detecting unit 81 installed on the contactless charging unit 38 in the portable device 18 is positioned on an opposite surface of the core 76 of the induced voltage generating unit 46 in the power transmitter 28 and is space coupled thereto" (emphasis added). (Chung-Sik, page 8-4, lines 20-25).

Patent Owner has obtained a certified translation of Matsuki, a copy of which is submitted along with this After Final Response. Matsuki describes a storage battery that can be charged without connection to a charging device. (Matsuki, column 1, lines 16-17). As shown in FIG. 2 of Matsuki, a storage battery 2' includes a resistor 4, a diode 5, and an input coil 6 connected in series between positive and negative electrodes of a storage battery body 3 so that current flows only in the direction of charging the storage battery body.

FIGURE 2



Matsuki discloses charging the storage battery using a charging device 1' having an output coil 7, also shown in FIG. 2. Matsuki recognizes that the charging current can be adjusted by changing the distance between the output coil 7 of the charging device 1' and the input coil 6. (Matsuki, column 2, lines 24 - 27). This is not a new disclosure. This is one of the problems recognized in the '568 Patent (column 2, lines 37-41): "However, the intensity of the AC current induced by the secondary coil 70 is changed according to a relative position between the primary coil 40 and the secondary coil 70 as mentioned above." Matsuki does not solve this problem, nor does it disclose circuitry in the battery for causing a change in the charging current. In fact, Matsuki fails to disclose any type of feedback circuitry in the battery or in the charging device. Rather, in Matsuki, although the relative positions of the output coil and the input coil are changed, the *intensity* of the magnetic field does not change. In the '568 Patent, the position of the primary coil and secondary coil remain fixed and the circuitry in the battery causes a change in the charging current. There is no disclosure of this claimed feature of the '568 Patent in any of the art of record.

The combination proposed in the Final Office Action requires modifying the relative positions of the base 12 and the portable device 18 of Chung-Sik, as disclosed in Matsuki, in order to adjust the charging current. See, for example, Final Office Action, pp. 18-19. However, Chung-Sik describes a system where signals transmitted from the portable device 18 to the base 12 will only occur "when the two devices are coupled to each other" in a fixed arrangement at which the core 78 of the portable device 18 is positioned on a surface of the core 76 of the transmitter 28 of the base unit 12. (Chung-Sik, page 8-4, lines 20-25). In fact, Chung-Sik does not teach or suggest making any change to the intensity of the magnetic field based on relative positions of the base 12 and the portable device 18 because Chung-Sik understands that their relative positions are fixed whenever the battery 32 is being charged.

A person having ordinary skill in the art would not be motivated to make the modification proposed in the Final Office Action as this modification would not have a reasonable chance of success as the modified system would be non-operable. *See, e.g.* MPEP § 2143.02 and *In re Merck & Co., Inc.*, 800 F.2d 1091. As described in the instant specification and above, if a high frequency AC current induced in a coil exceeds standards defined for a circuit part in battery, then it could cause damage to the circuit, battery, and other components. The prior art contact-less charging methods, such as those disclosed in Chung-Sik, employ a structure that fixes the relative positions between the charger and the battery so that the induced current remains in a range that prevents damage to the circuit or other components. Accordingly, a person having ordinary skill in the art would understand that varying the distance between the portable device 18 and the base 12, as proposed in the Final Office Action in view of Matsuki, would render Chunk-Sik non-operable. For example, varying the distance between the portable device 18 and the base 12 would damage the circuity, battery, and/or other components of the portable device 18 and/or the base 12. It is for precisely this reason that Chung-Sik describes a system where the portable device 18 and the base 12 operate when the devices are coupled to each other in a fixed arrangement. Therefore, there is no motivation to combine Chung-Sik and Matsuki as proposed in the Final Office Action and the combination of Chung-Sik and Matsuki fails to support a *prima facie* obviousness rejection as required by MPEP § 2143.02 and case law precedent.

However, even if a person having ordinary skill in the art would have been motivated to make the proposed combination (and they would not), the proposed combination of Chung-Sik and Matsuki fails to support a *prima facie* obviousness rejection. MPEP § 2143.01 states "[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious. *In re Ratti*, 270 F.2d 810, 813, 123 USPQ 349, 352 (CCPA 1959)." As described above, Chung-Sik describes a system that operates "when the two devices are coupled to each other" in a fixed arrangement at which the core 78 of the portable device 18 is positioned on a surface of the core 76 of the transmitter 28 of the base unit 12. (Chung-Sik, page 8-4, lines 20-25). This fixed arrangement is critical to the portable device of Chung-Sik as the monitoring of the battery voltage of the portable device is dependent on a constant reference voltage. Chung-Sik discloses:

> **The first voltage splitter 89 for inputting the rectified voltage IDC splits the voltage IDC into a reference voltage VI at a predetermined level** using internal resistors 88 and 90, and inputs the voltage to an inverse terminal (-) of the comparator [9]6. A charge level detection voltage V2 from a split voltage circuit 93 which is connected between the cathode and ground of the diode 86 and which splits and detects the voltage of an output node of the charging unit 52 is applied to the non-inverting terminal (+) of the comparator 96. **In this case, the reference voltage VI is constant and the charge level detection voltage V2 varies depending on a charge voltage level of the battery 32.** Thus, when the first microcomputer 48 outputs the control signal (SCTL) of 10 KHZ to an output port Pl, a charge voltage via inductive coupling between the induced voltage generating unit 46 and the induced voltage detecting unit 81 is applied to the battery 32 to initiate charge of the battery 32. (Chung-Sik, page 8-5, lines 1-8, emphasis added).

The combination proposed in the Final Office Action requires modifying the relative positions of the base 12 and the portable device 18 of Chung-Sik as allegedly disclosed in Matsuki. This combination changes the principle of operation of the system disclosed in Chung-Sik as the devices would not be coupled to each other in a fixed arrangement. Further, the proposed combination requires varying the charging current, and thereby varying the reference voltage, and as such the reference voltage would not be constant in the system suggested in the Final Office Action. However, if the reference voltage is variable, the comparator will not be able to correctly determine the charge level of the battery as the comparator relies on the reference voltage being constant. Accordingly, the proposed combination changes the principle of operation of the system disclosed in Chung-Sik as the system would not be able to determine the charge level of the battery based on a constant reference voltage. Therefore, for at least these reasons, the proposed combination of Chiung-Sik and Matsuki fails to support a *prima facie* obviousness rejection of the claims.

Chung-Sik and Kaite

The Final Office Action states claims 55, 57-60, 62-64, and 69-72 are rejected under 35 U.S.C. § 102 as anticipated by Chung-Sik and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite. (Final Office Action, p. 124). For example, the Final Office Action states "[t]o the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode it would have been obvious over Kaite

et al." (Final Office Action, p. 126). The Final Office Action does not articulate how the proposed combination of Chung-Sik and Kaite would have been predictable to one of ordinary skill in the art, how the resultant combination would have been predictable, or how a person having ordinary skill in the art would have a reasonable expectation of success in making the proposed combination as required by MPEP § 2143.01, MPEP § 2143.02, and case law precedent. Accordingly, Patent Owner submits that the combination of Chung-Sik and Kaite fails to support a *prima facie* obviousness rejection.

d. Rejection of Claims 1, 3 - 6, and 25 - 29

The Final Office Action states claim 1 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 14). Patent Owner disagrees. Claim 1 recites "wherein the monitoring result includes a wireless feedback control signal to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device." The Final Office Action relies on Chung-Sik and Matsuki to disclose the cited aspect of claim 1. Chung-Sik discloses:

> When the temperature is determined to be normal in operation 106, the first microcomputer 48 scans the input port P3 and searches for the status of the charge switch 30 in the process of operation 108. In operation 108, when the charge switch 30 is switched "off" and the hand-set status signal (HSS) is input as "high", the portable device 18 is determined to be separated and the aforementioned operation 112 is performed. In operation 108, when the charge switch 30 is turned "on", the first microcomputer 48 analyzes the data input to line 49 in operation 110 and searches whether or not the portable device is normal. In this case, the data input to the line 49 is input as data that is wirelessly transmitted from the portable device 18 when the battery 32 is completely charged. If analysis of input data in operation 110 indicates the portable device is abnormal (i.e. charge is incomplete), the first microcomputer 48 jumps to the aforementioned step 106 to continuously generate a charge voltage, and when the portable device is normal, the first microcomputer 48 jumps to operation 112 to stop charging. (Chung-Sik, p. 8-5, lines 22 - 30).

Patent Owner submits that Chung-Sik fails to teach the cited aspect of claim 1. Chung-Sik discloses stopping charging when the battery 32 is completely charged. This does not teach, suggest, or constitute "induce the change of intensity of the magnetic field by adjusting a power

applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device."

First, stopping charging when a battery is completely charged does not teach, suggest, or constitute "relative positions of the contact-less chargeable battery and the external contact-less charging device" as in claim 1. Second, stopping charging when the battery is completely charged does not teach, suggest, or constitute inducing a change of intensity of a magnetic field as in claim 1. Chung-Sik discloses stopping charging when a battery is completely charged. However, when the charging is stopped, the magnetic field is not present and therefore does not have an intensity. This does not constitute changing the intensity of a magnetic field. That is, Chung-Sik fails to teach, suggest, or disclose a *variable* intensity of a magnetic field or varying the intensity of a magnetic field. Patent Owner cannot locate any teachings in Kaite or Matsuki that cure this deficiency in Chung-Sik. To add to that, stopping charging of Chung-Sik is different from power adjustment and this is the same as simply turning off the light is different from adjusting the intensity of illumination of the light.

The Final Office Action further states Chung-Sik does "not specifically disclose to induce the change of intensity of the magnetic field based on relative positions of the contact-less chargeable battery and the external contact-less charging device." (Final Office Action, p. 18). The Final Office Action relies on Matsuki to teach the cited aspect of claim 1. (Final Office Action, p. 19). Matsuki discloses "[c]ontrolling the high-frequency output or changing the distance between the output coil 7 of the charging device 1′ and the input coil 6 of the storage battery 2′ allows the charging current to be adjusted and the charging time of the storage battery 2′ to be changed." (Matsuki, column 2, lines 24 - 27). This does not teach, suggest, or constitute "induc[ing] the change of intensity of the magnetic field [...] based on relative positions of the contact-less chargeable battery and the external contact-less charging device" as in claim 1. Specifically, Matsuki observes that the distance between the charging device and the storage battery would result in a change in charging time of the storage battery. However, this does not constitute changing the intensity of a magnetic field based on a distance. That is, in Matsuki, the intensity of the magnetic field generated from a primary coil does not change. In fact, if the position of the output coil and the input coil of Matsuki were to change, no change would be made in the operation of the charging device of Matsuki. This is in contrast to the claimed invention, where a wireless feedback control signal would be transmitted to control the operation of the claimed external

contact-less charging device. Accordingly, Matsuki fails to teach the cited aspect of claim 1. Patent Owner cannot locate any teachings in Kaite that cure this deficiency in Matsuki.

Furthermore, the proposed combination of Chung-Sik and Matsuki fails to disclose "wherein the monitoring result includes a wireless feedback control signal to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device." That is, none of the cited references disclose the feedback power adjustment control.

MPEP § 2143.01 states "[t]he mere fact that references can be combined or modified does not render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417, 82 USPQ2d 1385, 1396 (2007)." MPEP § 2143.02 states "[w]here there is a reason to modify or combine the prior art to achieve the claimed invention, the claims may be rejected as prima facie obvious provided there is also a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986)." For reasons including those stated above, Patent Owner notes that the proposed combination of Chung-Sik, Kaite, and/or Matsuki does not support the rejection of claim 1, as the results of the proposed combination would not have been predictable to one of ordinary skill in the art, would not have a reasonable expectation of success, and change the principle of operation of the system disclosed in Chung-Sik in violation of the MPEP and case law precedent.

For reasons including those stated above, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 1 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 1. Therefore, Patent Owner submits the rejection of claim 1 should be withdrawn.

Claims 3-6 and 25-29 depend from claim 1. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

e. Rejection of Claims 7-12 and 30-34

The Final Office Action states claim 7 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 26). Patent Owner disagrees. One

element of claim 7 reads "wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 7 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 7. Therefore, Patent Owner submits the rejection of claim 7 should be withdrawn.

Claims 8-12 and 30-34 depend from claim 7. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

f. Rejection of Claims 13-20, 35, and 37-39

The Final Office Action states claim 13 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 36). Patent Owner disagrees. One element of claim 13 reads "wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 13 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 13. Therefore, Patent Owner submits the rejection of claim 13 should be withdrawn.

Claims 14-20, 35, and 37-39 depend from claim 13. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

g. Rejection of Claims 21, 22, and 40-44

The Final Office Action states claim 21 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 44). Patent Owner disagrees. One element of claim 21 reads "wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 21 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki

fails to support a *prima facie* obviousness rejection of claim 21. Therefore, Patent Owner submits the rejection of claim 21 should be withdrawn.

Claims 22 and 40-44 depend from claim 21. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

h. Rejection of Claims 23, 24, and 45-48

The Final Office Action states claim 23 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 52). Patent Owner disagrees. One element of claim 23 reads "wherein the adjusting the power of the high frequency AC current applied to the primary coil is based on relative positions of the contact-less chargeable battery and the contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 23 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 23. Therefore, Patent Owner submits the rejection of claim 23 should be withdrawn.

Claims 24 and 45-48 depend from claim 23. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

i. Rejection of Claims 49-54

The Final Office Action states claim 49 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 79). Patent Owner disagrees. One element of claim 49 reads "wherein the microprocessor transmits the monitoring result to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device to solve an overvoltage state according to relative positions of the primary coil and the secondary coil." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 49 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 49. Therefore, Patent Owner submits the rejection of claim 49 should be withdrawn.

Claims 50-54 depend from claim 49. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

j. Rejection of Claims 55-59

The Final Office Action states claim 55 is rejected under 35 U.S.C. § 102 as anticipated by Chung-Sik and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite. (Final Office Action, p. 124). Patent Owner disagrees. Claim 55 reads, in part "wherein the at least one microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting a power applied to the primary coil by up to a predetermined level" and "wherein the at least one microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the power applied to the primary coil by up to the predetermined level." Chung-Sik discloses:

> When the temperature is determined to be normal in operation 106, the first microcomputer 48 scans the input port P3 and searches for the status of the charge switch 30 in the process of operation 108. In operation 108, when the charge switch 30 is switched "off" and the hand-set status signal (HSS) is input as "high", the portable device 18 is determined to be separated and the aforementioned operation 112 is performed. In operation 108, when the charge switch 30 is turned "on", the first microcomputer 48 analyzes the data input to line 49 in operation 110 and searches whether or not the portable device is normal. In this case, the data input to the line 49 is input as data that is wirelessly transmitted from the portable device 18 when the battery 32 is completely charged. If analysis of input data in operation 110 indicates the portable device is abnormal (i.e. charge is incomplete), the first microcomputer 48 jumps to the aforementioned step 106 to continuously generate a charge voltage, and when the portable device is normal, the first microcomputer 48 jumps to operation 112 to stop charging. (Chung-Sik, p. 8-5, lines 22 - 30).

Patent Owner submits that Chung-Sik fails to teach the cited aspects of claim 55. Chung-Sik discloses stopping charging when the battery 32 is completely charged. This does not teach, suggest, or constitute "a first charging power adjustment request [...] for adjusting a power applied to the primary coil by up to a predetermined level." Stopping charging when a battery is completely charged as disclosed in Chung-Sik does not teach, suggest, or constitute "adjusting a power applied to the primary coil by up to a predetermined level" as in claim 55. Specifically, when charging is stopped, power is not being applied to the battery. Therefore, stopping the charging as disclosed in Chung-Sik does not constitute "adjusting a power applied to the primary coil" as in claim 55. Patent Owner cannot locate any teachings in Kaite that cure this deficiency in Chung-Sik.

Further, Chung-Sik does not teach, suggest, or disclose "a second charging power adjustment request signal [...] for adjusting the power applied to the primary coil by up to the predetermined level." Even under the (incorrect) interpretation that the first adjustment request signal adjusting the power applied to the primary coil up to a predetermined level is disclosed by stopping charging when a battery is completely charged, Chung-Sik does not teach, suggest, or constitute a *second* adjustment. Chung-Sik discloses two charging modes - on and off. Once the charging has stopped, a second adjustment to the power cannot be made as there is no power to adjust. Therefore, Chung-Sik does not teach the cited aspect of claim 55. Patent Owner cannot locate any teachings in Kaite that cure this deficiency in Chung-Sik.

For reasons including those stated above, Chung-Sik and Kaite, either alone or in combination, fail to teach all aspects of claim 55 and the proposed combination of Chung-Sik and Kaite fails to support a *prima facie* obviousness rejection of claim 55. Therefore, Patent Owner submits the rejection of claim 55 should be withdrawn.

Claims 56-59 depend from claim 55. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

k. Rejection of Claims 60-64

The Final Office Action states claim 60 is rejected under 35 U.S.C. § 102 as anticipated by Chung-Sik and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite. (Final Office Action, p. 135). Patent Owner disagrees. Claim 60 reads, in part, "wherein the microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device by up to a predetermined level" and "wherein the microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device by up to the predetermined level." For reasons including those stated above with respect to claim 55, Chung-Sik and Kaite either alone or in combination, fail to teach all aspects of claim 60 and the proposed combination of Chung-Sik and Kaite fails to support a *prima facie* obviousness rejection of claim 60. Therefore, Patent Owner submits the rejection of claim 60 should be withdrawn.

Claims 61-64 depend from claim 60. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

l. Rejection of Claim 65

The Final Office Action states claim 65 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 93). Patent Owner disagrees. One element of claim 65 reads "wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 65 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 65. Therefore, Patent Owner submits the rejection of claim 65 should be withdrawn.

m. Rejection of Claim 66

The Final Office Action states claim 66 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 97). Patent Owner disagrees. One element of claim 66 reads "wherein the secondary coil is movable relative to the primary coil during the charging of the battery cell by the contact-less charging circuit module, and wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting the intensity of the magnetic field." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 66 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 66. Therefore, Patent Owner submits the rejection of claim 66 should be withdrawn.

n. Rejection of Claim 68

The Final Office Action states claim 68 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 102). Patent Owner disagrees. One element of claim 68 reads "wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone

or in combination, fail to teach all aspects of claim 68 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 68. Therefore, Patent Owner submits the rejection of claim 68 should be withdrawn.

o. Rejection of Claims 69-73

The Final Office Action states claim 69 is rejected under 35 U.S.C. § 102 as anticipated by Chung-Sik and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite. (Final Office Action, p. 144). Patent Owner disagrees. One element of claim 69 reads "wherein the monitoring result is a charging power adjustment request signal." For reasons including those stated above with respect to claim 55, Chung-Sik and Kaite, either alone or in combination, fail to teach all aspects of claim 69 and the proposed combination of Chung-Sik and Kaite fails to support a *prima facie* obviousness rejection of claim 69. Therefore, Patent Owner submits the rejection of claim 69 should be withdrawn.

Claims 70 - 73 depend from claim 69. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

p. Rejection of Claim 74

The Final Office Action states claim 74 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 107). Patent Owner disagrees. One element of claim 74 reads "wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 74 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 74. Therefore, Patent Owner submits the rejection of claim 74 should be withdrawn.

q. Rejection of Claim 75

The Final Office Action states claim 75 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 111). Patent Owner disagrees. One element of claim 75 reads "wherein the change of intensity of the magnetic field includes a change of intensity of the magnetic field by adjusting a power applied to the primary coil of the

external contact-less charging device based on relative positions of the contact-less charging circuit module and the external contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 75 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 75. Therefore, Patent Owner submits the rejection of claim 75 should be withdrawn.

6. Conclusion

In view of the foregoing remarks, it is respectfully submitted that this application is in condition for allowance. Accordingly, reconsideration of the application and allowance of the claims are respectfully requested. Although the present paper may include a combination of alterations to the application or claims, or characterizations of claim scope or referenced art, Patent Owner is not conceding that previously pending claims in this application are not patentable over the cited references. Rather, any alterations and/or characterizations are made strictly to facilitate prosecution of this reexamination. As such, reviewers of this or any parent, child, or related prosecution history shall not reasonably infer that Patent Owner has made any disclaimers or disavowals of any subject matter supported by the present application. Patent Owner has submitted amendments and arguments believed to be sufficient to overcome all of the outstanding rejections.

Consequently, Patent Owner has not advanced every argument for the allowability of the claims over the references of record. As such, Patent Owner does not acquiesce to any of the statements or characterizations not specifically traversed. If the Examiner should have any remaining questions or objections, a telephone interview to discuss and resolve these issues is respectfully requested.

The Commissioner is hereby authorized to charge Deposit Account No. 02-1818 for any fees which are due and owing. If such a withdrawal is made, please indicate the Attorney Docket No. 0313071.00020 on the account statement.

Respectfully submitted,
K&L GATES LLP

BY /_/
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Dated: DRAFT

EXHIBIT A

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AMENDMENTS TO THE CLAIMS

Claim 1 (Twice Amended): A contact-less chargeable battery including a charging circuit for charging an electric energy to a battery cell, the contact-less chargeable battery comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit [for] that includes first and second voltage detectors respectively detecting first and second voltages at both ends of the constant voltage/constant current supplier and a microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result includes a wireless feedback control signal to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device.

Claim 2 (Cancelled).

Claim 3 (Thrice Amended): The contact-less chargeable battery according to claim 1, wherein:

the overvoltage monitoring unit includes:

a wireless transmitting unit for wirelessly propagating the monitoring result through an antenna; and

[first and second voltage detectors for respectively detecting voltages at front and rear ends of the constant voltage/constant current supplier;]

a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and [outputs] outputting a voltage comparison result; and

the [a] microprocessor [for outputting a] outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 4 (Twice Amended): The contact-less chargeable battery according to claim 3, wherein [a] the magnetic field generated by the external contact-less charging device is generated intermittently,

wherein the microprocessor [overvoltage monitoring unit further includes a charging pause detecting unit for receiving the high frequency AC current output from the high frequency AC current inducing unit to detect] receives an end time point signal indicating a time point when the induction of high frequency AC current ends,[and then outputting the end time point to the microprocessor, and] wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 5 (Original): The contact-less chargeable battery according to claim 1, wherein the monitoring result is a charging power adjustment request signal.

Claim 6 (Original): The contact-less chargeable battery according to claim 1, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values of both ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 7 (Twice Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by[means of] a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

[an overvoltage monitoring unit for] a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device[by means of wireless communication] so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 8 (Amended): The contact-less charging circuit module according to claim 7, wherein the high frequency AC current inducing unit is a coil to which a magnetic flux of [a] the magnetic field generated from the external contact-less charging device is linked.

Claim 9 (Thrice Amended): The contact-less charging circuit module according to claim 7,[wherein the overvoltage monitoring unit includes] further comprising:

[a wireless transmitting unit for wirelessly propagating the monitoring result through]an antenna;

first and second voltage detectors for respectively detecting first and second voltages at front and rear ends of the constant voltage/constant current supplier; and

a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and [outputs] outputting a voltage comparison result, [;] and

wherein the [a] microprocessor [for outputting a] outputs the monitoring result according to the voltage comparison result[to the wireless transmitting unit] using the antenna.

Claim 10 (Twice Amended): The contact-less charging circuit module according to claim 9, wherein [a] the magnetic field generated by the external contact-less charging device is generated intermittently,

wherein the[overvoltage monitoring unit further includes a charging pause detecting unit for receiving the high frequency AC current output from the high frequency AC current inducing unit to detect] microprocessor receives a time point indicating when the induction of high frequency AC current ends, and then [outputting] outputs the end time point to the microprocessor, and

wherein the monitoring result is wirelessly transmitted to the external contact-less charging device[by means of wireless communication] while a high frequency AC current is not induced after the end time point is input.

Claim 11 (Amended): The contact-less charging circuit module according to claim [1] 7, wherein the monitoring result is a charging power adjustment request signal.

Claim 12 (Amended): The contact-less charging circuit module according to claim [1] 7, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 13 (Twice Amended): A contact-less charging device for transmitting a charging power by[means of] electromagnetic induction[phenomenon] to a contact-less chargeable battery that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode and wirelessly transmits a monitoring result for voltages at both ends of the constant voltage/constant current supplier, the contact-less charging device comprising:

a magnetic field generating unit for receiving an AC current and forming a magnetic field in an outer space;

a high frequency power driving unit for applying a high frequency AC current to the magnetic field generating unit; and

a[charging power adjusting unit for] microprocessor wirelessly receiving the monitoring result from the contact-less chargeable battery[by means of wireless communication] and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that [a] the charging power transmitted to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 14 (Original): The contact-less charging device according to claim 13, wherein the magnetic field generating unit is a coil to both sides of which a high frequency AC current is applied.

Claim 15 (Twice Amended): The contact-less charging device according to claim 13, [wherein the charging power adjusting unit includes]further comprising:

[a wireless receiving unit for wirelessly receiving the monitoring result through]an antenna coupled to the microprocessor and used to receive the monitoring result.[; and

a microprocessor for receiving the monitoring result from the wireless receiving unit and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit.]

Claim 16 (Twice Amended): The contact-less [chargeable battery] charging device according to claim 15, further comprising a [constant voltage supplier for] power supply [converting] receiving a common AC current, converting the common AC current into a DC current, and then supplying a constant-voltage current to the high frequency power driving unit, wherein the high frequency power driving unit includes:

a pulse signal generator for receiving a pulse driving signal from the microprocessor and outputting a pulse signal; and

a power driving part for receiving the pulse signal to rapidly switch the constant-voltage current input from the constant voltage supplier, thereby generating a high frequency AC current in a pulse pattern.

Claim 17 (Twice Amended): The contact-less charging device according to claim 16, wherein the[charging power adjusting unit] microprocessor adjusts [a] the charging power by modulating a width of a pulse current, a frequency of the pulse current, an amplitude of a pulse, or [the] a number of pulses.

Claim 18 (Amended): The contact-less charging device according to claim 16, wherein the [constant voltage supplier] power supply includes:

an overvoltage filter for receiving a common AC current and intercepting an overvoltage current;

a rectifier for rectifying the AC current passing through the filter to convert the AC current into a DC current; and

a constant voltage [supplying part for receiving] supplier that receives the converted DC current and outputs a constant voltage current.

Claim 19 (Amended): The contact-less charging device according to claim 13, wherein the high frequency power driving unit intermittently applies a high frequency AC current to the magnetic field generating unit, and

wherein the[charging power adjusting unit] microprocessor receives the monitoring result while a high frequency AC current is not applied to the magnetic field generating unit.

Claim 20 (Original): The contact-less charging device according to claim 13, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 21 (Twice Amended): A battery charging set including a contact-less chargeable battery and a contact-less charging device,

wherein the contact-less chargeable battery includes:

a high frequency AC current inducing unit to which a high frequency AC current is induced by[means of] a magnetic field intermittently generated from an external contactless charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to a battery cell in a constant voltage/constant current mode; and

[an overvoltage monitoring unit for] a first microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device[by means of wireless communication] while a high frequency AC current is not induced,

wherein the contact-less charging device includes:

a magnetic field generating unit for receiving an AC current and forming [a] the magnetic field in an outer space;

a high frequency power driving unit for intermittently applying a high frequency AC current to the magnetic field generating unit; and

a second microprocessor [charging power adjusting unit for], while a high frequency AC current is not applied to the magnetic field generating unit, wirelessly receiving the monitoring result[by means of wireless communication] and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that a charging power transmitted from the contact-less charging device to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 22 (Original): The battery charging set according to claim 21, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 23 (Twice Amended): A method for controlling charging of a contact-less chargeable battery using a contact-less charging device by[means of] electromagnetic induction[phenomenon], the method comprising:

(a) intermittently applying a high frequency AC current to a primary coil provided to the charging device so as to intermittently generate a magnetic field in an outer region;

(b) linking a magnetic flux of the generated magnetic field to a secondary coil provided to the battery so as to intermittently output an electromagnetically-induced high frequency AC current;

(c) rectifying the output high frequency AC current to be converted into a DC current;

(d) applying the DC current to a battery cell through a constant voltage/constant current supplier so as to charge the battery cell in a constant voltage/constant current mode;

(e) monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the charging device[by means of wireless communication] while a high frequency AC current is not induced in the secondary coil; and

(f) adjusting a power of the high frequency AC current applied to the primary coil according to the transmitted monitoring result,

wherein the adjusting the power of the high frequency AC current applied to the primary coil is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Clam 24 (Original): The method according to claim 23, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 25 (New, Amended): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 26 (New, Amended): The contact-less chargeable battery according to claim 1, wherein the microprocessor controls, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 27 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 28 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 29 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 30 (New, Amended): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 31 (New, Amended): The contact-less charging circuit module according to claim 7, wherein the microprocessor controls, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 32 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 33 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 34 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 35 (New): The contact-less chargeable battery according to claim 13, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 36 (Cancelled).

Claim 37 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier has a front end and a rear end, and wherein the constant voltage/constant current supplier receives a DC current from a rectifier at the front end and supplies a charging power at the rear end.

Claim 38 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier charges the battery in a constant current mode at an initial charging stage and then charges the battery in a constant voltage mode at a later charging stage.

Claim 39 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier charges the battery in a constant voltage mode based on a charging voltage of the battery exceeding a predetermined level.

Claim 40 (New, Amended): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 41 (New, Twice Amended): The battery charging set according to claim 21, wherein the microprocessor controls, through wireless feedback control of charging the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 42 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 43 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 44 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 45 (New): The method of claim 23, further comprising:

receiving, by the constant voltage/constant current supplier, the DC current at a front end of the constant voltage/constant current supplier; and

supplying, by the constant voltage/constant current supplier, the DC current at a rear end of the constant voltage/constant current supplier to the battery cell.

Claim 46 (New): The method of claim 23, further comprising:

supplying, by the constant voltage/constant current supplier, the DC current to the battery cell in a constant current mode during an initial charging stage and then in a constant voltage mode at a later charging stage.

Claim 47 (New): The method of claim 23, further comprising:

charging, by the constant voltage/constant current supplier, the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 48 (New, Amended): The method of claim 23, further comprising:

controlling, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing a change of intensity of the magnetic field.

Claim 49 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage; and

an overvoltage monitoring unit that includes first and second voltage detectors respectively detecting voltages at both ends of the constant voltage/constant current supplier, and a microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the microprocessor transmits the monitoring result to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device to solve an overvoltage state according to relative positions of the primary coil and the secondary coil.

Claim 50 (New): The contact-less charging circuit module according to claim 49, wherein a magnetic flux of the magnetic field generated from the external contact-less charging device is linked to the secondary coil of the high frequency AC current inducing unit.

Claim 51 (New, Amended): The contact-less charging circuit module according to claim 49, wherein:

the overvoltage monitoring unit further comprises:

a wireless transmitting unit wirelessly propagating the monitoring result through an antenna; and

wa voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

the microprocessor outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 52 (New): The contact-less charging circuit module according to claim 51, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the overvoltage monitoring unit further includes a charging pause detecting unit receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, and

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 53 (New): The contact-less charging circuit module according to claim 49, wherein the monitoring result is a charging power adjustment request signal.

Claim 54 (New): The contact-less charging circuit module according to claim 49, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 55 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier that includes circuitry controlled by at least one microprocessor, the constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage; and

an overvoltage monitoring unit that includes a wireless transmitter, first and second voltage detectors respectively detecting voltages at both ends of the constant voltage/constant current supplier, and the at least one microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the

external contact-less charging device using the wireless transmitter so as to induce a change of intensity of the magnetic field,

wherein the at least one microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting a power applied to the primary coil by up to a predetermined level,

wherein the at least one microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the power applied to the primary coil by up to the predetermined level.

Claim 56 (New): The contact-less charging circuit module according to claim 55, wherein at least one of the first charging power adjustment request signal and the second charging power adjustment request signal is based on relative positions of the primary coil and the secondary coil.

Claim 57 (New, Amended): The contact-less charging circuit module according to claim 55, wherein the wireless transmitter wirelessly propagates the monitoring result through an antenna,

wherein the overvoltage monitoring unit includes a voltage comparator comparing first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

wherein the at least one microprocessor outputs the monitoring result according to the voltage comparison result to the wireless transmitter.

Claim 58 (New, Amended): The contact-less charging circuit module according to claim 55, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the microprocessor receives an indication of a time point when the induction of high frequency AC current ends, and

wherein the monitoring result is wirelessly transmitted to the external contact-less charging device while a high frequency AC current is not induced after the end time point is input.

Claim 59 (New): The contact-less charging circuit module according to claim 55, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 60 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for receiving a charging power from an external contact-less charging device and charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by a magnetic field generated from the external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

a microprocessor monitoring the voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device so as to induce a change of intensity of the magnetic field,

herein the microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device by up to a predetermined level, and

wherein the microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device by up to the predetermined level.

Claim 61 (New): The contact-less charging circuit module according to claim 60, wherein at least one of the first charging power adjustment request signal and the second charging power adjustment request signal is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 62 (New, Amended): The contact-less charging circuit module according to claim 60, wherein the overvoltage monitoring unit includes:

an antenna;

first and second voltage detectors respectively detecting first and second voltages at front and rear ends of the constant voltage/constant current supplier; and

a voltage comparator comparing the first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

wherein the microprocessor outputs the monitoring result according to the voltage comparison result using the antenna.

Claim 63 (New, Amended): The contact-less charging circuit module according to claim 60, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the microprocessor receives an indication of a time point when the induction of high frequency AC current ends, and

wherein the monitoring result is wirelessly transmitted to the external contact-less charging device while a high frequency AC current is not induced after the end time point is input.

Claim 64 (New): The contact-less charging circuit module according to claim 60, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 65 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting unit transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 66 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit including a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting unit transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the secondary coil is movable relative to the primary coil during the charging of the battery cell by the contact-less charging circuit module, and

wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting the intensity of the magnetic field.

Claim 67 (Cancelled).

Claim 68 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit including a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit detecting first and second voltages at both ends of the constant voltage/constant current supplier, monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device.

Claim 69 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit for monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result is a charging power adjustment request signal.

Claim 70 (New): The contact-less charging circuit module according to claim 69, wherein the high frequency AC current inducing unit is a coil to which a magnetic flux of the magnetic field generated from the external contact-less charging device is linked.

Claim 71 (New): The contact-less charging circuit module according to claim 69, wherein the overvoltage monitoring unit includes:

a wireless transmitting unit for wirelessly propagating the monitoring result through an antenna;

first and second voltage detectors for respectively detecting voltages at front and rear ends of the constant voltage/constant current supplier;

a voltage comparator for comparing first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result; and

a microprocessor for outputting the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 72 (New): The contact-less charging circuit module according to claim 71, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the overvoltage monitoring unit further includes a charging pause detecting unit for receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, and

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 73 (New): The contact-less charging circuit module according to claim 69, wherein the charging power adjustment request signal is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 74 (New): A contact-less charging device for transmitting a charging power by means of electromagnetic induction phenomenon to a contact-less chargeable battery that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode and wirelessly transmits a monitoring result for voltages at both ends of the constant voltage/constant current supplier, the contact-less charging device comprising:

a magnetic field generating unit for receiving an AC current and forming a magnetic field in an outer space;

a high frequency power driving unit for applying a high frequency AC current to the magnetic field generating unit; and

a charging power adjusting unit that includes: a wireless receiving unit receiving the monitoring result from the contact-less chargeable battery by means of wireless communication, and a microprocessor controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that the charging power transmitted to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 75 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes a microprocessor, the microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field includes a change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
96/000,355	03/12/2021	8013568	0313071.00020	1538

24573 7590 07/18/2022

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EXAMINER	
DEB, ANJAN K	

ART UNIT	PAPER NUMBER
3992	

MAIL DATE	DELIVERY MODE
07/18/2022	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Ex Parte Reexamination Interview Summary	Control No.	Patent Under Reexamination	
	96/000,355	8013568	
	Examiner	Art Unit	AIA (FITF) Status
	ANJAN K DEB	3992	No

All participants (USPTO personnel, patent owner, patent owner's representative):

(1) ANJAN DEB	(3) Samuel P. Richey
(2) Hetul Patel & Stephen Ralis	(4) Matthew S. Dicke

Date of Interview: 11 July 2022

Type: a) ☑ Telephonic b) ☐ Video Conference
c) ☐ Personal (copy given to: 1) ☐ patent owner 2) ☐ patent owners representative)

Exhibit shown or demonstration conducted: d) ☐ Yes e) ☑ No.
If Yes, brief description: _____

Agreement with respect to the claims f) ☐ was reached. g) ☑ was not reached. h) ☐ N/A.
Any other agreement(s) are set forth below under "Description of the general nature of what was agreed to..."

Claim(s) discussed: 1 .

Identification of prior art discussed: Matsuki (JP H0145230 Y2), Chung-Sik (KR 950005819BI). .

Description of the general nature of what was agreed to if an agreement was reached, or any other comments:
See Continuation Sheet .

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims patentable, if available, must be attached. Also, where no copy of the amendments that would render the claims patentable is available, a summary thereof must be attached.)

A FORMAL WRITTEN RESPONSE TO THE LAST OFFICE ACTION MUST INCLUDE PATENT OWNER'S STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. (See MPEP § 2281). IF A RESPONSE TO THE LAST OFFICE ACTION HAS ALREADY BEEN FILED, THEN PATENT OWNER IS GIVEN **ONE MONTH** FROM THIS INTERVIEW DATE TO PROVIDE THE MANDATORY STATEMENT OF THE SUBSTANCE OF THE INTERVIEW
(37 CFR 1.560(b)). THE REQUIREMENT FOR PATENT OWNERS STATEMENT CAN NOT BE WAIVED.
EXTENSIONS OF TIME ARE GOVERNED BY 37 CFR 1.550(c).

/ANJAN K DEB/ Primary Examiner, Art Unit 3992	/Stephen J. Ralis/ Primary Examiner, Art Unit 3992	/HETUL B PATEL/ SPE, Art Unit 3992

cc: Requester (if third party requester)

Continuation of Description of the general nature of what was agreed to if an agreement was reached, or any other comments: Applicant discussed Interview Agenda filed on 6/22/2022 and the proposed claim amendment submitted by email attachment on 7/6/2022 (see attached).

Regarding item 1) of the agenda, Examiner stated that the 35 USC 251 rejection indicated in the Advisory Action filed on 6/15/2022 is not applicable to Ex Parte Reexamination.

Regarding item 2) of the agenda, Applicant referred to sections of the specification for providing support for the claim language, “adjusting a power applied to the primary coil of the external contact-less charging device is based on relative positions of the contact-less chargeable battery and the external contact-less charging device” (recited in the proposed amendment claim 1). Examiners disagreed that the sections of the specification referred by the Applicant provided sufficient support for the above claim language. Examiners indicated that the claims may be subject to rejection under 35 USC 112 first paragraph for lack of support as indicated in the Advisory action.

Regarding items 3) and 4) of the agenda, Applicant discussed the proposed amendment to the claims if entered would place the proceeding in better form for appeal by materially reducing the issues for appeal. Examiners advised Applicant to submit the proposed amendment in a formal response addressing all issues indicated in the Advisory Action including explanation of the support in the disclosure of the patent for the changes to the claims made by the amendment paper. No agreement was reached regarding entry of the claims.

Examiners further discussed the prior art reference Matsuki (JP H0145230 Y2) for teaching “adjusting a power applied to the primary coil of the external contact-less charging device is based on relative positions of the contact-less chargeable battery and the external contact-less charging device.” Applicant argued that Matsuki fails to disclose the claimed feedback control signal for adjusting the power applied to the primary coil of the external contact-less charging device. Additionally, Applicant argued that Matsuki is not combinable with the primary reference Chung-Sik (KR 950005819BI). The Examiners disagreed with Applicant’s arguments. No agreement was reached regarding the patentability of the claims.

Electronic Acknowledgement Receipt	
EFS ID:	46274790
Application Number:	96000355
International Application Number:	
Confirmation Number:	1538
Title of Invention:	CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF
First Named Inventor/Applicant Name:	8013568
Customer Number:	24573
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Filer Authorized By:	Matthew S. Dicke
Attorney Docket Number:	0313071.00020
Receipt Date:	26-JUL-2022
Filing Date:	12-MAR-2021
Time Stamp:	15:34:32
Application Type:	Supplemental Examination
Patent Number:	

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1		0313071-00020_RespOA.pdf	500046 f3d309409d4adebb865db3595674dcb8739afce3	yes	80

Multipart Description/PDF files in .zip description		
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EXHIBIT A

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AMENDMENTS TO THE CLAIMS

Claim 1 (Twice Amended): A contact-less chargeable battery including a charging circuit for charging an electric energy to a battery cell, the contact-less chargeable battery comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from ~~[~~a primary coil of an~~]~~ ~~the~~ external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit [for] that includes ~~a microprocessor monitoring~~first and second voltage detectors respectively detecting first and second voltages at both ends of the constant voltage/constant current supplier and a microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result includes a wireless feedback control signal to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device.

Claim 2 (Cancelled).

Claim 3 (Thrice Amended): The contact-less chargeable battery according to claim 1, wherein:

the overvoltage monitoring unit includes:

a wireless transmitting unit for wirelessly propagating the monitoring result through an antenna; and

[first and second voltage detectors for respectively detecting ~~first and second~~ voltages at front and rear ends of the constant voltage/constant current supplier~~; and~~;]

a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and [outputs] outputting a voltage comparison result~~, [;],~~ and

~~wherein~~ the [a] microprocessor [for outputting a] outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 4 (Twice Amended): The contact-less chargeable battery according to claim 3, wherein [a] the magnetic field generated by the external contact-less charging device is generated intermittently,

wherein the microprocessor [overvoltage monitoring unit further includes a charging pause detecting unit ~~[~~for receiving~~]~~ ~~that receives~~ the high frequency AC current output from the high frequency AC current inducing unit to detect] receives an end time point signal indicating a time point when the induction of high frequency AC current ends~~;~~,[and then ~~[~~outputting~~]~~ ~~outputs~~ the end time point to the microprocessor, and] wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 5 (Original): The contact-less chargeable battery according to claim 1, wherein the monitoring result is a charging power adjustment request signal.

Claim 6 (Original): The contact-less chargeable battery according to claim 1, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values of both ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 7 (Twice Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by[means of] a magnetic field generated from ~~[~~an~~]~~ ~~the~~ external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

[an overvoltage monitoring unit ~~[~~for~~]~~ ~~that includes~~ a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device[by means of wireless communication] so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 8 (Amended): The contact-less charging circuit module according to claim 7, wherein the high frequency AC current inducing unit is a coil to which a magnetic flux of [a] the magnetic field generated from the external contact-less charging device is linked.

Claim 9 (Thrice Amended): The contact-less charging circuit module according to claim 7~~,~~,[wherein the overvoltage monitoring unit includes] further comprising:

[a wireless transmitting unit for wirelessly propagating the monitoring result through]an antenna;

first and second voltage detectors for respectively detecting first and second voltages at front and rear ends of the constant voltage/constant current supplier; and

a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and [outputs] outputting a voltage comparison result, [;] and

wherein the [a] microprocessor [for outputting a] outputs the monitoring result according to the voltage comparison result[to the wireless transmitting unit] using the antenna.

Claim 10 (Twice Amended): The contact-less charging circuit module according to claim 9, wherein [a] the magnetic field generated by the external contact-less charging device is generated intermittently,

wherein the[overvoltage monitoring unit further includes a charging pause detecting unit ~~[for]~~ receiving the high frequency AC current output from the high frequency AC current inducing unit to detect] microprocessor receives a time point indicating when the induction of high frequency AC current ends, and then [outputting] outputs the end time point to the microprocessor, and

wherein the monitoring result is wirelessly transmitted to the external contact-less charging device[by means of wireless communication] while a high frequency AC current is not induced after the end time point is input.

Claim 11 (Amended): The contact-less charging circuit module according to claim [1] 7, wherein the monitoring result is a charging power adjustment request signal.

Claim 12 (Amended): The contact-less charging circuit module according to claim [1] 7, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 13 (Twice Amended): A contact-less charging device for transmitting a charging power by[means of] electromagnetic induction[phenomenon] to a contact-less chargeable battery that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode and wirelessly transmits a monitoring result for voltages at both ends of the constant voltage/constant current supplier, the contact-less charging device comprising:

a magnetic field generating unit for receiving an AC current and forming a magnetic field in an outer space;

a high frequency power driving unit for applying a high frequency AC current to the magnetic field generating unit; and

a[charging power adjusting unit for] microprocessor wirelessly receiving the monitoring result from the contact-less chargeable battery[by means of wireless communication] and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that [a] the charging power transmitted to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 14 (Original): The contact-less charging device according to claim 13, wherein the magnetic field generating unit is a coil to both sides of which a high frequency AC current is applied.

Claim 15 (Twice Amended): The contact-less charging device according to claim 13, [wherein the charging power adjusting unit includes]further comprising:

[a wireless receiving unit for wirelessly receiving the monitoring result through]an antenna~~;~~ coupled to the microprocessor and used to receive the monitoring result.[; and

a microprocessor for receiving the monitoring result from the wireless receiving unit and controlling the high frequency power driving unit to adjust ~~[a]~~ ~~the~~ power of the high frequency AC current applied to the magnetic field generating unit~~.~~.]

Claim 16 (Twice Amended): The contact-less [chargeable battery] charging device according to claim 15, further comprising a [constant voltage supplier for] power supply [converting] receiving a common AC current, converting the common AC current into a DC current, and then supplying a constant-voltage current to the high frequency power driving unit, wherein the high frequency power driving unit includes:

a pulse signal generator for receiving a pulse driving signal from the microprocessor and outputting a pulse signal; and

a power driving part for receiving the pulse signal to rapidly switch the constant-voltage current input from the constant voltage supplier, thereby generating a high frequency AC current in a pulse pattern.

Claim 17 (Twice Amended): The contact-less charging device according to claim 16, wherein the[charging power adjusting unit] microprocessor adjusts [a] the charging power by modulating a width of a pulse current, a frequency of the pulse current, an amplitude of a pulse, or [the] a number of pulses.

Claim 18 (Amended): The contact-less charging device according to claim 16, wherein the [constant voltage supplier] power supply includes:

an overvoltage filter for receiving a common AC current and intercepting an overvoltage current;

a rectifier for rectifying the AC current passing through the filter to convert the AC current into a DC current; and

a constant voltage [supplying part for receiving] supplier that receives the converted DC current and outputs a constant voltage current.

Claim 19 (Amended): The contact-less charging device according to claim 13, wherein the high frequency power driving unit intermittently applies a high frequency AC current to the magnetic field generating unit, and

wherein the[charging power adjusting unit] microprocessor receives the monitoring result while a high frequency AC current is not applied to the magnetic field generating unit.

Claim 20 (Original): The contact-less charging device according to claim 13, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 21 (Twice Amended): A battery charging set including a contact-less chargeable battery and a contact-less charging device,

wherein the contact-less chargeable battery includes:

a high frequency AC current inducing unit to which a high frequency AC current is induced by[means of] a magnetic field intermittently generated from an external contactless charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to a battery cell in a constant voltage/constant current mode; and

[an overvoltage monitoring unit ~~[~~for] ~~that includes~~ a first microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device[by means of wireless communication] while a high frequency AC current is not induced,

wherein the contact-less charging device includes:

a magnetic field generating unit for receiving an AC current and forming [a] the magnetic field in an outer space;

a high frequency power driving unit for intermittently applying a high frequency AC current to the magnetic field generating unit; and

a second microprocessor [charging power adjusting unit for~~,~~], while a high frequency AC current is not applied to the magnetic field generating unit, wirelessly receiving the monitoring result[by means of wireless communication] and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that a charging power transmitted from the contact-less charging device to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 22 (Original): The battery charging set according to claim 21, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 23 (Twice Amended): A method for controlling charging of a contact-less chargeable battery using a contact-less charging device by[means of] electromagnetic induction[phenomenon,], the method comprising:

(a) intermittently applying a high frequency AC current to a primary coil provided to the charging device so as to intermittently generate a magnetic field in an outer region;

(b) linking a magnetic flux of the generated magnetic field to a secondary coil provided to the battery so as to intermittently output an electromagnetically-induced high frequency AC current;

(c) rectifying the output high frequency AC current to be converted into a DC current;

(d) applying the DC current to a battery cell through a constant voltage/constant current supplier so as to charge the battery cell in a constant voltage/constant current mode;

(e) monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the charging device[by means of wireless communication] while a high frequency AC current is not induced in the secondary coil; and

(f) adjusting a power of the high frequency AC current applied to the primary coil according to the transmitted monitoring result,

wherein the adjusting the power of the high frequency AC current applied to the primary coil is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Clam 24 (Original): The method according to claim 23, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 25 (New, Amended): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 26 (New, Amended): The contact-less chargeable battery according to claim 1, wherein the ~~overvoltage monitoring unit~~microprocessor controls, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 27 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 28 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 29 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 30 (New, Amended): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 31 (New, Amended): The contact-less charging circuit module according to claim 7, wherein the ~~overvoltage monitoring unit~~microprocessor controls, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 32 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 33 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 34 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 35 (New): The contact-less chargeable battery according to claim 13, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 36 (Cancelled).

Claim 37 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier has a front end and a rear end, and wherein the constant voltage/constant current supplier receives a DC current from a rectifier at the front end and supplies a charging power at the rear end.

Claim 38 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier charges the battery in a constant current mode at an initial charging stage and then charges the battery in a constant voltage mode at a later charging stage.

Claim 39 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier charges the battery in a constant voltage mode based on a charging voltage of the battery exceeding a predetermined level.

Claim 40 (New, Amended): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 41 (New, Twice Amended): The battery charging set according to claim 21, wherein the ~~overvoltage monitoring unit~~microprocessor controls, through wireless feedback control of charging the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 42 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 43 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 44 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 45 (New): The method of claim 23, further comprising:

receiving, by the constant voltage/constant current supplier, the DC current at a front end of the constant voltage/constant current supplier; and

supplying, by the constant voltage/constant current supplier, the DC current at a rear end of the constant voltage/constant current supplier to the battery cell.

Claim 46 (New): The method of claim 23, further comprising:

supplying, by the constant voltage/constant current supplier, the DC current to the battery cell in a constant current mode during an initial charging stage and then in a constant voltage mode at a later charging stage.

Claim 47 (New): The method of claim 23, further comprising:

charging, by the constant voltage/constant current supplier, the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 48 (New, Amended): The method of claim 23, further comprising:

controlling, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing a change of intensity of the magnetic field.

Claim 49 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage; and

an overvoltage monitoring unit that includes ~~a wireless transmitting unit,~~ first and second voltage detectors respectively detecting voltages at both ends of the constant voltage/constant current supplier, and a microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication ~~through the wireless transmitting unit~~ so as to induce a change of intensity of the magnetic field,

wherein the microprocessor transmits the monitoring result to induce the change of intensity of the magnetic field ~~is based on~~by adjusting a power applied to the primary coil of the external contact-less charging device to solve an overvoltage state according to relative positions of the primary coil and the secondary coil.

Claim 50 (New): The contact-less charging circuit module according to claim 49, wherein a magnetic flux of the magnetic field generated from the external contact-less charging device is linked to the secondary coil of the high frequency AC current inducing unit.

Claim 51 (New, Amended): The contact-less charging circuit module according to claim 49, wherein ~~the~~:

the overvoltage monitoring unit further comprises:

a wireless transmitting unit wirelessly ~~propagates~~propagating the monitoring result through an antenna~~,~~; and

w~~herein the overvoltage monitoring unit includes~~ a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

~~wherein~~ the microprocessor outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 52 (New): The contact-less charging circuit module according to claim 51, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the overvoltage monitoring unit further includes a charging pause detecting unit receiving the high frequency AC current output from the high frequency AC current inducing unit

to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, and

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 53 (New): The contact-less charging circuit module according to claim 49, wherein the monitoring result is a charging power adjustment request signal.

Claim 54 (New): The contact-less charging circuit module according to claim 49, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 55 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by ~~means of~~ a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier that includes circuitry controlled by at least one microprocessor, the constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage; and

an overvoltage monitoring unit that includes a wireless ~~transmitting unit~~transmitter, first and second voltage detectors respectively detecting voltages at both ends of the constant voltage/constant current supplier, and the at least one microprocessor monitoring the detected

voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device ~~by means of wireless communication through~~using the wireless ~~transmitting unit~~transmitter so as to induce a change of intensity of the magnetic field,

wherein the at least one microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting a power applied to the primary coil ~~from a first level~~by up to a ~~second~~predetermined level,

wherein the at least one microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the power applied to the primary coil ~~from~~by up to the ~~second level to a third~~predetermined level.

Claim 56 (New): The contact-less charging circuit module according to claim 55, wherein at least one of the first charging power adjustment request signal and the second charging power adjustment request signal is based on relative positions of the primary coil and the secondary coil.

Claim 57 (New, Amended): The contact-less charging circuit module according to claim 55, wherein the wireless ~~transmitting unit~~transmitter wirelessly propagates the monitoring result through an antenna,

wherein the overvoltage monitoring unit includes a voltage comparator comparing first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

wherein the at least one microprocessor outputs the monitoring result according to the voltage comparison result to the wireless ~~transmitting unit~~transmitter.

Claim 58 (New, Amended): The contact-less charging circuit module according to claim 55, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the ~~overvoltage monitoring unit further includes a charging pause detecting unit receiving the high frequency AC current output from the high frequency AC current inducing unit to detect~~microprocessor receives an indication of a time point when the induction of high

frequency AC current ends, and ~~then outputting the end time point to the at least one microprocessor, and~~

wherein the monitoring result is wirelessly transmitted to the external contact-less charging device ~~by means of wireless communication~~ while a high frequency AC current is not induced after the end time point is input.

Claim 59 (New): The contact-less charging circuit module according to claim 55, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 60 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for receiving a charging power from an external contact-less charging device and charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by ~~means of~~ a magnetic field generated from the external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

~~an overvoltage monitoring unit that includes~~ a microprocessor monitoring the voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device ~~by means of wireless communication~~ so as to induce a change of intensity of the magnetic field,

wherein the microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device ~~from~~by up to a ~~first~~predetermined level ~~to a second level~~, and

wherein the microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device ~~from~~by up to the ~~second level to a third~~predetermined level.

Claim 61 (New): The contact-less charging circuit module according to claim 60, wherein at least one of the first charging power adjustment request signal and the second charging power adjustment request signal is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 62 (New, Amended): The contact-less charging circuit module according to claim 60, wherein the overvoltage monitoring unit includes:

~~a wireless transmitting unit wirelessly propagating the monitoring result through an antenna;~~

an antenna;

first and second voltage detectors respectively detecting first and second voltages at front and rear ends of the constant voltage/constant current supplier; and

a voltage comparator comparing the first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

wherein the microprocessor outputs the monitoring result according to the voltage comparison result ~~to~~using the ~~wireless transmitting unit~~antenna.

Claim 63 (New, Amended): The contact-less charging circuit module according to claim 60, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the ~~overvoltage monitoring unit further includes a charging pause detecting unit receiving the high frequency AC current output from the high frequency AC current inducing unit to detect~~microprocessor receives an indication of a time point when the induction of high frequency AC current ends, and ~~then outputting the end time point to the microprocessor, and~~

wherein the monitoring result is wirelessly transmitted to the external contact-less charging device ~~by means of wireless communication~~ while a high frequency AC current is not induced after the end time point is input.

Claim 64 (New): The contact-less charging circuit module according to claim 60, wherein the monitoring result is a difference of voltages at front and rear ends of the constant

voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 65 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting unit transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 66 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit including a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting unit transmitting

a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the secondary coil is movable relative to the primary coil during the charging of the battery cell by the contact-less charging circuit module~~.~~, and

wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting the intensity of the magnetic field.

Claim 67 (Cancelled).

Claim 68 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit including a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit ~~that includes: a microprocessor monitoring~~ detecting first and second voltages at both ends of the constant voltage/constant current supplier, ~~and a wireless transmitting unit~~monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the ~~contact-less~~ monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging ~~circuit module is movable relative~~ process for adjusting a power applied to the primary coil of the external contact-less charging device ~~during the charging~~based on relative positions of the contact-less chargeable battery ~~cell by~~and the external contact-less charging ~~circuit module~~device.

Claim 69 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit for monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result is a charging power adjustment request signal.

Claim 70 (New): The contact-less charging circuit module according to claim 69, wherein the high frequency AC current inducing unit is a coil to which a magnetic flux of the magnetic field generated from the external contact-less charging device is linked.

Claim 71 (New): The contact-less charging circuit module according to claim 69, wherein the overvoltage monitoring unit includes:

a wireless transmitting unit for wirelessly propagating the monitoring result through an antenna;

first and second voltage detectors for respectively detecting voltages at front and rear ends of the constant voltage/constant current supplier;

a voltage comparator for comparing first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result; and

a microprocessor for outputting the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 72 (New): The contact-less charging circuit module according to claim 71, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the overvoltage monitoring unit further includes a charging pause detecting unit for receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, and

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 73 (New): The contact-less charging circuit module according to claim 69, wherein the charging power adjustment request signal is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 74 (New): A contact-less charging device for transmitting a charging power by means of electromagnetic induction phenomenon to a contact-less chargeable battery that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode and wirelessly transmits a monitoring result for voltages at both ends of the constant voltage/constant current supplier, the contact-less charging device comprising:

a magnetic field generating unit for receiving an AC current and forming a magnetic field in an outer space;

a high frequency power driving unit for applying a high frequency AC current to the magnetic field generating unit; and

a charging power adjusting unit that includes: a wireless receiving unit receiving the monitoring result from the contact-less chargeable battery by means of wireless communication, and a microprocessor controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that the charging power transmitted to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 75 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes a microprocessor, the microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field includes a change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

REMARKS/ARGUMENTS

1. Introduction

a. Summary

Patent Owner submits this response in reply to the Final Office Action mailed March 3, 2022 (the "Final Office Action"),the Notice of Defective Paper in *Ex Parte* Reexamination Patent Owner Requested dated May 13, 2022 (the "Notice of Defective Paper"), and the Advisory Action dated June 15, 2022 (the "Advisory Action").

In the first Non-Final Office Action mailed June 30, 2021, claims 1-24 of U.S. Patent No. 8,013,568 (hereinafter "the '568 patent") were subject to reexamination. On August 30, 2021, Patent Owner filed a response to the first Non-Final Office Action in which claims 3, 9, 11-12, and 16 were amended and new claims 25-48 were added. In the second Non-Final Office Action mailed September 29, 2021, claims 1-48 were rejected. In the response to the second Non-Final Office Action filed November 29, 2021 (the "Second Response"), claim 36 was cancelled, new claims 49-75 were added, and claims 1-4, 7-10, 13, 15-18, 21, 23, 25, 30, 40, 41 and 48 were amended.

The Final Office Action was mailed March 3, 2022. A first After Final Response to the Final Office Action was filed May 23, 2022 (the "first After Final Response"). In the first After Final Response to the Final Office Action, claims 1, 3, 4, 7, 9, 10, 13, 15, 17, 19, 21, 23, 26, 31, 41, 49, 51, 55, 57, 58, 60, 62, 63, 66, 68, and 75 were amended and claims 2 and 67 were cancelled.

An Advisory Action was mailed on June 15, 2022. The Advisory Action states the amendments presented in the first After Final Response were not entered. (Advisory Action, p. 1). Patent Owner has filed this second After Final Response in response to the Advisory Action. In this second After Final Response to the Final Office Action and the Advisory Action, claims 1, 3, 4, 7, 9, 10, 13, 15, 17, 19, 21, 23, 26, 31, 41, 49, 51, 55, 57, 58, 60, 62, 63, 66, 68, and 75 are amended. No new matter was added with these amendments. These amendments do not enlarge the scope of the original patent claims. Claims 2 and 67 are cancelled in this response. Patent Owner makes no admission regarding the patentability of the cancelled claims.

Patent Owner notes that, as a matter of right, Patent Owner cannot amend any finally rejected claims, add new claims after a final rejection, or reinstate previously cancelled claims unless a showing under 37 C.F.R. § 1.116(b) is made except when an amendment merely cancels claims, adopts examiner's suggestions, removes issues for appeal, or in some other way requires

only a cursory review by the examiner. Patent Owner notes that, in accordance with 37 C.F.R. § 1.116(b), the amendments to claims 1, 3, 4, 7, 9, 10, 13, 15, 17, 19, 21, 23, 26, 31, and 41 present the rejected claims in better form for consideration on appeal, if necessary, and require only a cursory review by the Examiner in-line with the Final Office Action (Examiner's suggestions) to allow the claims. With respect to the amendments to claims 49, 51, 55, 57, 58, 60, 62, 63, 66, 68, and 75, Patent Owner notes that these amendments could not have been presented earlier as the Final Office Action presents the first rejection of these claims. Accordingly, Patent Owner submits the amendments to the claims should be allowed.

Favorable reconsideration of the pending claims and allowance of the new claims is respectfully requested in light of the following remarks.

b. April 5, 2022 Interview Summary

Patent Owner wishes to thank Examiners Deb, Patel, and Ferris for extending the courtesy of an interview with Matthew Dicke and Samuel Richey (counsel for Patent Owner) on April 5, 2022 (hereinafter the "April Interview"). During the April Interview, the rejections of claims 1 and 55 were discussed along with the interpretation of the claims under 35 U.S.C. § 112, sixth paragraph. In particular it was discussed how Chung-Sik fails to disclose adjusting a power level during a charging process. Further, it was discussed how the combination of Chung-Sik and Matsuki is improper as being both inoperable and by rendering the device of Chung-Sik unsatisfactory for its intended purpose.

Potential claim amendments were discussed with respect to claim 1 regarding the 35 U.S.C. § 112, sixth paragraph interpretation of "overvoltage monitoring unit" and to the wireless feedback control signal. It was agreed that these amendments would be proper in accordance with 37 C.F.R. § 1.116(b).

Additionally, it was mentioned that the term "microprocessor" could be subject to interpretation under 35 U.S.C. § 112, sixth paragraph in an Advisory Action responsive to this After Final Response. MPEP § 2271 states "[b]oth the patent owner and the examiner should recognize that a reexamination proceeding may result in the final cancellation of claims from the patent and that the patent owner does not have the right to renew or continue the proceedings by refiling under 37 CFR 1.53(b) or 37 CFR 1.53(d) or former 37 CFR 1.60 or 1.62, nor by filing a request for continued examination under 37 CFR 1.114. Complete and thorough actions by the examiner coupled with complete responses by the patent owner, including early presentation of

evidence under 37 CFR 1.131(a) or 37 CFR 1.132, will go far in avoiding such problems and reaching a desirable early termination of the reexamination prosecution." MPEP 2272 states "[a]ccordingly, both the examiner and the patent owner should identify and develop all issues prior to the final Office action, including the presentation of evidence under 37 CFR 1.131(a) and 1.132." The second Non-Final Office Action dated September 29, 2021 included an interpretation of "microprocessor" under 35 U.S.C. § 112, sixth paragraph, and in this Office Action that interpretation was withdrawn. In particular, the Office Action states "[i]n response to Patent Owner's arguments and amendment to the claims, t**he Examiner withdraws interpretation terms under 35 U.S.C. §112(6th ¶) of the claim** "constant voltage/constant current supplier," and **"microprocessor," as these are terms known in the art and do convey a particular structure**. (Remarks pages 25-29)." (Office Action, p. 4, emphasis added).

These claim interpretation issues have already been identified, developed, and withdrawn. Any reintroduction of a previously withdrawn issue after the issuance of this Office Action deprives Patent Owner of any opportunity to provide a response or present evidence. Patent Owner does not introduce any amendments that alter the usage of the term "microprocessor" from the response to the second Non-Final Office Action dated September 29, 2021. Accordingly, it is improper to reintroduce any interpretation of "microprocessor" under 35 U.S.C. § 112, sixth paragraph. Patent Owner requests this Office Action be withdrawn and prosecution be reopened should any interpretation of a term previously withdrawn be reintroduced in an Advisory Action.

No agreement with respect to the patentability of the claims was reached.

c. Response to Notice of Defective Paper

The Notice of Defective Paper states "Patent Owner did not provide markup of changes in the amended claims with respect to previous version of the claims and failed to provide an explanation of the support in the disclosure of the patent for the changes to the claims made by the amendment paper as required under 37 C.F.R. 1.530(e)." (Notice of Defective Paper, p. 2). Patent Owner respectfully disagrees and notes that this response as previously filed conforms to the requirements of 37 C.F.R. 1.530. Patent Owner provided an explanation of the support in the disclosure of the patent for the changes to the claims made by the amendment paper as required under 37 C.F.R. 1.530(e) in Section 2 of the previously filed response and the listing of claims conforms to the requirements of 37 C.F.R. 1.530(f) and (i). However, in order to facilitate these proceedings and as discussed with Examiner Deb on May 17, 2022, Patent Owner has included a

marked copy of the listing of claims (see Exhibit A) showing the amendments to claims 1 to 24 relative to the original claims and for claims 25 to 75, relative to the amendments submitted November 29, 2021. Patent Owner notes that the listing of claims provided in Exhibit A is provided for the convenience of the Examiners only and no admissions are made with respect to any amendment shown in Exhibit A.

d. July 11, 2022 Interview Summary

Patent Owner wishes to thank Examiners Deb, Patel, and Ralis for extending the courtesy of an interview with Matthew Dicke and Samuel Richey (counsel for Patent Owner) on July 11, 2022 (hereinafter the "July Interview"). During the July Interview, the Advisory Action was discussed. First, it was noted that the proposed rejection under 35 U.S.C. § 251 is not applicable in this proceeding and will be withdrawn.

Second, the proposed rejection under 35 U.S.C. § 112, first paragraph, with respect to the language "adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contactless charging device" was discussed. Patent Owner noted that this language was first introduced in the Second Response filed November 29, 2021 and the Final Office Action made no objection or rejection to this language. Further, Patent Owner demonstrated that this language is supported in the prior patent in at least column 2, lines 21 - 32, column 6, lines 10 - 24, column 6, lines 28-39, and column 6, line 66 - column 7, line 4, and column 9, lines 35-38. This support is fully explained in section 1(e) below. No agreement was reached with respect to the proposed rejection under 35 U.S.C. § 112, first paragraph during the Second Interview.

Third, the rejection under 35 U.S.C. § 103 was discussed. In particular, it was discussed how the proposed combination of Chung-Sik and Matsuki is inoperable as described in column 2, lines 21-53 and with respect to the electric toothbrush example as shown in FIG. 2 and described in column 2, line 57 - column 3, line 11, which is described in more detail in section 5(c). No agreement was reached with respect to the rejection under 35 U.S.C. § 103 during the Second Interview.

e. Response to Advisory Action

Patent Owner wishes to thank the Examiners for agreeing that the rejections and interpretations of the claims under 35 U.S.C. § 112 are overcome by the presented claim amendments. (Advisory Action, pp. 10 - 11). The Advisory Action raises two primary issues: (1)

a proposed rejection under 35 U.S.C. § § 112 with respect to the language "adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contactless charging device;" and (2) maintains the rejection of the claims under 35 U.S.C. § 103. (Advisory Action, pp. 9-12). Patent Owner notes that this second After Final Response does not include any new arguments other than those raised with respect to the 35 U.S.C. § 112 proposed rejections first stated in the Advisory Action articulated in this section. MPEP § 2272 states:

> Both the examiner and the patent owner should recognize that substantial patent rights will be at issue with no opportunity for the patent owner to refile under 37 CFR 1.53(b), or 1.53(d), and with no opportunity to file a request for continued examination under 37 CFR 1.114. Accordingly, both the examiner and the patent owner should identify and develop all issues prior to the final Office action, including the presentation of evidence under 37 CFR 1.131(a) and 1.132.

MPEP § 2271 states:

> Both the patent owner and the examiner should recognize that a reexamination proceeding may result in the final cancellation of claims from the patent and that the patent owner does not have the right to renew or continue the proceedings by refiling under 37 CFR 1.53(b) or 37 CFR 1.53(d) or former 37 CFR 1.60 or 1.62, nor by filing a request for continued examination under 37 CFR 1.114. Complete and thorough actions by the examiner coupled with complete responses by the patent owner, including early presentation of evidence under 37 CFR 1.131(a) or 37 CFR 1.132, will go far in avoiding such problems and reaching a desirable early termination of the reexamination prosecution.
>
> In making the final rejection, all outstanding grounds of rejection of record should be carefully reviewed and any grounds or rejection relied on should be reiterated. The grounds of rejection must (in the final rejection) be clearly developed to such an extent that the patent owner may readily judge the advisability of an appeal. However, where a single previous Office action contains a complete statement of a ground of rejection, the final rejection may refer to such a statement and also should include a rebuttal of any arguments raised in the patent owner's response.

First, the Advisory Action states that the language "adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contactless charging device," recited in claims 1, 13, 21,

23, 49, 56, 61, 68, 73, 74, and 75 is not supported in the prior patent and would be subject to a rejection under 35 U.S.C. § 112, first paragraph. (Advisory Action, p. 10). Patent Owner respectfully disagrees. *As an initial matter, Patent Owner notes that language similar to the objected to language was first introduced in the Second Response filed November 29, 2021 and the Final Office Action made no objection or rejection to this language*. As such, Patent Owner notes that these rejections, if made, would constitute new grounds of rejection and therefore constitute sufficient justification for withdrawing the Final Office Action and reopening prosecution under MPEP § 2275 and 37 CFR § 41.39(b)(1). Further, Patent Owner notes that the cited language is fully supported in the prior patent as described in the Second Response and referenced by the first After Final Response. See, for example, column 3, lines 35-39 (e.g. "Another object of the present invention is to provide a battery charging control method capable of preventing any damage of an internal battery circuit together with solving a restriction for relative positions between the battery and the charger that employ a contact-less charging method"); column 9, lines 29-44 (e.g., "the contact-less charging device and chargeable battery need not be fixed to a certain relative position as in the prior art so as to constantly keep an intensity of magnetic flux linked to the secondary coil"); column 11, lines 13-45; and column 12, lines 46-52. Patent Owner further notes that this claim language is fully supported in the prior patent at column 2, lines 21 - 32, column 6, lines 10 - 24, column 6, lines 28-39, column 6, line 66 - column 7, line 4, and column 9, lines 35-38 (emphasis added):

> Referring to FIG. 3, the contact-less charging device C of this embodiment includes a primary coil 200, a high frequency power driving unit 210, a primary antenna 220, a wireless receiving unit 230, a microprocessor 240, and a power supply 260. **The high frequency power driving unit 210 applies a high frequency AC current of several tens KHz to the primary coil 200 by means of rapid switching operation to generate a magnetic field.** For example, the high frequency power driving unit 210 applies a high frequency AC current of 50 KHz to the primary coil 200. If a magnetic field is generated to the primary coil 200 by the high frequency AC current, a charging power is transferred to the chargeable battery B in a contactless method by means of electromagnetic induction phenomenon. (column 6, lines 10 - 24)
>
> According to the charger 10 and the battery 50 adopting the contact-less charging method of the prior art, an intensity of **the high frequency AC current induced to the secondary coil 70 is proportional to an intensity of the magnetic flux linked to the secondary coil 70.** In addition, **the intensity of the magnetic**

> **flux linked to the secondary coil 70 is changed according to a relative position with the primary coil 40. That is to say, as the secondary coil 70 is positioned closer to the primary coil 40 of the charger 10, an intensity of the magnetic flux linked to the secondary coil 70 is increased, and as a result an intensity of the high frequency AC current induced by the secondary coil 70 is also increased.** (column 2, lines 21-32)
>
> **The wireless receiving unit 230 receives an adjustment request signal of charging power transmitted from the chargeable battery B** through the antenna 220, and then inputs the signal to the microprocessor 240. **The adjustment request signal is transmitted when an excessive charging power is transferred to the battery to probably cause a damage on circuit parts that supply constant voltage/constant current.** The adjustment request signal is modulated and transmitted from the chargeable battery B, and thus the wireless receiving unit 230 demodulates the adjustment request signal and then [sic] inputs it to the microprocessor 240. (column 6, lines 28-39)
>
> **The microprocessor 240** controls the whole operation of the charging device C, and particularly it **controls the high frequency power driving unit 210 to adjust a power of the high frequency AC current applied to the primary coil 200 if an adjustment request signal of the charging power is received from the wireless receiving unit 230**. (column 6, line 66 - column 7, line 4)
>
> Thus, **the contact-less charging device and chargeable battery of the present invention need not be fixed to a certain relative position** as in the prior art so as to constantly keep an intensity of magnetic flux linked to the secondary coil 270. (column 9, lines 35-38)

That is, the chargeable battery provides an adjustment request signal based on an excessive charging power being transmitted to the chargeable battery. This excessive charging power is generated based on the relative position of the secondary coil of the chargeable battery and the primary coil of the contact-less charging device. The contact-less charging device then adjusts the power applied to its primary coil based on the adjustment request signal, ***which is based on the relative positions of the chargeable battery and the contact-less charging device***. Accordingly, the prior patent supports the claim language "adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contactless charging device."

Accordingly, Patent Owner submits that the cited claim language is fully supported in the prior patent and, that if any rejection of this claim language is made, that the Final Office Action should be withdrawn and prosecution should be reopened. Additionally, Patent Owner submits that the amendments presented in the first After Final Response and this Second After Final Response do not raise new issues that would require further consideration and/or search, materially reduce or simply the issues for appeal, and should be entered for purposes of appeal.

Second, Patent Owner notes that the Advisory Action is not responsive to all arguments raised in the first After Final Response, particularly those raised with respect to the rejection of the claims under 35 U.S.C. § 103. For example, the Advisory Action does not address Section 5(c) of the first After Final Response, including the issues raised with respect to the proposed combination of Chung-Sik and Matsuki being improper for reasons including that the proposed combination does not have a reasonable expectation of success and the proposed combination improperly changes the principle of operation of the device disclosed in Chung-Sik.

Third, Patent Owner notes that claims 55 and 60 do not contain the claim language objected to in the Advisory Action. As amended, neither Chung-Sik or Kaite, alone or in combination, disclose all aspects of claims 55 and 60 as described in Sections 5(j) and 5(k) below. Therefore, Patent Owner notes that the amendments as presented place the proceeding in better form for appeal by materially reducing or simplifying the issues for appeal specifically by placing claims 55 - 64 in condition for allowance.

Patent Owner respectfully requests that the Examiners include a rebuttal to all arguments raised in this second After Final Response so that Patent Owner can adequately just the advisability of an appeal in accordance with MPEP § 2271 and § 2272.

2. Status of the Claims

Claims 1, 3-35, 37-66, and 68-75 are currently pending, of which claims 1, 7, 13, 21, 23, 49, 55, 60, 65, 66, 68, 69, 74, and 75 are independent.

In the present response, claims 1, 3, 4, 7, 9, 10, 13, 15, 17, 19, 21, 23, 26, 31, 41, 49, 51, 55, 57, 58, 60, 62, 63, 66, 68, and 75 are amended. Claims 2 and 67 are cancelled.

Independent claim 1 is amended as noted above. Support for these amendments is found at least at column 6, line 66 - column 7, line 4; column 7, lines 43 - 49; column 8, lines 32 - 41; column 11, lines 52 - 61; column 3, lines 35-39 (e.g. "Another object of the present invention is to

provide a battery charging control method capable of preventing any damage of an internal battery circuit together with solving a restriction for relative positions between the battery and the charger that employ a contact-less charging method"); column 9, lines 29-44 (e.g., "the contact-less charging device and chargeable battery need not be fixed to a certain relative position as in the prior art so as to constantly keep an intensity of magnetic flux linked to the secondary coil"); column 11, lines 13-45; column 12, lines 46-52; column 2, lines 21 - 32, column 6, lines 10 - 24, column 6, lines 28-39, and column 6, line 66 - column 7, line 4; column 9, lines 35-38 and previously pending claim 2. Claims 3, 4, and new claim 26 are amended to address typographical issues, formalities, and ensure proper antecedent basis.

Independent claims 7 and 13 are amended as noted above. Support for these amendments is found at least at column 6, line 66 - column 7, line 4; column 11, lines 62-65; column 3, lines 35-39 (e.g. "Another object of the present invention is to provide a battery charging control method capable of preventing any damage of an internal battery circuit together with solving a restriction for relative positions between the battery and the charger that employ a contact-less charging method"); column 9, lines 29-44 (e.g., "the contact-less charging device and chargeable battery need not be fixed to a certain relative position as in the prior art so as to constantly keep an intensity of magnetic flux linked to the secondary coil"); column 11, lines 13-45; column 12, lines 46-52; and column 2, lines 21 - 32, column 6, lines 10 - 24, column 6, lines 28-39, and column 6, line 66 - column 7, line 4, column 9, lines 35-38. Claims 9, 10, 13, 15, 17, 19, and new claim 31 are amended to address typographical issues, formalities, and ensure proper antecedent basis.

Independent claims 21 and 23 are amended as noted above. Support for these amendments is found at least at column 6, line 66 - column 7, line 4; column 7, lines 43-49; column 11, lines 52-65; column 3, lines 35-39 (e.g. "Another object of the present invention is to provide a battery charging control method capable of preventing any damage of an internal battery circuit together with solving a restriction for relative positions between the battery and the charger that employ a contact-less charging method"); column 9, lines 29-44 (e.g., "the contact-less charging device and chargeable battery need not be fixed to a certain relative position as in the prior art so as to constantly keep an intensity of magnetic flux linked to the secondary coil"); column 11, lines 13-45; column 12, lines 46-52; and column 2, lines 21 - 32, column 6, lines 10 - 24, column 6, lines 28-39, and column 6, line 66 - column 7, line 4, column 9, lines 35-38. New claims 40 and 41 are amended to address typographical issues, formalities, and ensure proper antecedent basis.

New independent claim 49 is amended as noted above. Support for these amendments is found at least at column 6, line 66 - column 7, line 4; column 3, lines 35-39 (e.g. "Another object of the present invention is to provide a battery charging control method capable of preventing any damage of an internal battery circuit together with solving a restriction for relative positions between the battery and the charger that employ a contact-less charging method"); column 9, lines 29-44 (e.g., "the contact-less charging device and chargeable battery need not be fixed to a certain relative position as in the prior art so as to constantly keep an intensity of magnetic flux linked to the secondary coil"); column 11, lines 13-45; column 12, lines 46-52; and column 2, lines 21 - 32, column 6, lines 10 - 24, column 6, lines 28-39, and column 6, line 66 - column 7, line 4, column 9, lines 35-38. New dependent claim 51 is amended to address typographical issues, formalities, and ensure proper antecedent basis.

New independent claims 55 and 60 are amended as noted above. Support for these amendments is found at least at column 11, lines 23-26 and lines 35-43. New claims 57, 58, 62, and 63 are amended to address typographical issues, formalities, and ensure proper antecedent basis.

New claim 66 is amended as noted above. Support for these amendments is found in at least previously pending claim 67.

New claims 68 and 75 are amended in this response. Support for these amendments is found in at least column 6, line 66 - column 7, line 4; column 7, lines 43-49; column 8, lines 32-41; column 11, lines 52 - 61; FIG. 3; column 3, lines 35-39 (e.g. "Another object of the present invention is to provide a battery charging control method capable of preventing any damage of an internal battery circuit together with solving a restriction for relative positions between the battery and the charger that employ a contact-less charging method"); column 9, lines 29-44 (e.g., "the contact-less charging device and chargeable battery need not be fixed to a certain relative position as in the prior art so as to constantly keep an intensity of magnetic flux linked to the secondary coil"); column 11, lines 13-45; column 12, lines 46-52; and column 2, lines 21 - 32, column 6, lines 10 - 24, column 6, lines 28-39, and column 6, line 66 - column 7, line 4, column 9, lines 35-38.

For completeness, claims 8, 11, 12, 16, 18, 25, 30, 40, and 48 were amended in the response to the second Non-Final Office Action filed November 29, 2021 and not further amended in this response. Further, new claims 49-75 were added in the second Non-Final Office Action filed

November 29, 2021. Support for these previously presented amendments and the new claims can be found in the response to the second Non-Final Office Action filed November 29, 2021.

3. Response to Claim Interpretation under 35 U.S.C. § 112, Sixth Paragraph

a. overvoltage monitoring unit

In the Final Office Action, the Office invoked an interpretation under 35 U.S.C. § 112, sixth paragraph with respect to claims 1, 4, 7, 9, 10, 21, 26, 31, 41, 49, 52, 55, 58, 60, 62, 63, 65, 66, 68, 69, 71, 72, and 75 for claim term "overvoltage monitoring unit." Patent Owner respectfully disagrees and asserts that the pending claims were not intended to be and should not be interpreted as means-plus-function claims under 35 U.S.C. § 112, sixth paragraph. With respect to claims 7, 9, 10, 21, 26, 31, 41, 58, 60, 62, and 63, Patent Owner has removed the term "overvoltage monitoring unit." Patent Owner notes that this amendment does not broaden the claim as the microprocessor was previously recited in the claims. Accordingly, Patent Owner submits that these claims should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

With respect to claims 1, 4, 49, 52, 55, 65 and 66, Patent Owner submits that the claim recites specific structures for the "overvoltage monitoring unit." For example, claim 1 recites "an overvoltage monitoring unit that includes first and second voltage detectors [...] and a microprocessor." Claim 49 recites "an overvoltage monitoring unit that includes a wireless transmitting unit, first and second voltage detectors [...], and a microprocessor." Claim 55 recites "an overvoltage monitoring unit that includes a wireless transmitter, first and second voltage detectors [...], and the at least one microprocessor." Claim 65 and 66 recite "an overvoltage monitoring unit that includes: a microprocessor [...] and a wireless transmitting unit." Accordingly, the interpretation of claims 1, 49, 52, 55, 65, 66, and 68 under 35 U.S.C. § 112, sixth paragraph is improper.

With respect to claims 68 and 69, Patent Owner submits that the term "overvoltage monitoring unit," when read by a person having ordinary skill in the art in view of the specification, is understood to have a sufficiently definite meaning as the name for the structure that performs the function. Even when a term covers a broad class of structures or identifies the structures by their function (e.g., "filters," "brakes," "clamp," "screwdriver," and "locks"), 35 U.S.C. § 112 sixth paragraph will not apply. *See* MPEP 2181(I)(A). To determine whether a word, term, or phrase coupled with a function denotes structure, examiners may check whether: (1) the specification

provides a description sufficient to inform one of ordinary skill in the art that the term denotes structure; (2) general and subject matter specific dictionaries provide evidence that the term has achieved recognition as a noun denoting structure; and/or (3) the prior art provides evidence that the term is an art-recognized structure to perform the claimed function. *See* MPEP 2181(I)(C); and *Ex parte Rodriguez,* 92 USPQ2d 1395, 1404 (Bd. Pat. App. & Int. 2009) (precedential). Persons of ordinary skill in the art reading the specification of the '568 patent would recognize that the recited claim terms have a sufficient definite meaning as the name for a structure. The recited claim terms are also modified by sufficient structure, material, and/or acts for a person skilled in the art reading the specification to recognize that the recited claim terms, together with the functions, structures, materials, and acts recited in the claims, connote sufficient definite structure. See, for example, claims 1, 4, 7, 9, 10, 21, 26, 31, 41, 49, 52, 55, 58, 60, 62, 63, 65, 66, 68, 71, 72, and 75. Further, with respect to claims 71 and 72, Patent Owner submits that the claims recite specific structures for the "overvoltage monitoring unit." For example, claim 71 recites "wherein the overvoltage monitoring unit includes: a wireless transmitting unit [...] first and second voltage detectors [...] a voltage comparator [...] and a microprocessor." Accordingly, the interpretation of claims 69, 71, and 72 under 35 U.S.C. § 112, sixth paragraph is improper.

The Final Office Action states the "overvoltage monitoring unit" is interpreted to include "a wireless transmitting unit 320 for wirelessly propagating the monitoring result through an antenna 330; first and second voltage detectors (350, 360) for respectively detecting voltages at front and rear ends of the constant voltage/constant current supplier; a voltage comparator 380 for comparing first and second voltages detected by the first and second voltage detectors (350, 360) and outputs a voltage comparison result; a microprocessor 310 for outputting a monitoring result according to the voltage comparison result to the wireless transmitting unit 320; and charging pause detection unit 390 receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the micro-processor 310 (column 4, lines 28-45) (FIG. 5)." (Final Office Action, pp. 8 - 9). Patent Owner notes that it is improper to read every structure indicated in the specification into the "overvoltage monitoring unit." MPEP § 2181 states (emphasis added):

> If the written description sets forth the corresponding structure, material, or acts in compliance with 35 U.S.C. 112(b) or pre-AIA 35 U.S.C. 112, second paragraph, the claim limitation must "be construed to cover the corresponding

> structure, material, or acts described in the specification and equivalents thereof." 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph. However, **functional limitations that are not recited in the claim, or structural limitations from the written description that are unnecessary to perform the claimed function, cannot be imported into the claim**. *Welker Bearing*, 550 F.3d at 1097, 89 USPQ2d at 1294; *Wenger Mfg., Inc. v. Coating Mach. Sys., Inc.*, 239 F.3d 1225, 1233, 57 USPQ2d 1679, 1685 (Fed. Cir. 2001).

Patent Owner notes that the claims recite the necessary structural limitations to perform the claimed functions. Accordingly, Patent Owner submits that, in the event the term "overvoltage monitoring unit" is interpreted under 35 U.S.C. § 112, sixth paragraph, the interpretation of the term articulated in the Final Office Action is improper for at least including functional limitations and/or structure that is unnecessary to perform the claimed functions.

Claim 75 recites "an overvoltage monitoring unit that includes a microprocessor." The microprocessor constitutes specific structure for the "overvoltage monitoring unit." Accordingly, the interpretation of claim 75 under 35 U.S.C. § 112, sixth paragraph is improper.

b. wireless transmitting unit

In the Final Office Action, the Office invoked an interpretation under 35 U.S.C. § 112, sixth paragraph with respect to claim 3 for claim term "wireless transmitting unit." Patent Owner respectfully disagrees and asserts that the pending claims were not intended to be and should not be interpreted as means-plus-function claims under 35 U.S.C. § 112, sixth paragraph. Patent Owner notes that a "wireless transmitting unit," when read by a person having ordinary skill in the art in view of the specification, is understood to have a sufficiently definite meaning as the name for the structure that performs the function as indicated on page 9 of the Office Action. Accordingly, Patent Owner submits that this claim should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

c. charging pause detecting unit

In the Final Office Action, the Office invoked an interpretation under 35 U.S.C. § 112, sixth paragraph with respect to claims 4, 10, 52, 58, 63, and 72 for claim term "charging pause detecting unit." Patent Owner respectfully disagrees and asserts that the pending claims were not intended to be and should not be interpreted as means-plus-function claims under 35 U.S.C. § 112, sixth paragraph. However, with respect to claims 4, 10, 58, and 63 Patent Owner has removed the

term "charging pause detecting unit." Accordingly, Patent Owner submits that these claims should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

With respect to claims 52 and 72, Patent Owner submits that the specification provides a description sufficient to inform one of ordinary skill in the art that the term denotes structure when coupled with its function. For example, support for the claimed "charging pause detecting unit" is found at least at column 8, line 64 to column 9, line 16; column 10, lines 1-4; and Figs. 5-6 (e.g., the charging pause detector 390 measures the high frequency AC current induced in the secondary coil 270 and so as to detect when the induced high frequency AC current is interrupted (the pause region), and that inputs the detection signal to the microprocessor 310). FIG. 5 illustrates a block diagram of an electronic circuit having a variety of electronic components, such as a coil 279, an antenna 330, and a battery cell 300. Accordingly, the figures inform one of ordinary skill in the art that the components shown in the figures, including the "charging pause detecting unit" constitute one or more electronic components coupled together to perform the recited function. Accordingly, Patent Owner submits the three-part test is not met and this claim should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

d. charging power adjustment unit

In the Final Office Action, the Office invoked an interpretation under 35 U.S.C. § 112, sixth paragraph with respect to claims 13, 17, 19, 21, and 74 for claim term "charging power adjustment unit." Patent Owner respectfully disagrees and asserts that the pending claims were not intended to be and should not be interpreted as means-plus-function claims under 35 U.S.C. § 112, sixth paragraph. However, with respect to claims 13, 17, 19, and 21 Patent Owner has removed the term "charging power adjustment unit." Accordingly, Patent Owner submits that these claims should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

With respect to claim 74, Patent Owner submits that the claim recites specific structures for the "charging power adjustment unit." Specifically, claim 74 recites "a charging power adjusting unit that includes: a wireless receiving unit [...] and a microprocessor." Accordingly, Patent Owner submits the three-part test is not met and this claim should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

The Final Office Action states "the structure of charging power adjustment unit includes a wireless receiver and a microprocessor." (Final Office Action, p. 10). Patent Owner notes that it is improper to read every structure indicated in the specification into the "charging power adjustment

unit" in accordance with MPEP § 2181. Accordingly, Patent Owner submits that, in the event the term "charging power adjustment unit" is interpreted under 35 U.S.C. § 112, sixth paragraph, the interpretation of the term articulated in the Final Office Action is improper for at least including functional limitations and/or structure that are unnecessary to perform the claimed functions.

e. wireless receiving unit

In the Final Office Action, the Office invoked an interpretation under 35 U.S.C. § 112, sixth paragraph, with respect to claims 15 and 74 for claim term "wireless receiving unit." Patent Owner respectfully disagrees and asserts that the pending claims were not intended to be and should not be interpreted as means-plus-function claims under 35 U.S.C. § 112, sixth paragraph. However, with respect to claim 15, Patent Owner has removed the term "wireless receiving unit." Accordingly, Patent Owner submits that this claim should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

With respect to claim 74, Patent Owner submits that the specification provides a description sufficient to inform one of ordinary skill in the art that the term denotes structure when coupled with its function. For example, support for the claimed "wireless receiving unit" is found at least at column 10, lines 14-17 (e.g., [i]f the response signal is wirelessly transmitted, the wireless receiving unit 230 of the charging device C demodulates the response signal and then inputs it to the microprocessor 240.) and FIGs. 3 and 4. For example, FIG. 4 illustrates a block diagram of an electronic circuit having a variety of electronic components, such as an AC power source 250, a coil 200, and an antenna 220. Accordingly, the figures inform one of ordinary skill in the art that the components shown in the figures, including the "wireless receiving unit" constitute one or more electronic components coupled together to perform the recited function. Accordingly, Patent Owner submits the three-part test is not met. Further, "the term "receiver" (i.e., the absence of the term means) presumptively connotes sufficiently definite structure to those of skill in the art. *See Personalized Media*, 161 F.3d at 703–04." (*EnOcean GmbH v. Face Int'l Corp.*, No. 12-1645 at 7 (Fed. Cir. 2014)). Therefore, this claim should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

f. Conclusion

In view of the foregoing, Patent Owner respectfully asserts that the pending claims are not means-plus-function claims and that each and every word of the claims should be given patentable weight. Furthermore, for at least the reasons stated above, Patent Owner respectfully requests

withdrawal of the pending 35 U.S.C. § 112, sixth paragraph, interpretation of the claim terms in the pending claims.

4. Response to Claim Rejections under 35 U.S.C. § 112, First and Second Paragraphs

a. 35 U.S.C § 112, second paragraph

In the Final Office Action, claims 1, 21, and 65 are rejected as being indefinite with respect to "what component of the claimed "overvoltage monitoring unit" recited in claims 1, 21, and 65, is monitoring the voltages at both ends of the constant voltage/constant current supplier." (Final Office Action, p. 11). Patent Owner disagrees, but has amended the claims to advance prosecution. With respect to claim 1, Patent Owner has amended claim 1 to recite "first and second voltage detectors respectively detecting first and second voltages at both ends of the constant voltage/constant current supplier." With respect to claim 21, Patent Owner has amended claim 21 to remove the cited language. With respect to claim 65, Patent Owner notes that it is well specified in the specification that a microprocessor monitors the voltage at both ends of the constant voltage/constant current supplier. See, for example, column 11, lines 52-58 ("in the above embodiment [...] the microprocessor 310 of the battery B monitors voltages measured at both ends of the constant voltage/constant current supplier 290" and column 11, lines 31-35 ("the microprocessor 310 periodically repeats monitoring an overvoltage state at both ends of the constant voltage/constant current supplier 290."

Therefore, Patent Owner submits that the rejections of claims 1, 21, and 65 under 35 U.S.C § 112, second paragraph should be withdrawn.

b. 35 U.S.C § 112, first paragraph

In the Final Office Action, claims 55 and 60 are rejected as failing to comply with the written description requirement with respect to the terms "adjusting a power applied to the primary coil from a first level to a second level" and "adjusting the power applied to the primary coil from the second level to a third level." (Final Office Action, p. 13). Specifically, the Final Office Action states "the first, second, and third level fail to comply with the written description requirement." (Final Office Action, p. 13). Patent Owner respectfully disagrees. Column 11, lines 23-26 state "the microprocessor 240 controls the high frequency power driving unit 210 to lower the power of the high frequency AC current applied to the primary coil 200 as much as a predetermined level." This constitutes adjusting a power applied to the primary coil from a first level (e.g. the power

level at which the high frequency power driving unit 210 is operating) to a second level (e.g. the power level lowered by as much as a predetermined level). Similarly, column 11, lines 38-43 state (emphasis added) "the microprocessor 310 wirelessly transmits an adjustment request signal of charging power to the charging device C again **so that the power of high frequency AC current applied to the primary coil 200 is lowered as much as a predetermined level once again.**" This constitutes adjusting the power applied to the primary coil from the second level to a third level (e.g. the second power level lowered by as much as a predetermined level once again). However, despite the clear support in the specification for the cited claim language, Patent Owner has amended claims 55 and 60 to remove the objected to phrases. Therefore, Patent Owner submits that the rejections of claims 55 and 60 under 35 U.S.C § 112, first paragraph should be withdrawn.

Conclusion

Thus, for at least the same reasons stated above, Patent Owner respectfully requests withdrawal of the pending 35 U.S.C. § 112, first and second paragraph rejections.

5. Response to Claim Rejections under 35 U.S.C. § 102 and 35 U.S.C. § 103

The Final Office Action states claims 1 - 15, 19 - 54, 56, 61, 65 - 68, and 73 - 75 are rejected under 35 U.S.C. § 103 as unpatentable over Korean Patent No. KR 950005819B1 (hereinafter "Chung-Sik") in view of Japanese Patent No. JP H0145230 Y2 to Matsuki (hereinafter "Matsuki") and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of U.S. Pat. No. 6,016,046 to Kaite (hereinafter "Kaite") in view of Matsuki. (Final Office Action, p. 14).

The Final Office Action states claims 16-18 are rejected under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Matsuki and in view of Korean Patent No. KR100451606B1 (hereinafter "Cho"). (Final Office Action, p. 115).

The Final Office Action states claims 55, 57-60, 62-64, and 69-72 are rejected under 35 U.S.C. § 102 as anticipated by Chung-Sik and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite. (Final Office Action, p. 124).

Without conceding to these rejections, Patent Owner has amended the claims as noted above. Chung-Sik, Kaite, Matsuki, and Cho, alone or in combination, do not teach or suggest all features of any of independent claims 1, 7, 13, 21, 23, 49, 55, 60, 65, 66, 68, 69, 74, and 75.

a. Overview of Technical Problem

As illustrated in FIG. 1 of the '568 patent (reproduced below), in a conventional contact-less charging method, a charger 10 includes a primary coil 40 supplied with a high frequency AC current to form a magnetic field M, and a battery 50 includes a secondary coil 70 to which a high frequency AC current is induced according to the linkage of the magnetic field M generated in the primary coil 40. *See* FIG. 1 and column 1, line 66 to column 2, line 6.

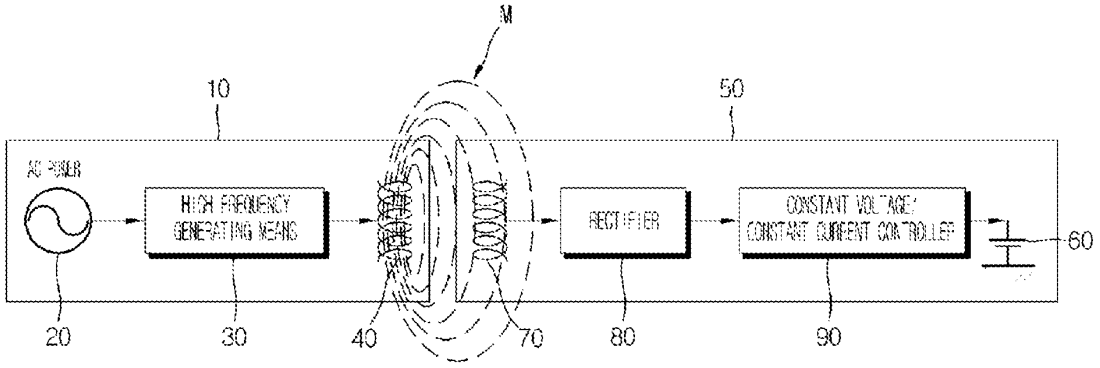


FIG. 1 of the '568 patent

An intensity of the AC current induced in the secondary coil 70 is proportional to an intensity of the magnetic flux linked to the secondary coil 70, which depends on a relative position of the secondary coil 70 and the primary coil 40. *See* column 2, lines 21-27. For example, if the secondary coil 70 is positioned closer to the primary coil 40, the intensity of the magnetic flux linked to the secondary coil 70 will increase, and as a result the intensity of the high frequency AC current induced in the secondary coil 70 will also increase. *See* column 2, lines 27-32. However, if a large high frequency AC current induced in the secondary coil 70 exceeds standards defined for a circuit part in battery 50 (e.g., constant voltage/constant current supplier 90), then it could cause damage to the circuit part. *See* column 2, lines 42-48.

In order to avoid causing damage, prior art contact-less charging methods typically employ a structure that fixes the relative positions between the charger 10 and the battery 50 to a position where the standards of a circuit part (e.g., the constant voltage/constant current supplier 90) in the battery 50 are defined. *See* column 2, lines 49-53. For example, as illustrated in FIG. 2 of the '568 patent, an electric toothbrush 100 includes a toothbrush body 110 having a battery 115 mounted

to its lower end, and a charger 120 for charging the battery 115. *See* FIG. 2 and column 2, lines 54-60.

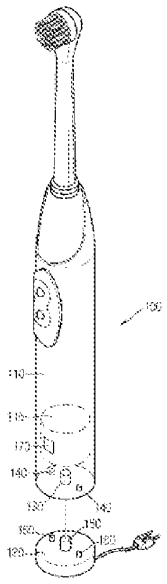


FIG. 2 of the '568 patent

The toothbrush body 110 and the charger 120 are closely fixed with each other by matching the grooves 130, 140 and the protrusions 15, 160, and as a result relative positions of the charger 120 and the battery 150 are also closely fixed. *See* column 2, line 66 to column 3, line 3. Standards of a constant voltage/constant current supplier 170 provided to the battery 115 are defined with the understanding that the toothbrush body 110 and the charger 120 are closely fixed in this manner, and thus damage to the constant voltage/constant current supplier 170 may be prevented while charging the battery 115 due to an unexpected overvoltage by strictly restricting relative positions of the battery 115 and the charger 120 in this manner. *See* column 3, lines 4-13. That is to say, whenever charging the battery 115, a user should fix the toothbrush body 110 on the charger 120 in this particular fixed relative position. *See* column 3, lines 12-17.

b. Overview of Technical Solution

One object of the disclosure of the '568 patent is to provide a battery charging control method capable of preventing damage of an internal battery circuit together with solving a restriction for relative positions between the battery and the charger. *See* column 3, lines 35-39.

For example, as illustrated in FIG. 7 of the '568 patent (reproduced below), "the contact-less charging device and chargeable battery need not be fixed to a certain relative position as in the prior art so as to constantly keep an intensity of magnetic flux linked to the secondary coil 270" (emphasis added). *See* FIG. 7 and column 9, lines 35-38. For example, where the charging device C is designed in a pad shape as shown in FIG. 7, a user may conveniently charge a battery B just by placing a subject such as a cellular phone coupled with the battery B onto the pad, thereby allowing one to make a convenient charger and battery set. *See* column 9, lines 38-44.

To facilitate this, in one example, a contact-less charging device and chargeable battery may adjust a charging power via wireless feedback control during the battery charging process. *See* column 9, lines 29-32 and column 12, lines 46-52.

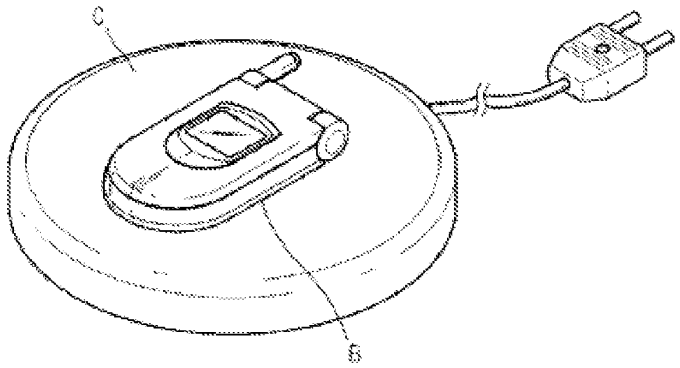


FIG. 7 of the '568 patent

c. Motivation to Combine

Chung-Sik and Matsuki

The Final Office Action states claims 1-54, 56, 61, 65 - 68, and 73-75 are rejected under 35 U.S.C. § 103 as unpatentable over a combination of Chung-Sik and Matsuki. For example, the Final Office Action states "[a]t the time the invention was made it would have been obvious to one of ordinary skill in the art to modify contact-less wireless charging of battery disclosed by Chung-Sik by adding wireless feedback control signal to induce the change of intensity of the magnetic field based on relative positions of the contact-less chargeable battery and the external contact-less charging device disclosed by Matsuki for charging a battery." (Final Office Action, p. 19).

MPEP § 2143.01 states:

> The mere fact that references can be combined or modified does not render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417, 82 USPQ2d 1385, 1396 (2007).
>
> A statement that modifications of the prior art to meet the claimed invention would have been "'well within the ordinary skill of the art at the time the claimed invention was made'" because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a prima facie case of obviousness without some objective reason to combine the teachings of the references. *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993). "'[R]ejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.'" *KSR*, 550 U.S. at 418, 82 USPQ2d at 1396 (quoting *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006)).

Patent Owner notes the Final Office Action simply assumes it would have been obvious to make the modification and provides no justification for the modification or rationale explaining a motivation to combine in violation of the MPEP and case law precedent. Accordingly, Patent Owner submits that the obviousness rejections of the claims cannot be sustained.

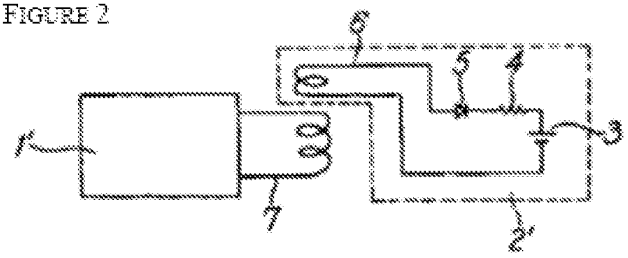
MPEP § 2143.02 states "[w]here there is a reason to modify or combine the prior art to achieve the claimed invention, the claims may be rejected as prima facie obvious provided there is also a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986)." "An invention 'composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.'" *Volkswagen Grp. of Am., Inc. v. Velocity Patent LLC*, IPR2015-00276, Paper 8, slip op. at 10 (PTAB Jun. 1, 2015) (quoting *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 418 (2007). In order to show that it would be obvious to make a particular combination, "a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.'" *Apotex Inc. v. Wyeth LLC*, IPR2014-00115, Paper 94, slip op. at 11 (Apr. 20, 2015) (quoting *Procter & Gamble Co. v. Teva Pharms. USA, Inc.*, 566 F.3d 989, 994 (Fed. Cir. 2009))." The proposed combination of Chung-Sik and Matsuki fails to meet the requirements of the MPEP and

case law precedent as a skilled artisan would not have been motivated to combine the teachings and would not have had a reasonable expectation of success in making the proposed combination.

Chung-Sik teaches "the battery may be recharged only when the portable device 18 is installed on the base unit 12" (emphasis added). (Chung-Sik, page 8-2, lines 59-60). In Chung-Sik, "when the portable device 18 is installed on the base unit 12, the charge switch 30 is switched 'on' according to mechanical input" (emphasis added). (Chung-Sik, page 8-4, lines 30-40). Further, in Chung-Sik, "when a portion of the contactless charging unit 38 of the portable device 18 is mounted (positioned) on the power transmitter 28 of the base unit 12, a charge switch 30 of the base unit 12 is started (turned 'on') by the mounting of the portable device 18." (Chung-Sik, page 8-2, line 62 to page 8-3, line 2). Further, in Chung-Sik "when the portable device 18 is separated from the base unit 12, operation of the contactless charging unit 28 and the power transmitter 28 are stopped to stop charging the battery 32." (Chung-Sik, page 8-3, lines 11-14). Further, in Chung-Sik, "when the two devices are coupled to each other, the core 78 of the induced voltage detecting unit 81 installed on the contactless charging unit 38 in the portable device 18 is positioned on an opposite surface of the core 76 of the induced voltage generating unit 46 in the power transmitter 28 and is space coupled thereto" (emphasis added). (Chung-Sik, page 8-4, lines 20-25).

Patent Owner has obtained a certified translation of Matsuki, a copy of which is submitted along with this After Final Response. Matsuki describes a storage battery that can be charged without connection to a charging device. (Matsuki, column 1, lines 16-17). As shown in FIG. 2 of Matsuki, a storage battery 2' includes a resistor 4, a diode 5, and an input coil 6 connected in series between positive and negative electrodes of a storage battery body 3 so that current flows only in the direction of charging the storage battery body.

FIGURE 2



Matsuki discloses charging the storage battery using a charging device 1' having an output coil 7, also shown in FIG. 2. Matsuki recognizes that the charging current can be adjusted by

changing the distance between the output coil 7 of the charging device 1' and the input coil 6. (Matsuki, column 2, lines 24 - 27). This is not a new disclosure. This is one of the problems recognized in the '568 Patent (column 2, lines 37-41): "However, the intensity of the AC current induced by the secondary coil 70 is changed according to a relative position between the primary coil 40 and the secondary coil 70 as mentioned above." Matsuki does not solve this problem, nor does it disclose circuitry in the battery for causing a change in the charging current. In fact, Matsuki fails to disclose any type of feedback circuitry in the battery or in the charging device. Rather, in Matsuki, although the relative positions of the output coil and the input coil are changed, the *intensity* of the magnetic field does not change. In the '568 Patent, the position of the primary coil and secondary coil remain fixed and the circuitry in the battery causes a change in the charging current. There is no disclosure of this claimed feature of the '568 Patent in any of the art of record.

The combination proposed in the Final Office Action requires modifying the relative positions of the base 12 and the portable device 18 of Chung-Sik, as disclosed in Matsuki, in order to adjust the charging current. See, for example, Final Office Action, pp. 18-19. However, Chung-Sik describes a system where signals transmitted from the portable device 18 to the base 12 will only occur "when the two devices are coupled to each other" in a fixed arrangement at which the core 78 of the portable device 18 is positioned on a surface of the core 76 of the transmitter 28 of the base unit 12. (Chung-Sik, page 8-4, lines 20-25). In fact, Chung-Sik does not teach or suggest making any change to the intensity of the magnetic field based on relative positions of the base 12 and the portable device 18 because Chung-Sik understands that their relative positions are fixed whenever the battery 32 is being charged.

A person having ordinary skill in the art would not be motivated to make the modification proposed in the Final Office Action as this modification would not have a reasonable chance of success as the modified system would be non-operable. *See, e.g.* MPEP § 2143.02 and *In re Merck & Co., Inc.*, 800 F.2d 1091. As described in the instant specification and above, if a high frequency AC current induced in a coil exceeds standards defined for a circuit part in battery, then it could cause damage to the circuit, battery, and other components. The prior art contact-less charging methods, such as those disclosed in Chung-Sik, employ a structure that fixes the relative positions between the charger and the battery so that the induced current remains in a range that prevents damage to the circuit or other components. Accordingly, a person having ordinary skill in the art would understand that varying the relative positions of (e.g. the distance between) the portable

device 18 and the base 12, as proposed in the Final Office Action in view of Matsuki, would render Chunk-Sik non-operable. For example, varying the relative positions of the portable device 18 and the base 12 would damage the circuity, battery, and/or other components of the portable device 18 and/or the base 12. It is for precisely this reason that Chung-Sik describes a system where the portable device 18 and the base 12 operate when the devices are coupled to each other in a fixed arrangement.

Patent Owner notes that these limitations of the prior art designs of Chung-Sik and Matsuki are well known to a person having ordinary skill in the art and explained in the prior patent (column 2, lines 21-53, emphasis added):

> **According to the charger 10 and the battery 50 adopting the contact-less charging method of the prior art, an intensity of the high frequency AC current induced to the secondary coil 70 is proportional to an intensity of the magnetic flux linked to the secondary coil 70**. In addition, **the intensity of the magnetic flux linked to the secondary coil 70 is changed according to a relative position with the primary coil 40.** That is to say, as the secondary coil 70 is positioned closer to the primary coil 40 of the charger 10, an intensity of the magnetic 30 flux linked to the secondary coil 70 is increased, and as a result an intensity of the high frequency AC current induced by the secondary coil 70 is also increased.
>
> Meanwhile, **standards of the constant current/constant voltage supplier 90, which is an essential element of a charging circuit module provided to the contact-less chargeable battery 50, are defined according to an intensity of the high frequency AC current induced by the secondary coil 70**. However, the intensity of the AC current induced by the secondary coil 70 is changed according to a relative position between the primary coil 40 and the secondary coil 70 as mentioned above.
>
> Thus, if standards of the constant current/constant voltage supplier 90 are defined using a small high frequency AC current, **in case the battery 50 is positioned at a position where a large high frequency AC current is induced, overvoltage exceeding the standards may be applied to both ends of the constant current/constant voltage supplier 90 while charging the battery 10, thereby possibly causing a damage on parts**.
>
> Considering the above, the charger 10 and the battery 50 adopting **the contact-less charging method of the prior art generally employs a structure capable of relatively fixing positions between them at a position where the standards of the constant current/constant voltage supplier 90 are defined**.

Chung-Sik describes a system that operates "when the two devices are coupled to each other" in a fixed arrangement at which the core 78 of the portable device 18 is positioned on a surface of the core 76 of the transmitter 28 of the base unit 12. (Chung-Sik, page 8-4, lines 20-25). This fixed position is to ensure that the portable device of Chung-Sik has a constant reference voltage as described in more detail below. (Chung-Sik, page 8-5, lines 1-8). However, as noted in the prior patent, by removing the fixed positioning of the base unit and the portable device according to proposed combination with Matsuki, a higher current would be induced in the portable device of Chung-Sik. This would be damaging to the portable device. A person having ordinary skill in the art would not be motivated to make a combination that damages the device being modified (e.g. is not operable) as the combination does not have any expectation of success. Therefore, there is no motivation to combine Chung-Sik and Matsuki as proposed in the Final Office Action and the combination of Chung-Sik and Matsuki fails to support a *prima facie* obviousness rejection as required by MPEP § 2143.02 and case law precedent.

However, even if a person having ordinary skill in the art would have been motivated to make the proposed combination (and they would not), the proposed combination of Chung-Sik and Matsuki fails to support a *prima facie* obviousness rejection. MPEP § 2143.01 states "[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious. *In re Ratti*, 270 F.2d 810, 813, 123 USPQ 349, 352 (CCPA 1959)." As described above, Chung-Sik describes a system that operates "when the two devices are coupled to each other" in a fixed arrangement at which the core 78 of the portable device 18 is positioned on a surface of the core 76 of the transmitter 28 of the base unit 12. (Chung-Sik, page 8-4, lines 20-25). This fixed arrangement is critical to the portable device of Chung-Sik as the monitoring of the battery voltage of the portable device is dependent on a constant reference voltage. Chung-Sik discloses:

> **The first voltage splitter 89 for inputting the rectified voltage IDC splits the voltage IDC into a reference voltage VI at a predetermined level** using internal resistors 88 and 90, and inputs the voltage to an inverse terminal (-) of the comparator [9]6. A charge level detection voltage V2 from a split voltage circuit 93 which is connected between the cathode and ground of the diode 86 and which splits and detects the voltage of an output node of the charging unit 52 is applied to the non-inverting terminal (+) of the comparator 96. **In this case, the reference voltage VI is constant and the charge level detection voltage V2 varies**

> **depending on a charge voltage level of the battery 32.** Thus, when the first microcomputer 48 outputs the control signal (SCTL) of 10 KHZ to an output port Pl, a charge voltage via inductive coupling between the induced voltage generating unit 46 and the induced voltage detecting unit 81 is applied to the battery 32 to initiate charge of the battery 32. (Chung-Sik, page 8-5, lines 1-8, emphasis added).

The combination proposed in the Final Office Action requires modifying the relative positions of the base 12 and the portable device 18 of Chung-Sik as allegedly disclosed in Matsuki. This combination changes the principle of operation of the system disclosed in Chung-Sik as the devices would not be coupled to each other in a fixed arrangement. Further, the proposed combination requires varying the charging current, and thereby varying the reference voltage, and as such the reference voltage would not be constant in the system suggested in the Final Office Action. However, if the reference voltage is variable, the comparator will not be able to correctly determine the charge level of the battery as the comparator relies on the reference voltage being constant. Accordingly, the proposed combination changes the principle of operation of the system disclosed in Chung-Sik as the system would not be able to determine the charge level of the battery based on a constant reference voltage. Therefore, for at least these reasons, the proposed combination of Chung-Sik and Matsuki fails to support a *prima facie* obviousness rejection of the claims.

Chung-Sik and Kaite

The Final Office Action states claims 55, 57-60, 62-64, and 69-72 are rejected under 35 U.S.C. § 102 as anticipated by Chung-Sik and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite. (Final Office Action, p. 124). For example, the Final Office Action states "[t]o the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode it would have been obvious over Kaite et al." (Final Office Action, p. 126). The Final Office Action does not articulate how the proposed combination of Chung-Sik and Kaite would have been predictable to one of ordinary skill in the art, how the resultant combination would have been predictable, or how a person having ordinary skill in the art would have a reasonable expectation of success in making the proposed combination as required by MPEP § 2143.01, MPEP § 2143.02, and case law precedent. Accordingly, Patent

Owner submits that the combination of Chung-Sik and Kaite fails to support a *prima facie* obviousness rejection.

d. Rejection of Claims 1, 3 - 6, and 25 - 29

The Final Office Action states claim 1 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 14). Patent Owner disagrees. Claim 1 recites "wherein the monitoring result includes a wireless feedback control signal to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device." The Final Office Action relies on Chung-Sik and Matsuki to disclose the cited aspect of claim 1. Chung-Sik discloses:

> When the temperature is determined to be normal in operation 106, the first microcomputer 48 scans the input port P3 and searches for the status of the charge switch 30 in the process of operation 108. In operation 108, when the charge switch 30 is switched "off" and the hand-set status signal (HSS) is input as "high", the portable device 18 is determined to be separated and the aforementioned operation 112 is performed. In operation 108, when the charge switch 30 is turned "on", the first microcomputer 48 analyzes the data input to line 49 in operation 110 and searches whether or not the portable device is normal. In this case, the data input to the line 49 is input as data that is wirelessly transmitted from the portable device 18 when the battery 32 is completely charged. If analysis of input data in operation 110 indicates the portable device is abnormal (i.e. charge is incomplete), the first microcomputer 48 jumps to the aforementioned step 106 to continuously generate a charge voltage, and when the portable device is normal, the first microcomputer 48 jumps to operation 112 to stop charging. (Chung-Sik, p. 8-5, lines 22 - 30).

Patent Owner submits that Chung-Sik fails to teach the cited aspect of claim 1. Chung-Sik discloses stopping charging when the battery 32 is completely charged. This does not teach, suggest, or constitute "induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device."

First, stopping charging when a battery is completely charged does not teach, suggest, or constitute "relative positions of the contact-less chargeable battery and the external contact-less charging device" as in claim 1. Second, stopping charging when the battery is completely charged

does not teach, suggest, or constitute inducing a change of intensity of a magnetic field as in claim 1. Chung-Sik discloses stopping charging when a battery is completely charged. However, when the charging is stopped, the magnetic field is not present and therefore does not have an intensity. This does not constitute changing the intensity of a magnetic field. That is, Chung-Sik fails to teach, suggest, or disclose a *variable* intensity of a magnetic field or varying the intensity of a magnetic field. Patent Owner cannot locate any teachings in Kaite or Matsuki that cure this deficiency in Chung-Sik. To add to that, stopping charging of Chung-Sik is different from power adjustment and this is the same as simply turning off the light is different from adjusting the intensity of illumination of the light.

The Final Office Action further states Chung-Sik does "not specifically disclose to induce the change of intensity of the magnetic field based on relative positions of the contact-less chargeable battery and the external contact-less charging device." (Final Office Action, p. 18). The Final Office Action relies on Matsuki to teach the cited aspect of claim 1. (Final Office Action, p. 19). Matsuki discloses "[c]ontrolling the high-frequency output or changing the distance between the output coil 7 of the charging device 1′ and the input coil 6 of the storage battery 2′ allows the charging current to be adjusted and the charging time of the storage battery 2′ to be changed." (Matsuki, column 2, lines 24 - 27). This does not teach, suggest, or constitute "induc[ing] the change of intensity of the magnetic field [...] based on relative positions of the contact-less chargeable battery and the external contact-less charging device" as in claim 1. Specifically, Matsuki observes that the distance between the charging device and the storage battery would result in a change in charging time of the storage battery. However, this does not constitute changing the intensity of a magnetic field based on a distance. That is, in Matsuki, the intensity of the magnetic field generated from a primary coil does not change. In fact, if the position of the output coil and the input coil of Matsuki were to change, no change would be made in the operation of the charging device of Matsuki. This is in contrast to the claimed invention, where a wireless feedback control signal would be transmitted to control the operation of the claimed external contact-less charging device. Accordingly, Matsuki fails to teach the cited aspect of claim 1. Patent Owner cannot locate any teachings in Kaite that cure this deficiency in Matsuki.

Furthermore, the proposed combination of Chung-Sik and Matsuki fails to disclose "wherein the monitoring result includes a wireless feedback control signal to induce the change of

intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device." That is, none of the cited references disclose the feedback power adjustment control.

MPEP § 2143.01 states "[t]he mere fact that references can be combined or modified does not render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417, 82 USPQ2d 1385, 1396 (2007)." MPEP § 2143.02 states "[w]here there is a reason to modify or combine the prior art to achieve the claimed invention, the claims may be rejected as prima facie obvious provided there is also a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986)." For reasons including those stated above, Patent Owner notes that the proposed combination of Chung-Sik, Kaite, and/or Matsuki does not support the rejection of claim 1, as the results of the proposed combination would not have been predictable to one of ordinary skill in the art, would not have a reasonable expectation of success, and change the principle of operation of the system disclosed in Chung-Sik in violation of the MPEP and case law precedent.

For reasons including those stated above, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 1 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 1. Therefore, Patent Owner submits the rejection of claim 1 should be withdrawn.

Claims 3-6 and 25-29 depend from claim 1. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

e. Rejection of Claims 7-12 and 30-34

The Final Office Action states claim 7 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 26). Patent Owner disagrees. One element of claim 7 reads "wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 7 and the proposed

combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 7. Therefore, Patent Owner submits the rejection of claim 7 should be withdrawn.

Claims 8-12 and 30-34 depend from claim 7. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

f. Rejection of Claims 13-20, 35, and 37-39

The Final Office Action states claim 13 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 36). Patent Owner disagrees. One element of claim 13 reads "wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 13 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 13. Therefore, Patent Owner submits the rejection of claim 13 should be withdrawn.

Claims 14-20, 35, and 37-39 depend from claim 13. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

g. Rejection of Claims 21, 22, and 40-44

The Final Office Action states claim 21 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 44). Patent Owner disagrees. One element of claim 21 reads "wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 21 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 21. Therefore, Patent Owner submits the rejection of claim 21 should be withdrawn.

Claims 22 and 40-44 depend from claim 21. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

h. Rejection of Claims 23, 24, and 45-48

The Final Office Action states claim 23 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 52). Patent Owner disagrees. One element of claim 23 reads "wherein the adjusting the power of the high frequency AC current applied to the primary coil is based on relative positions of the contact-less chargeable battery and the contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 23 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 23. Therefore, Patent Owner submits the rejection of claim 23 should be withdrawn.

Claims 24 and 45-48 depend from claim 23. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

i. Rejection of Claims 49-54

The Final Office Action states claim 49 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 79). Patent Owner disagrees. One element of claim 49 reads "wherein the microprocessor transmits the monitoring result to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device to solve an overvoltage state according to relative positions of the primary coil and the secondary coil." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 49 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 49. Therefore, Patent Owner submits the rejection of claim 49 should be withdrawn.

Claims 50-54 depend from claim 49. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

j. Rejection of Claims 55-59

The Final Office Action states claim 55 is rejected under 35 U.S.C. § 102 as anticipated by Chung-Sik and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite. (Final Office Action, p. 124). Patent Owner disagrees. Claim 55 reads, in part "wherein the at least

one microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting a power applied to the primary coil by up to a predetermined level" and "wherein the at least one microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the power applied to the primary coil by up to the predetermined level." Chung-Sik discloses:

> When the temperature is determined to be normal in operation 106, the first microcomputer 48 scans the input port P3 and searches for the status of the charge switch 30 in the process of operation 108. In operation 108, when the charge switch 30 is switched "off" and the hand-set status signal (HSS) is input as "high", the portable device 18 is determined to be separated and the aforementioned operation 112 is performed. In operation 108, when the charge switch 30 is turned "on", the first microcomputer 48 analyzes the data input to line 49 in operation 110 and searches whether or not the portable device is normal. In this case, the data input to the line 49 is input as data that is wirelessly transmitted from the portable device 18 when the battery 32 is completely charged. If analysis of input data in operation 110 indicates the portable device is abnormal (i.e. charge is incomplete), the first microcomputer 48 jumps to the aforementioned step 106 to continuously generate a charge voltage, and when the portable device is normal, the first microcomputer 48 jumps to operation 112 to stop charging. (Chung-Sik, p. 8-5, lines 22 - 30).

Patent Owner submits that Chung-Sik fails to teach the cited aspects of claim 55. Chung-Sik discloses stopping charging when the battery 32 is completely charged. This does not teach, suggest, or constitute "a first charging power adjustment request [...] for adjusting a power applied to the primary coil by up to a predetermined level." Stopping charging when a battery is completely charged as disclosed in Chung-Sik does not teach, suggest, or constitute "adjusting a power applied to the primary coil by up to a predetermined level" as in claim 55. Specifically, when charging is stopped, power is not being applied to the battery. Therefore, stopping the charging as disclosed in Chung-Sik does not constitute "adjusting a power applied to the primary coil" as in claim 55. Patent Owner cannot locate any teachings in Kaite that cure this deficiency in Chung-Sik.

Further, Chung-Sik does not teach, suggest, or disclose "a second charging power adjustment request signal [...] for adjusting the power applied to the primary coil by up to the predetermined level." Even under the (incorrect) interpretation that the first adjustment request signal adjusting the power applied to the primary coil up to a predetermined level is disclosed by stopping charging when a battery is completely charged, Chung-Sik does not teach, suggest, or

constitute a *second* adjustment. Chung-Sik discloses two charging modes - on and off. Once the charging has stopped, a second adjustment to the power cannot be made as there is no power to adjust. Therefore, Chung-Sik does not teach the cited aspect of claim 55. Patent Owner cannot locate any teachings in Kaite that cure this deficiency in Chung-Sik.

For reasons including those stated above, Chung-Sik and Kaite, either alone or in combination, fail to teach all aspects of claim 55 and the proposed combination of Chung-Sik and Kaite fails to support a *prima facie* obviousness rejection of claim 55. Therefore, Patent Owner submits the rejection of claim 55 should be withdrawn.

Claims 56-59 depend from claim 55. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

k. Rejection of Claims 60-64

The Final Office Action states claim 60 is rejected under 35 U.S.C. § 102 as anticipated by Chung-Sik and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite. (Final Office Action, p. 135). Patent Owner disagrees. Claim 60 reads, in part, "wherein the microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device by up to a predetermined level" and "wherein the microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device by up to the predetermined level." For reasons including those stated above with respect to claim 55, Chung-Sik and Kaite either alone or in combination, fail to teach all aspects of claim 60 and the proposed combination of Chung-Sik and Kaite fails to support a *prima facie* obviousness rejection of claim 60. Therefore, Patent Owner submits the rejection of claim 60 should be withdrawn.

Claims 61-64 depend from claim 60. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

l. Rejection of Claim 65

The Final Office Action states claim 65 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 93). Patent Owner disagrees. One element of claim 65 reads "wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging

device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 65 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 65. Therefore, Patent Owner submits the rejection of claim 65 should be withdrawn.

m. Rejection of Claim 66

The Final Office Action states claim 66 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 97). Patent Owner disagrees. One element of claim 66 reads "wherein the secondary coil is movable relative to the primary coil during the charging of the battery cell by the contact-less charging circuit module, and wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting the intensity of the magnetic field." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 66 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 66. Therefore, Patent Owner submits the rejection of claim 66 should be withdrawn.

n. Rejection of Claim 68

The Final Office Action states claim 68 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 102). Patent Owner disagrees. One element of claim 68 reads "wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 68 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 68. Therefore, Patent Owner submits the rejection of claim 68 should be withdrawn.

o. Rejection of Claims 69-73

The Final Office Action states claim 69 is rejected under 35 U.S.C. § 102 as anticipated by Chung-Sik and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite. (Final Office Action, p. 144). Patent Owner disagrees. One element of claim 69 reads "wherein the monitoring result is a charging power adjustment request signal." For reasons including those stated above with respect to claim 55, Chung-Sik and Kaite, either alone or in combination, fail to teach all aspects of claim 69 and the proposed combination of Chung-Sik and Kaite fails to support a *prima facie* obviousness rejection of claim 69. Therefore, Patent Owner submits the rejection of claim 69 should be withdrawn.

Claims 70 - 73 depend from claim 69. Patent Owner submits these claims are in condition for allowance for reasons including they depend from an allowable base claim.

p. Rejection of Claim 74

The Final Office Action states claim 74 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 107). Patent Owner disagrees. One element of claim 74 reads "wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 74 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 74. Therefore, Patent Owner submits the rejection of claim 74 should be withdrawn.

q. Rejection of Claim 75

The Final Office Action states claim 75 is rejected under 35 U.S.C. § 103 as unpatentable over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Final Office Action, p. 111). Patent Owner disagrees. One element of claim 75 reads "wherein the change of intensity of the magnetic field includes a change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less charging circuit module and the external contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail

to teach all aspects of claim 75 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 75. Therefore, Patent Owner submits the rejection of claim 75 should be withdrawn.

6. Conclusion

In view of the foregoing remarks, it is respectfully submitted that this application is in condition for allowance. Accordingly, reconsideration of the application and allowance of the claims are respectfully requested. Although the present paper may include a combination of alterations to the application or claims, or characterizations of claim scope or referenced art, Patent Owner is not conceding that previously pending claims in this application are not patentable over the cited references. Rather, any alterations and/or characterizations are made strictly to facilitate prosecution of this reexamination. As such, reviewers of this or any parent, child, or related prosecution history shall not reasonably infer that Patent Owner has made any disclaimers or disavowals of any subject matter supported by the present application. Patent Owner has submitted amendments and arguments believed to be sufficient to overcome all of the outstanding rejections.

Consequently, Patent Owner has not advanced every argument for the allowability of the claims over the references of record. As such, Patent Owner does not acquiesce to any of the statements or characterizations not specifically traversed. If the Examiner should have any remaining questions or objections, a telephone interview to discuss and resolve these issues is respectfully requested.

The Commissioner is hereby authorized to charge Deposit Account No. 02-1818 for any fees which are due and owing. If such a withdrawal is made, please indicate the Attorney Docket No. 0313071.00020 on the account statement.

Respectfully submitted,
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AMENDMENTS TO THE CLAIMS

Claim 1 (Twice Amended): A contact-less chargeable battery including a charging circuit for charging an electric energy to a battery cell, the contact-less chargeable battery comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit [for] that includes first and second voltage detectors respectively detecting first and second voltages at both ends of the constant voltage/constant current supplier and a microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result includes a wireless feedback control signal to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device.

Claim 2 (Cancelled).

Claim 3 (Thrice Amended): The contact-less chargeable battery according to claim 1, wherein:

the overvoltage monitoring unit includes:

a wireless transmitting unit for wirelessly propagating the monitoring result through an antenna; and

[first and second voltage detectors for respectively detecting voltages at front and rear ends of the constant voltage/constant current supplier;]

a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and [outputs] outputting a voltage comparison result; and

the [a] microprocessor [for outputting a] outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 4 (Twice Amended): The contact-less chargeable battery according to claim 3, wherein [a] the magnetic field generated by the external contact-less charging device is generated intermittently,

wherein the microprocessor [overvoltage monitoring unit further includes a charging pause detecting unit for receiving the high frequency AC current output from the high frequency AC current inducing unit to detect] receives an end time point signal indicating a time point when the induction of high frequency AC current ends,[and then outputting the end time point to the microprocessor, and] wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 5 (Original): The contact-less chargeable battery according to claim 1, wherein the monitoring result is a charging power adjustment request signal.

Claim 6 (Original): The contact-less chargeable battery according to claim 1, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values of both ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 7 (Twice Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by[means of] a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

[an overvoltage monitoring unit for] a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device[by means of wireless communication] so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 8 (Amended): The contact-less charging circuit module according to claim 7, wherein the high frequency AC current inducing unit is a coil to which a magnetic flux of [a] the magnetic field generated from the external contact-less charging device is linked.

Claim 9 (Thrice Amended): The contact-less charging circuit module according to claim 7,[wherein the overvoltage monitoring unit includes] further comprising:

[a wireless transmitting unit for wirelessly propagating the monitoring result through]an antenna;

first and second voltage detectors for respectively detecting first and second voltages at front and rear ends of the constant voltage/constant current supplier; and

a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and [outputs] outputting a voltage comparison result, [;] and

wherein the [a] microprocessor [for outputting a] outputs the monitoring result according to the voltage comparison result[to the wireless transmitting unit] using the antenna.

Claim 10 (Twice Amended): The contact-less charging circuit module according to claim 9, wherein [a] the magnetic field generated by the external contact-less charging device is generated intermittently,

wherein the[overvoltage monitoring unit further includes a charging pause detecting unit for receiving the high frequency AC current output from the high frequency AC current inducing unit to detect] microprocessor receives a time point indicating when the induction of high frequency AC current ends, and then [outputting] outputs the end time point to the microprocessor, and

wherein the monitoring result is wirelessly transmitted to the external contact-less charging device[by means of wireless communication] while a high frequency AC current is not induced after the end time point is input.

Claim 11 (Amended): The contact-less charging circuit module according to claim [1] 7, wherein the monitoring result is a charging power adjustment request signal.

Claim 12 (Amended): The contact-less charging circuit module according to claim [1] 7, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 13 (Twice Amended): A contact-less charging device for transmitting a charging power by[means of] electromagnetic induction[phenomenon] to a contact-less chargeable battery that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode and wirelessly transmits a monitoring result for voltages at both ends of the constant voltage/constant current supplier, the contact-less charging device comprising:

a magnetic field generating unit for receiving an AC current and forming a magnetic field in an outer space;

a high frequency power driving unit for applying a high frequency AC current to the magnetic field generating unit; and

a[charging power adjusting unit for] microprocessor wirelessly receiving the monitoring result from the contact-less chargeable battery[by means of wireless communication] and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that [a] the charging power transmitted to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 14 (Original): The contact-less charging device according to claim 13, wherein the magnetic field generating unit is a coil to both sides of which a high frequency AC current is applied.

Claim 15 (Twice Amended): The contact-less charging device according to claim 13, [wherein the charging power adjusting unit includes]further comprising:

[a wireless receiving unit for wirelessly receiving the monitoring result through]an antenna coupled to the microprocessor and used to receive the monitoring result.[; and

a microprocessor for receiving the monitoring result from the wireless receiving unit and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit.]

Claim 16 (Twice Amended): The contact-less [chargeable battery] charging device according to claim 15, further comprising a [constant voltage supplier for] power supply [converting] receiving a common AC current, converting the common AC current into a DC current, and then supplying a constant-voltage current to the high frequency power driving unit, wherein the high frequency power driving unit includes:

a pulse signal generator for receiving a pulse driving signal from the microprocessor and outputting a pulse signal; and

a power driving part for receiving the pulse signal to rapidly switch the constant-voltage current input from the constant voltage supplier, thereby generating a high frequency AC current in a pulse pattern.

Claim 17 (Twice Amended): The contact-less charging device according to claim 16, wherein the[charging power adjusting unit] microprocessor adjusts [a] the charging power by modulating a width of a pulse current, a frequency of the pulse current, an amplitude of a pulse, or [the] a number of pulses.

Claim 18 (Amended): The contact-less charging device according to claim 16, wherein the [constant voltage supplier] power supply includes:

an overvoltage filter for receiving a common AC current and intercepting an overvoltage current;

a rectifier for rectifying the AC current passing through the filter to convert the AC current into a DC current; and

a constant voltage [supplying part for receiving] supplier that receives the converted DC current and outputs a constant voltage current.

Claim 19 (Amended): The contact-less charging device according to claim 13, wherein the high frequency power driving unit intermittently applies a high frequency AC current to the magnetic field generating unit, and

wherein the[charging power adjusting unit] microprocessor receives the monitoring result while a high frequency AC current is not applied to the magnetic field generating unit.

Claim 20 (Original): The contact-less charging device according to claim 13, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 21 (Twice Amended): A battery charging set including a contact-less chargeable battery and a contact-less charging device,

wherein the contact-less chargeable battery includes:

a high frequency AC current inducing unit to which a high frequency AC current is induced by[means of] a magnetic field intermittently generated from an external contactless charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to a battery cell in a constant voltage/constant current mode; and

[an overvoltage monitoring unit for] a first microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device[by means of wireless communication] while a high frequency AC current is not induced,

wherein the contact-less charging device includes:

a magnetic field generating unit for receiving an AC current and forming [a] the magnetic field in an outer space;

a high frequency power driving unit for intermittently applying a high frequency AC current to the magnetic field generating unit; and

a second microprocessor [charging power adjusting unit for], while a high frequency AC current is not applied to the magnetic field generating unit, wirelessly receiving the monitoring result[by means of wireless communication] and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that a charging power transmitted from the contact-less charging device to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 22 (Original): The battery charging set according to claim 21, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 23 (Twice Amended): A method for controlling charging of a contact-less chargeable battery using a contact-less charging device by[means of] electromagnetic induction[phenomenon], the method comprising:

(a) intermittently applying a high frequency AC current to a primary coil provided to the charging device so as to intermittently generate a magnetic field in an outer region;

(b) linking a magnetic flux of the generated magnetic field to a secondary coil provided to the battery so as to intermittently output an electromagnetically-induced high frequency AC current;

(c) rectifying the output high frequency AC current to be converted into a DC current;

(d) applying the DC current to a battery cell through a constant voltage/constant current supplier so as to charge the battery cell in a constant voltage/constant current mode;

(e) monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the charging device[by means of wireless communication] while a high frequency AC current is not induced in the secondary coil; and

(f) adjusting a power of the high frequency AC current applied to the primary coil according to the transmitted monitoring result,

wherein the adjusting the power of the high frequency AC current applied to the primary coil is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Clam 24 (Original): The method according to claim 23, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 25 (New, Amended): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 26 (New, Amended): The contact-less chargeable battery according to claim 1, wherein the microprocessor controls, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 27 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 28 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 29 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 30 (New, Amended): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 31 (New, Amended): The contact-less charging circuit module according to claim 7, wherein the microprocessor controls, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 32 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 33 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier supplies the charging power in a constant

current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 34 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 35 (New): The contact-less chargeable battery according to claim 13, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 36 (Cancelled).

Claim 37 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier has a front end and a rear end, and wherein the constant voltage/constant current supplier receives a DC current from a rectifier at the front end and supplies a charging power at the rear end.

Claim 38 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier charges the battery in a constant current mode at an initial charging stage and then charges the battery in a constant voltage mode at a later charging stage.

Claim 39 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier charges the battery in a constant voltage mode based on a charging voltage of the battery exceeding a predetermined level.

Claim 40 (New, Amended): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 41 (New, Amended): The battery charging set according to claim 21, wherein the microprocessor controls, through wireless feedback control of charging the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 42 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 43 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 44 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 45 (New): The method of claim 23, further comprising:

receiving, by the constant voltage/constant current supplier, the DC current at a front end of the constant voltage/constant current supplier; and

supplying, by the constant voltage/constant current supplier, the DC current at a rear end of the constant voltage/constant current supplier to the battery cell.

Claim 46 (New): The method of claim 23, further comprising:

supplying, by the constant voltage/constant current supplier, the DC current to the battery cell in a constant current mode during an initial charging stage and then in a constant voltage mode at a later charging stage.

Claim 47 (New): The method of claim 23, further comprising:

charging, by the constant voltage/constant current supplier, the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 48 (New, Amended): The method of claim 23, further comprising:

controlling, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing a change of intensity of the magnetic field.

Claim 49 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage; and

an overvoltage monitoring unit that includes first and second voltage detectors respectively detecting voltages at both ends of the constant voltage/constant current supplier, and a microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the microprocessor transmits the monitoring result to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device to solve an overvoltage state according to relative positions of the primary coil and the secondary coil.

Claim 50 (New): The contact-less charging circuit module according to claim 49, wherein a magnetic flux of the magnetic field generated from the external contact-less charging device is linked to the secondary coil of the high frequency AC current inducing unit.

Claim 51 (New, Amended): The contact-less charging circuit module according to claim 49, wherein:

the overvoltage monitoring unit further comprises:

a wireless transmitting unit wirelessly propagating the monitoring result through an antenna; and

a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

the microprocessor outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 52 (New): The contact-less charging circuit module according to claim 51, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the overvoltage monitoring unit further includes a charging pause detecting unit receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, and

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 53 (New): The contact-less charging circuit module according to claim 49, wherein the monitoring result is a charging power adjustment request signal.

Claim 54 (New): The contact-less charging circuit module according to claim 49, wherein the monitoring result is a difference of voltages at front and rear ends of the constant

voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 55 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier that includes circuitry controlled by at least one microprocessor, the constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage; and

an overvoltage monitoring unit that includes a wireless transmitter, first and second voltage detectors respectively detecting voltages at both ends of the constant voltage/constant current supplier, and the at least one microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device using the wireless transmitter so as to induce a change of intensity of the magnetic field,

wherein the at least one microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting a power applied to the primary coil by up to a predetermined level,

wherein the at least one microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the power applied to the primary coil by up to the predetermined level.

Claim 56 (New): The contact-less charging circuit module according to claim 55, wherein at least one of the first charging power adjustment request signal and the second charging power adjustment request signal is based on relative positions of the primary coil and the secondary coil.

Claim 57 (New, Amended): The contact-less charging circuit module according to claim 55, wherein the wireless transmitter wirelessly propagates the monitoring result through an antenna,

wherein the overvoltage monitoring unit includes a voltage comparator comparing first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

wherein the at least one microprocessor outputs the monitoring result according to the voltage comparison result to the wireless transmitter.

Claim 58 (New, Amended): The contact-less charging circuit module according to claim 55, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the microprocessor receives an indication of a time point when the induction of high frequency AC current ends, and

wherein the monitoring result is wirelessly transmitted to the external contact-less charging device while a high frequency AC current is not induced after the end time point is input.

Claim 59 (New): The contact-less charging circuit module according to claim 55, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 60 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for receiving a charging power from an external contact-less charging device and charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by a magnetic field generated from the external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

a microprocessor monitoring the voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device so as to induce a change of intensity of the magnetic field,

wherein the microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device by up to a predetermined level, and

wherein the microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device by up to the predetermined level.

Claim 61 (New): The contact-less charging circuit module according to claim 60, wherein at least one of the first charging power adjustment request signal and the second charging power adjustment request signal is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 62 (New, Amended): The contact-less charging circuit module according to claim 60, wherein the overvoltage monitoring unit includes:

an antenna;

first and second voltage detectors respectively detecting first and second voltages at front and rear ends of the constant voltage/constant current supplier; and

a voltage comparator comparing the first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

wherein the microprocessor outputs the monitoring result according to the voltage comparison result using the antenna.

Claim 63 (New, Amended): The contact-less charging circuit module according to claim 60, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the microprocessor receives an indication of a time point when the induction of high frequency AC current ends, and

wherein the monitoring result is wirelessly transmitted to the external contact-less charging device while a high frequency AC current is not induced after the end time point is input.

Claim 64 (New): The contact-less charging circuit module according to claim 60, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 65 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting unit transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 66 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit including a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting unit transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the secondary coil is movable relative to the primary coil during the charging of the battery cell by the contact-less charging circuit module, and

wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting the intensity of the magnetic field.

Claim 67 (Cancelled).

Claim 68 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit including a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit detecting first and second voltages at both ends of the constant voltage/constant current supplier, monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device.

Claim 69 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit for monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result is a charging power adjustment request signal.

Claim 70 (New): The contact-less charging circuit module according to claim 69, wherein the high frequency AC current inducing unit is a coil to which a magnetic flux of the magnetic field generated from the external contact-less charging device is linked.

Claim 71 (New): The contact-less charging circuit module according to claim 69, wherein the overvoltage monitoring unit includes:

a wireless transmitting unit for wirelessly propagating the monitoring result through an antenna;

first and second voltage detectors for respectively detecting voltages at front and rear ends of the constant voltage/constant current supplier;

a voltage comparator for comparing first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result; and

a microprocessor for outputting the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 72 (New): The contact-less charging circuit module according to claim 71, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the overvoltage monitoring unit further includes a charging pause detecting unit for receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, and

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 73 (New): The contact-less charging circuit module according to claim 69, wherein the charging power adjustment request signal is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 74 (New): A contact-less charging device for transmitting a charging power by means of electromagnetic induction phenomenon to a contact-less chargeable battery that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode and wirelessly transmits a monitoring result for voltages at both ends of the constant voltage/constant current supplier, the contact-less charging device comprising:

a magnetic field generating unit for receiving an AC current and forming a magnetic field in an outer space;

a high frequency power driving unit for applying a high frequency AC current to the magnetic field generating unit; and

a charging power adjusting unit that includes: a wireless receiving unit receiving the monitoring result from the contact-less chargeable battery by means of wireless communication, and a microprocessor controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that the charging power transmitted to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 75 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes a microprocessor, the microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field includes a change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

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Patent Owner:	LS CABLE & SYSTEM LTD.
Reexam Control No.:	96/000,355
Conf. No.:	1538
Art Unit:	3992
Examiner:	Anjan K Deb
Attorney Docket No.:	0313071.00020
Reexam Filing Date:	March 12, 2021
Patent Under Reexam:	8,013,568
Title:	CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF

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Commissioner for Patents
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SECOND AFTER FINAL RESPONSE TO FINAL OFFICE ACTION

This Response is submitted in reply to the Final Office Action dated March 3, 2022, the Notice of Defective Paper in *Ex Parte* Reexamination Patent Owner Requested dated May 13, 2022, and the Advisory Action dated June 15, 2022. The Patent Owner respectfully requests entry of the following amendments and consideration of the following:

Amendments to the Claims reflected in the listing of claims beginning on page 2 of this paper; and

Remarks/Arguments beginning on page 23 of this paper.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
96/000,355	03/12/2021	8013568	0313071.00020	1538

24573 7590 08/16/2022

K&L Gates LLP-Chicago
P.O. Box 1135
Chicago, IL 60690

EXAMINER	
DEB, ANJAN K	

ART UNIT	PAPER NUMBER
3992	

MAIL DATE	DELIVERY MODE
08/16/2022	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Ex Parte Reexamination Advisory Action ***Before the Filing of an Appeal Brief***	**Control No.** 96/000,355	**Patent Under Reexamination** 8013568	
	Examiner ANJAN K DEB	**Art Unit** 3992	**AIA (FITF) Status** No

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

THE PROPOSED RESPONSE FILED 26 July 2022 FAILS TO OVERCOME ALL OF THE REJECTIONS IN THE FINAL REJECTION MAILED 03 March 2022.

1. ☑ Unless a timely appeal is filed, or other appropriate action by the patent owner is taken to overcome all of the outstanding rejection(s), this prosecution of the present *ex parte* reexamination proceeding WILL BE TERMINATED and a Notice of Intent to Issue *Ex Parte* Reexamination Certificate will be mailed in due course. Any finally rejected claims, or claims objected to, will be CANCELLED.
   THE PERIOD FOR RESPONSE IS EXTENDED TO RUN 6 MONTHS FROM THE MAILING DATE OF THE FINAL REJECTION.
   Extensions of time are governed by 37 CFR 1.550(c).

NOTICE OF APPEAL

2. ☐ An Appeal Brief is due two months from the date of the Notice of Appeal filed on _____ to avoid dismissal of the appeal. See 37 CFR 41.37(a). Extensions of time are governed by 37 CFR 1.550(c). See 37 CFR 41.37(e) .

AMENDMENTS

3. ☐ The proposed amendment(s) filed after a final action, but prior to the date of filing a brief, will not be entered because:
   (a) ☐ They raise new issues that would require further consideration and/or search (see NOTE below);
   (b) ☐ They raise the issue of new matter (see NOTE below);
   (c) ☐ They are not deemed to place the proceeding in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
   (d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.
   NOTE: See continuation sheet (See 37 CFR 1.116 and 41.33(a)).
4. ☑ Patent owner's proposed response filed 26 July 2022 has overcome the following rejection(s): See Continuation Sheet
5. ☐ The proposed new or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
6. ☑ For purposes of appeal, the proposed amendment(s) a) ☐ will not be entered, or b) ☑ will be entered and an explanation of how the new or amended claim(s) would be rejected is provided below or appended.
   The status of the claim(s) is (or will be) as follows:
   Claim(s) patentable and/or confirmed: _____
   Claim(s) objected to: _____
   Claim(s) rejected: 1,3-35,37-66 and 68-75
   Claim(s) not subject to reexamination: _____

AFFIDAVIT OR OTHER EVIDENCE

7. ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____ .
8. ☐ The affidavit or other evidence filed after a final action, but before or on the date of filing a Notice of Appeal will not be entered because patent owner failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
9. ☐ The affidavit or other evidence filed after the date of filing a Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence fails to overcome all rejections under appeal and/or appellant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
10. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

11. ☑ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: See continuation sheet .
12. ☐ Note the attached Information Disclosure Statement(s), PTO/SB/08, Paper No(s) _____ .
13. ☐ Other: _____ .

/ANJAN K DEB/ Primary Examiner, Art Unit 3992	/Stephen J. Ralis/ Primary Examiner, Art Unit 3992	/MICHAEL FUELLING/ Supervisory Patent Examiner, Art Unit 3992

cc: Requester (if third party requester)

Continuation of AMENDMENTS 4. Patent owner's propose response filed has overcome the following rejection(s): Claims 1, 21, and 65 rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA),2nd paragraph.
Claims 55 and 60, rejected under 35 U.S.C. 112(a) or 35 U.S.C. 112 (pre-AIA), first paragraph,

Ex Parte Reexamination Advisory Action Before the Filing of an Appeal Brief

(PTO-467 Continuation Sheet)

Continuation of PTO-467 AMENDMENTS Box 4.

Patent owner's proposed response filed 26 July 2022 has overcome the following rejection(s):

Claims 1, 21, and 65 rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA),2nd paragraph.

Claims 55 and 60, rejected under 35 U.S.C. 112(a) or 35 U.S.C. 112 (pre-AIA), first paragraph.

Continuation of PTO-467 Box 11.

RESPONSE TO AMENDMENT/ARGUMENTS FILED 7/26/2022

Notice of Defective Paper

In response to Notice of Defective Paper, Patent Owner has provided listing of the claims with markup of changes in the amended claims with respect to previous version of the claims. Regarding an explanation of the changes made to the claims, specifically Patent Owner was requested in the previous Advisory action to provide support in the specification for twice amended claim 1 for adding the limitation, "adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device."

Patent Owner submits that Support for the amendments is found at least at column 2, lines 21 - 32, column 6, lines 10 - 24, column 6, lines 28-39, and column 6, line 66 - column 7,

line 4, and column 9, lines 35-38. (Patent Owner's Remarks, page 26). Additionally, Patent Owner submits that claim 1 as amended finds support at col 6, line 66 - column 7, line 4; column 7, lines 43 - 49; column 8, lines 32 - 41; column 11, lines 52 - 61; column 3, lines 35-39 (e.g. "Another object of the present invention is to provide a battery charging control method capable of preventing any damage of an internal battery circuit together with solving a restriction for relative positions between the battery and the charger that employ a contact-less charging method"); column 9, lines 29-44 (e.g., "the contact-less charging device and chargeable battery need not be fixed to a certain relative position as in the prior art so as to constantly keep an intensity of magnetic flux linked to the secondary coil"); column 11, lines 13-45; column 12, lines 46-52; column 2, lines 21 - 32, column 6, lines 10 - 24, column 6, lines 28-39, and column 6, line 66 - column 7, line 4; column 9, lines 35-38 and previously pending claim 2. (Remarks, pages 30-31).

As indicated in the previous Advisory Action, nowhere in the above cited sections it is specifically disclosed, "adjusting a power applied to the primary coil of the external contact-less charging device is based on relative positions of the contact-less chargeable battery and the external contact-less charging device" (See previous Advisory Action dated 6/15/2022, pages 1-4 incorporated herein by reference).

Therefore, claim 1 (Twice Amended) is subject to a rejection under 35 U.S.C. § 112, first paragraph as failing to comply with the written description requirement. Similar rejections apply to independent claims, 7, 13, 21, 23, 49, 65, 68, 74, and 75.

Claim Interpretation Under 35 U.S.C. §112(6th ¶)

a) Overvoltage monitoring unit (claims 1, 4, 7, 9, 10, 21, 26, 31, 41, 49, 52, 55, 58, 60, 62, 63, 65, 66, 68, 69, 71, 72, 75).

With respect to claims 7, 9, 10, 21, 26, 31, 41, 58, 60, 62, and 63, Patent Owner has removed the term "overvoltage monitoring unit." Patent Owner notes that this amendment does not broaden the claim as the microprocessor was previously recited in the claims. Accordingly, Patent Owner submits that these claims should not be interpreted under 35 U.S.C. § 112, sixth paragraph.

With respect to claims 1, 4, 49, 52, 55, 65 and 66, Patent Owner has amended these claims and submits that the claims recites specific structures for the "overvoltage monitoring unit" therefore should not be interpreted under 35 U.S.C. § 112, sixth paragraph. (Remarks pages 33-35).

With respect to claims 68 and 69 as amended, Patent Owner submits that the term "overvoltage monitoring unit," when read by a person having ordinary skill in the art in view of the specification, is understood to have a sufficiently definite meaning as the name for the structure that performs the function. (Remarks page 34).

Regarding claims 71 and 72 as amended, Patent Owner submits that the claims recite specific structures for the "overvoltage monitoring unit." For example, claim 71 recites "wherein the overvoltage monitoring unit includes: a wireless transmitting unit [...] first and second voltage detectors[...] a voltage comparator[...] and a microprocessor. (Remarks page 34).

Regarding Claim 75, it recites "an overvoltage monitoring unit that includes a microprocessor." The microprocessor constitutes specific structure for the "overvoltage monitoring unit." (Remarks page 35).

The Examiner agrees with Patent Owner's above arguments, "Overvoltage monitoring unit" will not be interpreted under 35 U.S.C. § 112, sixth paragraph.

b) "wireless transmitting unit" (claim 3)

Patent Owner submits that the term "wireless transmitting unit" should not be interpreted under 35 U.S.C. § 112, sixth paragraph because a "wireless transmitting unit," when read by a person having ordinary skill in the art in view of the specification, is understood to have a sufficiently definite meaning as the name for the structure that performs the function. (Remarks page 35).

The Examiner agrees with Patent Owner's above arguments, "wireless transmitting unit" will not be interpreted under 35 U.S.C. § 112, sixth paragraph.

c) "charging pause detecting unit" (Claims 4, 10, 52, 58, 63, 72)

Patent Owner has amended the claims by removing the term "charging pause detecting unit" from claims 4, 10, 58, and 63, therefore these claims are not interpreted under 35 U.S.C. § 112, sixth paragraph. (Remarks page 35-36).

With respect to claims 52 and 72, Patent Owner submits that the specification provides a description sufficient to inform one of ordinary skill in the art that the term denotes structure when coupled with its function. For example, support for the claimed "charging pause detecting unit" is found at least at column 8, line 64 to column 9, line 16; column 10, lines 1-4; and Figs. 5-6). (Remarks page 36).

The Examiner agrees with Patent Owner's above arguments, "charging pause detecting unit" will not be interpreted under 35 U.S.C. § 112, sixth paragraph.

d) "charging power adjustment unit" (Claim 13, 17, 19, 21, 74)

Patent Owner has amended claims 13, 17, 19, and 21 by removing the term "charging power adjustment unit." Accordingly, Patent Owner submits that the term should not be interpreted under 35 U.S.C. § 112, sixth paragraph. With respect to claim 74, Patent Owner submits that the claim recites specific structures for the "charging power adjustment unit." Specifically, claim 74 recites charging power adjusting unit includes wireless receiving unit and a microprocessor. Accordingly, Patent Owner submits that "charging power adjustment unit" should not be interpreted under 35 U.S.C. § 112, sixth paragraph. (Remarks page 36-37)

The Examiner agrees with Patent Owner's above arguments, claims 13, 17, 19, 21, 74 as amended will not be interpreted under 35 U.S.C. § 112, sixth paragraph.

e) "wireless receiving unit" (Claims 15, 74)

Patent Owner has amended claim 15 by removing the term "wireless receiving unit." Accordingly, Patent Owner submits that the term should not be interpreted under 35 U.S.C. § 112, sixth paragraph. (Patent Owner's Remarks page 37). Regarding claim 74, Patent Owner submits that that the term "wireless receiving unit" is described in the specification at col. 10, lines 14-17 and shown in the Fig. 3 and Fig. 4. Accordingly, the figures inform one of ordinary skill in the art that the components shown in the figures, including the "wireless receiving unit" constitute one or more electronic components coupled together to perform the recited function. Additionally, the term "receiver" connotes sufficiently definite structure to those of skill in the art therefore the term should not be interpreted under 35 U.S.C. § 112, sixth paragraph. (Remarks page 37).

The Examiner agrees with Patent Owner's above arguments, claims 15 and 74 as amended will not be interpreted under 35 U.S.C. § 112, sixth paragraph.

Claim Rejections under 35 U.S.C. § 112, First and Second Paragraphs

35 U.S.C. § 112, 2nd paragraph

Regarding Claims 1, 21, and 65 rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor (or for applications subject to pre-AIA 35 U.S.C. 112, the applicant), regards as the invention, because it is not clear as to what component of the claimed "overvoltage monitoring unit" recited in claims 1, 21, and 65, is monitoring the voltages at both ends of the constant voltage/constant current supplier, Patent Owner has amended claims 1 and 21, and argued that the rejections of claims 1 and 21 under 35 U.S.C § 112, second paragraph should be withdrawn. (Remarks, page 38).

Regarding claim 65, Patent Owner notes that it is well specified in the specification that a microprocessor monitors the voltage at both ends of the constant voltage/constant current supplier. See, for example, column 11, lines 52-58 ("in the above embodiment [...] the microprocessor 310 of the battery B monitors voltages measured at both ends of the constant voltage/constant current supplier 290" and column 11, lines 31-35 ("the microprocessor 310 periodically repeats monitoring an overvoltage state at both ends of the constant voltage/constant current supplier 290." (Remarks, page 38).

The Examiner agrees, Claims 1, 21, and 65 as amended are no longer subject to rejection under 35 U.S.C. § 112, second paragraph.

35 U.S.C. § 112, first paragraph

Regarding the rejection of claims 55 and 60, under 35 U.S.C. § 112 first paragraph, as failing to comply with the written description requirement, Patent Owner has amended claims 55 and 60 to remove the objected to phrases. Therefore, Patent Owner submits that the rejections of

claims 55 and 60 under 35 U.S.C § 112, first paragraph should be withdrawn. (Remarks, page 38-39).

The Examiner agrees, Claims 55 and 60 as amended are no longer subject to rejection under 35 U.S.C. § 112, first paragraph.

Claim Rejections under 35 U.S.C. § 102 and 35 U.S.C. § 103

Chung-Sik and Matsuki

Regarding the rejection of claims 1 - 15, 19 - 54, 56, 61, 65 - 68, and 73 - 75 under 35 U.S.C. § 103 as unpatentable over Korean Patent No. KR 950005819B1 (hereinafter "Chung-Sik") in view of Japanese Patent No. JP HO 145230 Y2 to Matsuki (hereinafter "Matsuki") and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of U.S. Pat. No. 6,016,046 to Kaite (hereinafter "Kaite") in view of Matsuki, Patent Owner has amended the claims and submits that Chung-Sik, Kaite, and Matsuki, alone or in combination, do not teach or suggest all features of any of independent claims 1, 7, 13, 21, 23, 49, 55, 60, 65, 66, 68, 69, 74, and 75. (Remarks page 39).

More specifically, Patent Owner argued that there is no motivation to combine Chung-Sik and Matsuki, because Chung-Sik teaches, "the battery may be recharged only when the portable device 18 is installed on the base unit 12" (Remarks page 44). Regarding Matsuki, Patent Owner argued that Matsuki fails to disclose any type of feedback circuitry in the battery or in the charging device. Rather, in Matsuki, although the relative positions of the output coil and the input coil are changed, the intensity of the magnetic field does not change. (Remarks page 45).

Patent Owner's above argument has been fully considered by the Examiner but is not found convincing because Chung-Sik discloses feedback to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil based on battery voltage monitoring (Chung-Sik, English Translation, page 8-5, paragraphs 4-6). Although Chung-Sik fixes the relative positions between the charger and the battery, Matsuki, discloses wireless battery charging current can be adjusted based on the distance of output coil 7 of charging equipment 1 and input coil 6 of battery 2' (Matsuki. Fig. 2). Additionally, Matsuki teaches that the charging current can be adjusted by controlling the high-frequency output of coil 7 (See Matsuki, English Translation, column 2, last paragraph copied below).

> Controlling the high-frequency output or changing the distance between the output coil 7 of the charging device 1' and the input coil 6 of the storage battery 2' allows the charging current to be adjusted and the charging time of the storage battery 2' to be changed.

One of ordinary skill in the art would be motivated to combine the charger disclosed by Chung-Sik and Matsuki so that charging can be performed without connection to the charging device or dedicated adaptors, making charging work exceptionally simple that allows the charging current to be adjusted and the charging time of the battery to be changed as required. Moreover, Matsuki specifically disclosed changing the distance between the output coil of the charging device and the input coil of the storage battery allows the charging current of the battery to be adjusted.(See Matsuki, English Translation column 2, last paragraph and column 3).

Chung-Sik and Kate

Regarding claims 55, 57-60, 62-64, and 69-72 rejected under 35 U.S.C. § 102 as anticipated by Chung-Sik and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite, Patent Owner argued that Final Office Action does not articulate how the

proposed combination of Chung-Sik and Kaite would have been predictable to one of ordinary skill in the art, how the resultant combination would have been predictable, or how a person having ordinary skill in the art would have a reasonable expectation of success in making the proposed combination as required by MPEP § 2143.01, MPEP § 2143.02, and case law precedent. Accordingly, Patent Owner submits that the combination of Chung-Sik and Kaite fails to support a *prima facie* obviousness rejection. (Remarks, page 48-49). The Examiner disagrees, because the Examiner specifically articulated the motivation to combine so as to modify the constant voltage supplier disclosed by Chung-Sik by adding the constant current constant voltage circuit disclosed by Kaite et al. to stabilize output from the rectifying circuit for efficient charging of the battery. (See Final Rejection page 126 and 128).

Continuation of PTO-467 Box 6.

Explanation of how the new or amended claim(s) would be rejected is provided below:

AMENDMENT OF CLAIMS AFTER THE FINAL REJECTION FILED ON 7/26/2022, IS SUBJECT TO THE FOLLOWING REJECTIONS.

Claim Rejections under 35 U.S.C. § 112, first paragraph:

Claims 1, 13, 21, 23, 49, 56, 61, 68, 73, 74, and 75 rejected under 35 U.S.C. § 112, first paragraph as failing to comply with the written description requirement.

The specification fails to disclose "adjusting a power applied to the primary coil of the external contact-less charging device is based on relative positions of the contact-less chargeable battery and the external contact-less charging device," recited in claim 1, and similar recitation in claims 13, 21, 23, 49, 56, 61, 68, 73, 74, and 75.

Claim Rejections under 35 U.S.C. § 103

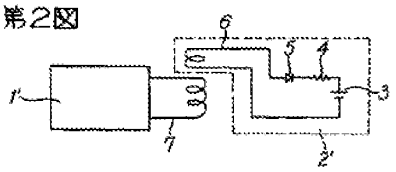
Claim(s) 1, 3-15, 19-35, 37-54, 56, 61, 65-66, 68, and 73-75 are rejected under 35 U.S.C. 103(a) as being obvious over Chung-Sik (KR 950005819B1) and Matsuki (JP H0145230 Y2) or in the alternative as being obvious over Chung-Sik (KR 950005819B1), Kaite et al. (US 6,016,046) and Matsuki (JP H0145230 Y2).

Regarding Claims 1, 3-15, 19-35, 37-54, 56, 61, 65-66, 68, and 73-75, Chung-Sik and Matsuki or Chung-Sik, Matsuki, and Kaite disclosed all of the limitations as set forth in the Final Rejection (Final Rejection pages 14-115 incorporated herein by reference). Specifically, regarding Claims 1, 13, 21, 23, 49, 56, 61, 68, 73, 74, and 75, Chung-Sik discloses the added limitation (after final amendment filed on 7/26/2022) including an overvoltage monitoring unit that includes first and second voltage detectors (V1, V2) respectively detecting first and second voltages at both ends of the constant voltage/constant current supplier 52 and a microprocessor (54, 56) monitoring the detected voltages at both ends of the constant voltage/constant current supplier 52 and transmitting a monitoring result to the external contact-less charging device by means of wireless communication (RADIO UNIT 34) through line 37 so as to induce a change of intensity of the magnetic field of the induced voltage generating unit 46 (Fig. 1, 2) (page 8-2, lines 31-34, 40-55; page 8-3, lines 36-40; page 8-5, lines 35-43) (Fig. 2).

Regarding the added limitation in the amendment after final filed dated 7/26/2022, namely, "adjusting a power applied to the primary coil of the external contact-less charging device is based on relative positions of the contact-less chargeable battery and the external contact-less charging device" (recited in claim 1, and similar recitation in claims 13, 21, 23, 49, 56, 61, 68, 73, 74, and 75), Chung-Sik discloses feedback to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil based on battery voltage monitoring (Chung-Sik, English Translation, page 8-5, paragraph 6). Although Chung-Sik fixes

the relative positions between the charger and the battery, Matsuki, discloses wireless battery charging current can be adjusted based on the distance of output coil 7 of charging equipment 1 and input coil 6 of battery 2' (Matsuki. Fig. 2). Additionally, Matsuki teaches that the charging current can be adjusted by controlling the high-frequency output of coil 7 (col. 2 last paragraph copied below).

> Controlling the high-frequency output or changing the distance between the output coil 7 of the charging device 1' and the input coil 6 of the storage battery 2' allows the charging current to be adjusted and the charging time of the storage battery 2' to be changed.



Matsuki. Fig. 2.

One of ordinary skill in the art would be motivated to combine the charger disclosed by Chung-Sik and Matsuki so that charging can be performed without connection to the charging device making charging work exceptionally simple that allows the charging current to be adjusted and the charging time of the battery to be changed as required. Moreover, Matsuki specifically teaches changing the distance between the output coil of the charging device and the input coil of the storage battery allows the charging current of the battery to be adjusted.(See Matsuki, English Translation column 2, last paragraph and column 3).

See MPEP 2143 I Exemplary rationales that may support a conclusion of obviousness include. A. Combining Prior Art Elements According to Known Methods To Yield Predictable

Results. The rationale to support a conclusion that the claim would have been obvious is that all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination yielded nothing more than predictable results to one of ordinary skill in the art. KSR, 550 U.S. at 416, 82 USPQ2d at 1395; Sakraida v. AG Pro, Inc., 425 U.S. 273, 282, 189 USPQ 449, 453 (1976); Anderson's-Black Rock, Inc. v. Pavement Salvage Co., 396 U.S. 57, 62-63, 163 USPQ 673, 675 (1969); Great Atl. & P. Tea Co. v. Supermarket Equip. Corp., 340 U.S. 147, 152, 87 USPQ 303, 306 (1950). "[I]t can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does." KSR, 550 U.S. at 418, 82 USPQ2d at 1396. If any of these findings cannot be made, then this rationale cannot be used to support a conclusion that the claim would have been obvious to one of ordinary skill in the art. In the instant case the prior art specifically teaches changing the distance between the output coil of the charging device and the input coil of the storage battery allows the charging current of the battery to be adjusted which is a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.

Claims 16-18 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Chung-Sik and Matsuki as applied to claim 15 above, and further in view of Cho Gyu Hyeong et al. (KR 100451606 B1) (Hereafter Cho et al) as set forth in the Final Rejection (Final Rejection pages 115-123 incorporated herein by reference).

Claim(s) 55, 57-60, 62-64, and 69-72 are rejected under pre-AIA 35 U.S.C. 102 (b) as anticipated by Chung-Sik (KR 950005819B1) or, in the alternative, under pre-AIA 35 U.S.C.

103(a) as obvious over Chung-Sik (KR 950005819B1) and Kaite et al. (US 6,016,046) as set forth in the Final Rejection (Final Rejection pages 124-152 incorporated herein by reference).

For the reasons given above, claims 1, 3-35, 37-66, and 68-75 as amendment are rejected.

Claims 2, 36, and 67 are cancelled by Patent Owner.

/ANJAN K DEB/
Primary Examiner, Art Unit 3992

Conferees

/Stephen J. Ralis/
Primary Examiner, Art Unit 3992

/MICHAEL FUELLING/
Supervisory Patent Examiner, Art Unit 3992

Electronic Acknowledgement Receipt	
EFS ID:	46486109
Application Number:	96000355
International Application Number:	
Confirmation Number:	1538
Title of Invention:	CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF
First Named Inventor/Applicant Name:	8013568
Customer Number:	24573
Filer:	Matthew S. Dicke/Meg Boinski
Filer Authorized By:	Matthew S. Dicke
Attorney Docket Number:	0313071.00020
Receipt Date:	25-AUG-2022
Filing Date:	12-MAR-2021
Time Stamp:	13:49:25
Application Type:	Supplemental Examination
Patent Number:	

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$840
RAM confirmation Number	E20228OD50292078
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Notice of Appeal Filed	0313071-00020_NoticeOfAppeal.pdf	324485 6060cbe777b5714f70369a78ba68b5e2e5f200a3	no	2
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	37962 cbb8bb784e4c44f0a1bb2eabc3ac26600b9f121a	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	362447		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Electronic Patent Application Fee Transmittal

Application Number:	96000355
Filing Date:	12-Mar-2021
Title of Invention:	CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF
First Named Inventor/Applicant Name:	8013568
Filer:	Matthew S. Dicke/Meg Boinski
Attorney Docket Number:	0313071.00020

Filed as Large Entity

Filing Fees for Supplemental Examination

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
NOTICE OF APPEAL	1401	1	840	840
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**840**

PTO/AIA/31 (05-22)
Approved for use through 05/31/2024. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

NOTICE OF APPEAL FROM THE EXAMINER TO THE PATENT TRIAL AND APPEAL BOARD

Docket Number (Optional): 0313071.00020

I hereby certify that this correspondence is being facsimile transmitted to the USPTO, transmitted via the USPTO's patent electronic filing system, or deposited with the United States Postal Service with sufficient postage in an envelope addressed to "Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR 1.8(a)] on August 25, 2022.

Signature /Matthew S. Dicke/

Typed or printed name Matthew S. Dicke

First Named Inventor	
LS CABLE & SYSTEM LTD. (Assignee)	
Application Number: 96/000,355	Filed: March 12, 2021
For: CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL	
Art Unit: 3992	Examiner: DEB, ANJAN K

Applicant hereby **appeals** to the Patent Trial and Appeal Board from the last decision of the examiner.

The fee for this Notice of Appeal is (37 CFR 41.20(b)(1)) $ 840.00

☐ Applicant asserts small entity status. See 37 CFR 1.27. Therefore, the fee shown above is reduced by 50%, and the resulting fee is: $ _____

☐ Applicant certifies micro entity status. See 37 CFR 1.29. Therefore, the fee shown above is reduced by 75%, and the resulting fee is: $ _____
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☐ A petition for an extension of time under 37 CFR 1.136(a) (PTO/AIA/22 or equivalent) is enclosed.
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I am the

☐ applicant

☑ attorney or agent of record
Registration number 58819

☐ attorney or agent acting under 37 CFR 1.34
Registration number _____

Signature /Matthew S. Dicke/

Typed or printed name Matthew S. Dicke

Telephone Number 312-578-5415

Date August 25, 2022

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Electronic Acknowledgement Receipt	
EFS ID:	46900228
Application Number:	96000355
International Application Number:	
Confirmation Number:	1538
Title of Invention:	CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF
First Named Inventor/Applicant Name:	8013568
Customer Number:	24573
Filer:	Matthew S. Dicke/Meg Boinski
Filer Authorized By:	Matthew S. Dicke
Attorney Docket Number:	0313071.00020
Receipt Date:	26-OCT-2022
Filing Date:	12-MAR-2021
Time Stamp:	17:14:03
Application Type:	Supplemental Examination
Patent Number:	

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$220
RAM confirmation Number	E20220PH14594340
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		0313071-00020_Reexam_AppealBrief.pdf	446894 4979303a5f85c1b484e9071c185ac9bc4f7a2a4d	yes	82
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Appeal Brief Filed		1	57	
	Claims		58	82	
Warnings:					
Information:					
2	Reexam Request for Extension of Time	0313071-00020_Reexam_EOT_ToFile.pdf	82198 f11c30b3c047d46183d9de2abc632bf7be38e28f	no	2
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	38059 8bcfab617fe48d73e92bd583da578e87920fa4b8	no	2
Warnings:					
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		Total Files Size (in bytes):	567151		

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If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

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Electronic Patent Application Fee Transmittal

Application Number:	96000355
Filing Date:	12-Mar-2021
Title of Invention:	CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF
First Named Inventor/Applicant Name:	8013568
Filer:	Matthew S. Dicke/Meg Boinski
Attorney Docket Number:	0313071.00020

Filed as Large Entity

Filing Fees for Supplemental Examination

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
PETITION FEE- 37 CFR 1.17(G) (GROUP II)	1463	1	220	220
Miscellaneous:				
		Total in USD ($)		**220**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Owner:	LS CABLE & SYSTEM LTD
Control No.:	96/000,355
Patent No.:	8,013,568
Issued:	March 12, 2021
Title:	CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF
Art Unit:	3992
Conf. no.	1538
Examiner:	Anjan K. Deb
Docket No.:	0313071.00020

Attn: Mail Stop Ex Parte Reexamination
Central Reexamination Unit
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U.S. Patent and Trademark Office
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Alexandria, VA 22313-1450

REQUEST FOR EXTENSION OF TIME FOR
APPEAL BRIEF PURSUANT TO 37 C.F.R. 1.550(c) and MPEP 2265(V)(D)

The Patent Owner involved in the present Ex-Parte Reexamination Proceeding hereby requests a one month "no cause" extension of time to file its Appeal Brief originally due on October 25, 2022. Notwithstanding the request for one month extension of time, the Appeal Brief is being filed concurrently herewith. This request is accompanied by the fee set forth in 37 CFR 1.17(g).

Patent Owner respectfully submits that this request is timely (see MPEP 2265(V)(D) "For example, if the patent owner only specifies a one month extension of time in its request, the patent owner must file, in addition to an appeal brief, the written request for extension and the required fee within three months from the date of the appeal").

Please charge any fees due in connection with this request to Deposit Account No. 02-1818.

Respectfully submitted,

BY __/Matthew S. Dicke/__
Matthew S. Dicke
Reg. No. 58819
Customer. No. 24573
Dated: October 26, 2022

CLAIMS APPENDIX

Claims involved in the appeal:

Claim 1 (Twice Amended): A contact-less chargeable battery including a charging circuit for charging an electric energy to a battery cell, the contact-less chargeable battery comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from [a primary coil of an] ~~the~~ external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit [for] that includes ~~a microprocessor monitoring~~first and second voltage detectors respectively detecting first and second voltages at both ends of the constant voltage/constant current supplier and a microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result includes a wireless feedback control signal to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device.

Claim 2 (Cancelled).

Claim 3 (Thrice Amended): The contact-less chargeable battery according to claim 1, wherein:

the overvoltage monitoring unit includes:

a wireless transmitting unit for wirelessly propagating the monitoring result through an antenna; and

[first and second voltage detectors for respectively detecting ~~first and second~~ voltages at front and rear ends of the constant voltage/constant current supplier~~; and;~~]

a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and [outputs] outputting a voltage comparison result~~; [;];~~ and

~~wherein~~ the [a] microprocessor [for outputting a] outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 4 (Twice Amended): The contact-less chargeable battery according to claim 3, wherein [a] the magnetic field generated by the external contact-less charging device is generated intermittently,

wherein the microprocessor [overvoltage monitoring unit further includes a charging pause detecting unit ~~[~~for receiving~~]~~ ~~that receives~~ the high frequency AC current output from the high frequency AC current inducing unit to detect] receives an end time point signal indicating a time point when the induction of high frequency AC current ends~~,~~[and then ~~[~~outputting~~]~~ ~~outputs~~ the end time point to the microprocessor, and] wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 5 (Original): The contact-less chargeable battery according to claim 1, wherein the monitoring result is a charging power adjustment request signal.

Claim 6 (Original): The contact-less chargeable battery according to claim 1, wherein the monitoring result is a difference of voltages at both ends of the constant

voltage/constant current supplier, voltage values of both ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 7 (Twice Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by[means of] a magnetic field generated from ~~[~~an~~]~~ ~~the~~ external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

[an overvoltage monitoring unit ~~[~~for~~]~~ ~~that includes~~ a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device[by means of wireless communication] so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 8 (Amended): The contact-less charging circuit module according to claim 7, wherein the high frequency AC current inducing unit is a coil to which a magnetic flux of [a] the magnetic field generated from the external contact-less charging device is linked.

Claim 9 (Thrice Amended): The contact-less charging circuit module according to claim 7~~,~~[wherein the overvoltage monitoring unit includes] further comprising:

[a wireless transmitting unit for wirelessly propagating the monitoring result through]an antenna;

first and second voltage detectors for respectively detecting first and second voltages at front and rear ends of the constant voltage/constant current supplier; and

a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and [outputs] outputting a voltage comparison result, [;] and

wherein the [a] microprocessor [for outputting a] outputs the monitoring result according to the voltage comparison result[to the wireless transmitting unit] using the antenna.

Claim 10 (Twice Amended): The contact-less charging circuit module according to claim 9, wherein [a] the magnetic field generated by the external contact-less charging device is generated intermittently,

wherein the[overvoltage monitoring unit further includes a charging pause detecting unit ~~[for]~~ receiving the high frequency AC current output from the high frequency AC current inducing unit to detect] microprocessor receives a time point indicating when the induction of high frequency AC current ends, and then [outputting] outputs the end time point to the microprocessor, and

wherein the monitoring result is wirelessly transmitted to the external contact-less charging device[by means of wireless communication] while a high frequency AC current is not induced after the end time point is input.

Claim 11 (Amended): The contact-less charging circuit module according to claim [1] 7, wherein the monitoring result is a charging power adjustment request signal.

Claim 12 (Amended): The contact-less charging circuit module according to claim [1] 7, -wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 13 (Twice Amended): A contact-less charging device for transmitting a charging power by[means of] electromagnetic induction[phenomenon] to a contact-less chargeable battery that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode and wirelessly transmits a monitoring result for voltages at both ends of the constant voltage/constant current supplier, the contact-less charging device comprising:

a magnetic field generating unit for receiving an AC current and forming a magnetic field in an outer space;

a high frequency power driving unit for applying a high frequency AC current to the magnetic field generating unit; and

a[charging power adjusting unit for] microprocessor wirelessly receiving the monitoring result from the contact-less chargeable battery[by means of wireless communication] and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that [a] the charging power transmitted to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 14 (Original): The contact-less charging device according to claim 13, wherein the magnetic field generating unit is a coil to both sides of which a high frequency AC current is applied.

Claim 15 (Twice Amended): The contact-less charging device according to claim 13, [wherein the charging power adjusting unit includes]further comprising:

[a wireless receiving unit for wirelessly receiving the monitoring result through]an antenna~~;~~ coupled to the microprocessor and used to receive the monitoring result.[; and

a microprocessor for receiving the monitoring result from the wireless receiving unit and controlling the high frequency power driving unit to adjust ~~[a] the~~ power of the high frequency AC current applied to the magnetic field generating unit~~.~~.]

Claim 16 (Twice Amended): The contact-less [chargeable battery] charging device according to claim 15, further comprising a [constant voltage supplier for] power supply [converting] receiving a common AC current, converting the common AC current into a DC current, and then supplying a constant-voltage current to the high frequency power driving unit, wherein the high frequency power driving unit includes:

a pulse signal generator for receiving a pulse driving signal from the microprocessor and outputting a pulse signal; and

a power driving part for receiving the pulse signal to rapidly switch the constant-voltage current input from the constant voltage supplier, thereby generating a high frequency AC current in a pulse pattern.

Claim 17 (Twice Amended): The contact-less charging device according to claim 16, wherein the[charging power adjusting unit] microprocessor adjusts [a] the charging power by modulating a width of a pulse current, a frequency of the pulse current, an amplitude of a pulse, or [the] a number of pulses.

Claim 18 (Amended): The contact-less charging device according to claim 16, wherein the [constant voltage supplier] power supply includes:

an overvoltage filter for receiving a common AC current and intercepting an overvoltage current;

a rectifier for rectifying the AC current passing through the filter to convert the AC current into a DC current; and

a constant voltage [supplying part for receiving] supplier that receives the converted DC current and outputs a constant voltage current.

Claim 19 (Amended): The contact-less charging device according to claim 13, wherein the high frequency power driving unit intermittently applies a high frequency AC current to the magnetic field generating unit, and

wherein the[charging power adjusting unit] microprocessor receives the monitoring result while a high frequency AC current is not applied to the magnetic field generating unit.

Claim 20 (Original): The contact-less charging device according to claim 13, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 21 (Twice Amended): A battery charging set including a contact-less chargeable battery and a contact-less charging device,

wherein the contact-less chargeable battery includes:

a high frequency AC current inducing unit to which a high frequency AC current is induced by[means of] a magnetic field intermittently generated from an external contactless charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to a battery cell in a constant voltage/constant current mode; and

[an overvoltage monitoring unit [for] ~~that includes~~ a first microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device[by means of wireless communication] while a high frequency AC current is not induced,

wherein the contact-less charging device includes:

a magnetic field generating unit for receiving an AC current and forming [a] the magnetic field in an outer space;

a high frequency power driving unit for intermittently applying a high frequency AC current to the magnetic field generating unit; and

a second microprocessor [charging power adjusting unit for,], while a high frequency AC current is not applied to the magnetic field generating unit, wirelessly receiving the monitoring result[by means of wireless communication] and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that a charging power transmitted from the contact-less charging device to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 22 (Original): The battery charging set according to claim 21, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 23 (Twice Amended): A method for controlling charging of a contact-less chargeable battery using a contact-less charging device by[means of] electromagnetic induction[phenomenon,], the method comprising:

(a) intermittently applying a high frequency AC current to a primary coil provided to the charging device so as to intermittently generate a magnetic field in an outer region;

(b) linking a magnetic flux of the generated magnetic field to a secondary coil provided to the battery so as to intermittently output an electromagnetically-induced high frequency AC current;

(c) rectifying the output high frequency AC current to be converted into a DC current;

(d) applying the DC current to a battery cell through a constant voltage/constant current supplier so as to charge the battery cell in a constant voltage/constant current mode;

(e) monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the charging device[by means of wireless communication] while a high frequency AC current is not induced in the secondary coil; and

(f) adjusting a power of the high frequency AC current applied to the primary coil according to the transmitted monitoring result,

wherein the adjusting the power of the high frequency AC current applied to the primary coil is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Clam 24 (Original): The method according to claim 23, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 25 (New, Amended): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 26 (New, Amended): The contact-less chargeable battery according to claim 1, wherein the ~~overvoltage monitoring unit~~microprocessor controls, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 27 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 28 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 29 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 30 (New, Amended): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 31 (New, Amended): The contact-less charging circuit module according to claim 7, wherein the ~~overvoltage monitoring unit~~microprocessor controls, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 32 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 33 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 34 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 35 (New): The contact-less chargeable battery according to claim 13, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 36 (Cancelled).

Claim 37 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier has a front end and a rear end, and wherein the constant voltage/constant current supplier receives a DC current from a rectifier at the front end and supplies a charging power at the rear end.

Claim 38 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier charges the battery in a constant

current mode at an initial charging stage and then charges the battery in a constant voltage mode at a later charging stage.

Claim 39 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier charges the battery in a constant voltage mode based on a charging voltage of the battery exceeding a predetermined level.

Claim 40 (New, Amended): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 41 (New, Twice Amended): The battery charging set according to claim 21, wherein the ~~overvoltage monitoring unit~~microprocessor controls, through wireless feedback control of charging the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 42 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 43 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 44 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 45 (New): The method of claim 23, further comprising:

receiving, by the constant voltage/constant current supplier, the DC current at a front end of the constant voltage/constant current supplier; and

supplying, by the constant voltage/constant current supplier, the DC current at a rear end of the constant voltage/constant current supplier to the battery cell.

Claim 46 (New): The method of claim 23, further comprising:

supplying, by the constant voltage/constant current supplier, the DC current to the battery cell in a constant current mode during an initial charging stage and then in a constant voltage mode at a later charging stage.

Claim 47 (New): The method of claim 23, further comprising:

charging, by the constant voltage/constant current supplier, the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 48 (New, Amended): The method of claim 23, further comprising:

controlling, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing a change of intensity of the magnetic field.

Claim 49 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage; and

an overvoltage monitoring unit that includes ~~a wireless transmitting unit,~~ first and second voltage detectors respectively detecting voltages at both ends of the constant voltage/constant current supplier, and a microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication ~~through the wireless transmitting unit~~ so as to induce a change of intensity of the magnetic field,

wherein the microprocessor transmits the monitoring result to induce the change of intensity of the magnetic field ~~is based on~~by adjusting a power applied to the primary coil of the external contact-less charging device to solve an overvoltage state according to relative positions of the primary coil and the secondary coil.

Claim 50 (New): The contact-less charging circuit module according to claim 49, wherein a magnetic flux of the magnetic field generated from the external contact-less charging device is linked to the secondary coil of the high frequency AC current inducing unit.

Claim 51 (New, Amended): The contact-less charging circuit module according to claim 49, wherein ~~the~~:

the overvoltage monitoring unit further comprises:

a wireless transmitting unit wirelessly ~~propagates~~propagating the monitoring result through an antenna~~.~~; and

~~wherein the overvoltage monitoring unit includes~~ a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

~~wherein~~ the microprocessor outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 52 (New): The contact-less charging circuit module according to claim 51, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the overvoltage monitoring unit further includes a charging pause detecting unit receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, and

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 53 (New): The contact-less charging circuit module according to claim 49, wherein the monitoring result is a charging power adjustment request signal.

Claim 54 (New): The contact-less charging circuit module according to claim 49, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 55 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by ~~means of~~ a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier that includes circuitry controlled by at least one microprocessor, the constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage; and

an overvoltage monitoring unit that includes a wireless ~~transmitting unit~~transmitter, first and second voltage detectors respectively detecting voltages at both ends of the constant voltage/constant current supplier, and the at least one microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device ~~by means of wireless communication through~~using the wireless ~~transmitting unit~~transmitter so as to induce a change of intensity of the magnetic field,

wherein the at least one microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting a power applied to the primary coil ~~from a first level~~by up to a ~~second~~predetermined level,

wherein the at least one microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the power applied to the primary coil ~~from~~by up to the ~~second level to a third~~predetermined level.

Claim 56 (New): The contact-less charging circuit module according to claim 55, wherein at least one of the first charging power adjustment request signal and the second charging power adjustment request signal is based on relative positions of the primary coil and the secondary coil.

Claim 57 (New, Amended): The contact-less charging circuit module according to claim 55, wherein the wireless ~~transmitting unit~~transmitter wirelessly propagates the monitoring result through an antenna,

wherein the overvoltage monitoring unit includes a voltage comparator comparing first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

wherein the at least one microprocessor outputs the monitoring result according to the voltage comparison result to the wireless ~~transmitting unit~~transmitter.

Claim 58 (New, Amended): The contact-less charging circuit module according to claim 55, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the ~~overvoltage monitoring unit further includes a charging pause detecting unit receiving the high frequency AC current output from the high frequency AC current inducing unit to detect~~microprocessor receives an indication of a time point when the induction of high frequency AC current ends, and ~~then outputting the end time point to the at least one microprocessor, and~~

wherein the monitoring result is wirelessly transmitted to the external contact-less charging device ~~by means of wireless communication~~ while a high frequency AC current is not induced after the end time point is input.

Claim 59 (New): The contact-less charging circuit module according to claim 55, wherein the monitoring result is a difference of voltages at front and rear ends of the

constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 60 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for receiving a charging power from an external contact-less charging device and charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by ~~means of~~ a magnetic field generated from the external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

~~an overvoltage monitoring unit that includes~~ a microprocessor monitoring the voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device ~~by means of wireless communication~~ so as to induce a change of intensity of the magnetic field,

wherein the microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device ~~from~~by up to a ~~first~~predetermined level ~~to a second level.~~, and

wherein the microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device ~~from~~by up to the ~~second level to a third~~predetermined level.

Claim 61 (New): The contact-less charging circuit module according to claim 60, wherein at least one of the first charging power adjustment request signal and the second charging power adjustment request signal is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 62 (New, Amended): The contact-less charging circuit module according to claim 60, wherein the overvoltage monitoring unit includes:

~~a wireless transmitting unit wirelessly propagating the monitoring result through an antenna;~~

an antenna;

first and second voltage detectors respectively detecting first and second voltages at front and rear ends of the constant voltage/constant current supplier; and

a voltage comparator comparing the first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

wherein the microprocessor outputs the monitoring result according to the voltage comparison result ~~to~~using the ~~wireless transmitting unit~~antenna.

Claim 63 (New, Amended): The contact-less charging circuit module according to claim 60, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the ~~overvoltage monitoring unit further includes a charging pause detecting unit receiving the high frequency AC current output from the high frequency AC current inducing unit to detect~~microprocessor receives an indication of a time point when the induction of high frequency AC current ends, and ~~then outputting the end time point to the microprocessor, and~~

wherein the monitoring result is wirelessly transmitted to the external contact-less charging device ~~by means of wireless communication~~ while a high frequency AC current is not induced after the end time point is input.

Claim 64 (New): The contact-less charging circuit module according to claim 60, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 65 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting unit transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 66 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit including a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting unit transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the secondary coil is movable relative to the primary coil during the charging of the battery cell by the contact-less charging circuit module~~.~~, and

wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting the intensity of the magnetic field.

Claim 67 (Cancelled).

Claim 68 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit including a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit ~~that includes: a microprocessor monitoring~~ detecting first and second voltages at both ends of the constant voltage/constant current supplier, ~~and a wireless transmitting unit~~monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the ~~contact-less~~ monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging ~~circuit module is movable relative~~ process for adjusting a power applied to the primary coil of the external contact-less charging device ~~during the charging~~based on relative positions of the contact-less chargeable battery ~~cell by~~and the external contact-less charging ~~circuit module~~device.

Claim 69 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit for monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result is a charging power adjustment request signal.

Claim 70 (New): The contact-less charging circuit module according to claim 69, wherein the high frequency AC current inducing unit is a coil to which a magnetic flux of the magnetic field generated from the external contact-less charging device is linked.

Claim 71 (New): The contact-less charging circuit module according to claim 69, wherein the overvoltage monitoring unit includes:

a wireless transmitting unit for wirelessly propagating the monitoring result through an antenna;

first and second voltage detectors for respectively detecting voltages at front and rear ends of the constant voltage/constant current supplier;

a voltage comparator for comparing first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result; and

a microprocessor for outputting the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 72 (New): The contact-less charging circuit module according to claim 71, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the overvoltage monitoring unit further includes a charging pause detecting unit for receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, and

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 73 (New): The contact-less charging circuit module according to claim 69, wherein the charging power adjustment request signal is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 74 (New): A contact-less charging device for transmitting a charging power by means of electromagnetic induction phenomenon to a contact-less chargeable battery that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode and wirelessly transmits a monitoring result for voltages at both ends of the constant voltage/constant current supplier, the contact-less charging device comprising:

a magnetic field generating unit for receiving an AC current and forming a magnetic field in an outer space;

a high frequency power driving unit for applying a high frequency AC current to the magnetic field generating unit; and

a charging power adjusting unit that includes: a wireless receiving unit receiving the monitoring result from the contact-less chargeable battery by means of wireless communication, and a microprocessor controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that the charging power transmitted to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 75 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes a microprocessor, the microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field includes a change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

In re Patent Application of: **LS CABLE & SYSTEM LTD.** Request for Reexamination of **8,013,568** Control No. **96/000,355** Confirmation No. **1538** Filing Date: **3/12/2021** For: CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF	Attorney Docket No.: (0313071.00020) Examiner: **ANJAN K DEB** Art Unit: **3992**

APPELLANT'S APPEAL BRIEF

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Sir or Madam:

This is an Appeal Brief filed in support of Appellant's Notice of Appeal, filed August 25, 2022. Appeal is taken from the Final Office Action mailed March 3, 2022 and in furtherance of the Advisory Actions mailed June 15, 2022 and August 16, 2022.

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CLAIMS APPENDIX 58

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I. Real Party in Interest

The real party in interest is LS CABLE & SYSTEM LTD., assignee of the present application as recorded at reel 021107, frame 0629; reel 046367, frame 0522; reel 046556, frame 0633; reel 055487, frame 0432; reel 055487, frame 0441; reel 055487, frame 0643; reel 055487, frame 0295; reel 055487, frame 0271; reel 055487, frame 0307; reel 055487, frame 0319; and reel 055487, frame 0283.

II. Related Appeals, Interferences, and Trials

At present there are no related appeals, interferences, or trials.

III. Status of Claims

Claims 1, 3-35, 37-66, and 68-75 are subject to reexamination. Claims 1, 3-35, 37-66, and 68-75 are rejected. Claims 2, 36, and 67 are cancelled. Claims 1, 3-35, 37-66, and 68-75 are being appealed. Per MPEP § 1205.02 and MPEP § 2274, a copy of the appealed claims is attached in the Claims Appendix and includes pending claims 1, 3-35, 37-66, and 68-75, and cancelled claims 2, 36, and 67.

IV. Summary of the Claimed Subject Matter

As illustrated in FIG. 1 of U.S. Patent No. 8,013,568 (hereinafter "the '568 Patent") (reproduced below), in a conventional contact-less charging method, a charger 10 includes a primary coil 40 supplied with a high frequency AC current to form a magnetic field M, and a battery 50 includes a secondary coil 70 to which a high frequency AC current is induced according to the linkage of the magnetic field M generated in the primary coil 40. *See* FIG. 1 and column 1, line 66 to column 2, line 6.

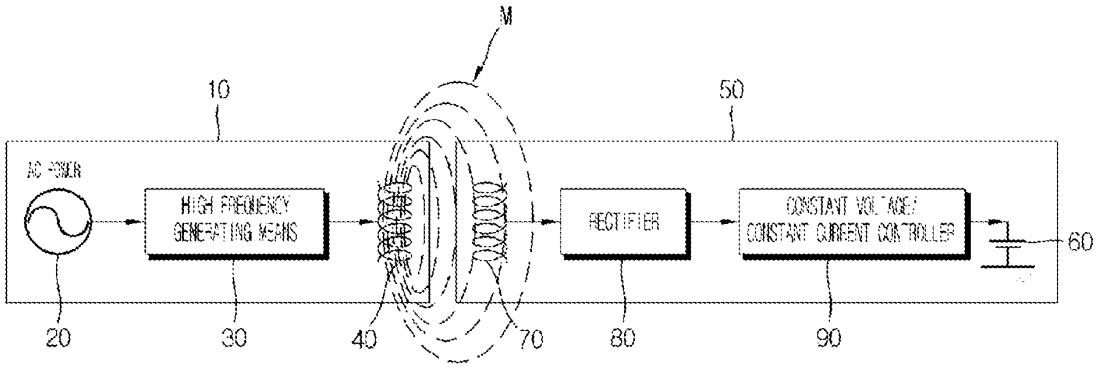


FIG. 1 of the '568 Patent

An intensity of the AC current induced in the secondary coil 70 is proportional to an intensity of the magnetic flux linked to the secondary coil 70, which depends on a relative position of the secondary coil 70 and the primary coil 40. *See* column 2, lines 21-27. For example, if the secondary coil 70 is positioned closer to the primary coil 40, the intensity of the magnetic flux linked to the secondary coil 70 will increase, and as a result the intensity of the high frequency AC current induced in the secondary coil 70 will also increase. *See* column 2, lines 27-32. However, if a large high frequency AC current induced in the secondary coil 70 exceeds standards defined for a circuit part in battery 50 (e.g., constant voltage/constant current supplier 90), then it could cause damage to the circuit part. *See* column 2, lines 42-48.

In order to avoid causing damage, prior art contact-less charging methods typically employ a structure that fixes the relative positions between the charger 10 and the battery 50 to a position where the operation of a circuit part (e.g., the constant voltage/constant current supplier 90) in the battery 50 is defined. *See* column 2, lines 49-53. For example, as illustrated in FIG. 2 of the '568 Patent, an electric toothbrush 100 includes a toothbrush body 110 having a battery 115 mounted to its lower end and a charger 120 for charging the battery 115. *See* FIG. 2 and column 2, lines 54-60.

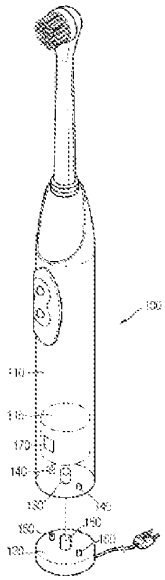


FIG. 2 of the '568 Patent

The toothbrush body 110 and the charger 120 are closely fixed with each other by matching the grooves 130, 140 and the protrusions 150, 160, and as a result relative positions of the charger 120 and the battery 115 are also closely fixed. *See* column 2, line 66 to column 3, line 3 and FIG. 2. Standards of a constant voltage/constant current supplier 170 provided to the battery 115 are defined with the understanding that the toothbrush body 110 and the charger 120 are closely fixed in this manner, and thus damage to the constant voltage/constant current supplier 170 may be prevented while charging the battery 115 due to an unexpected overvoltage by strictly restricting relative positions of the battery 115 and the charger 120 in this manner. *See* column 3, lines 4-

13. That is to say, whenever charging the battery 115, a user should fix the toothbrush body 110 on the charger 120 in this particular fixed relative position. *See* column 3, lines 12-17.

In furtherance of this background, a summary of the present invention by way of reference to the drawings and specification for each of the independent claims is provided below. The Examiners and Appellant are in agreement that no claims are presently construed as being in means-plus-function format or in step-plus-function format.[1]

Independent Claim	**Support in '568 Patent**	
	Specification	**Drawings**
1. A contact-less chargeable battery including a charging circuit for charging an electric energy to a battery cell, the contact-less chargeable battery comprising:	Col. 2, lines 21-32; col. 3, lines 35-39; col. 6, lines 10-24; col. 9, lines 29-44; and col. 12, lines 46-52.	FIGS. 1 – 7.
a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;	Col. 2, lines 21-32; col. 6, lines 10-24; col. 10, lines 26-32; and col. 11, lines 13-45.	FIG. 1; FIG. 3; and FIG. 4.
a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current	Col 3, lines 52-54; and col. 10, lines 33-36.	FIG.1; FIG. 3; FIG. 4; and FIG. 5

[1] *See* Second Advisory action mailed August 16, 2022 at pp. 5-6.

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and	Col. 3, lines 55-57; and col. 10, lines 33-36.	FIG. 1; FIG. 3; FIG. 4; and FIG. 5.
an overvoltage monitoring unit that includes first and second voltage detectors respectively detecting first and second voltages at both ends of the constant voltage/constant current supplier and a microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,	Col 6, line 66 – col. 7, line 4; col. 7, lines 43-49; col. 8, lines 32-41; col. 9, lines 29-44; col. 10, lines 55-58; and col. 11, lines 13-45.	FIG. 3; FIG. 4; and FIG. 5.
wherein the monitoring result includes a wireless feedback control signal to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device.	Col. 3, lines 35-39; col. 6, lines 10-24; col. 6, lines 28-39; col. 9, lines 29-44; col. 11, lines 13-45; and col. 12, lines 46-52.	FIGS. 3 – 7.

7. A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:	Col. 3, lines 35-48; col. 6, lines 10-24; col. 6, line 66 – col. 7, line 4; and col. 9, lines 29-44.	FIG. 1; FIG. 2; FIG. 3; FIG. 6; and FIG. 7.
a high frequency AC current inducing unit to which a high frequency AC current is induced by a magnetic field generated from an external contact-less charging device;	Col. 2, lines 5-32 col. 3, lines 49-52; col. 6, lines 10-24; col. 6, line 66 col 7, line 4; and col. 11, lines 62-65.	FIG. 1; FIG. 3; and FIG. 4.
a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;	Col. 2, lines 5-12; col. 3, lines 52-62; and col. 10, lines 33-36.	FIG.1; FIG. 3; FIG. 4; and FIG. 5
a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and	Col 3, lines 52-54; and col. 10, lines 33-36.	FIG. 1; FIG. 3; FIG. 4; and FIG. 5.
a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device so as to induce a change of intensity of the magnetic field,	Col. 9, lines 29-44; col. 11, lines 13-45; col. 11, lines 62-65; and col. 12, lines 46-52.	FIG. 3; FIG. 4; and FIG. 5.

wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.	Col. 3, lines 35-39; col. 9, lines 29-44; col. 11, lines 13-45; and col. 12, lines 46-52.	FIGS. 3 – 7.
13. A contact-less charging device for transmitting a charging power by electromagnetic induction to a contact-less chargeable battery that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode and wirelessly transmits a monitoring result for voltages at both ends of the constant voltage/constant current supplier, the contact-less charging device comprising:	Col. 3, lines 35-39; col. 7, lines 43-49; and col. 9, lines 29-44.	FIG. 3; FIG. 4; and FIG. 6
a magnetic field generating unit for receiving an AC current and forming a magnetic field in an outer space;	Col. 3, line 64 – col. 4, line 11; col. 9, lines 19-21; and col. 10, lines 1-13.	FIG. 3; FIG. 5; and FIG. 6.
a high frequency power driving unit for applying a high frequency AC current to the magnetic field generating unit; and	Col. 2, lines 5-32; col. 6, line 66 – col. 7, line 4; and col. 11, lines 62-65.	FIG. 3; FIG. 4; and FIG. 5.
a microprocessor wirelessly receiving the monitoring result from the contact-	Col. 10, lines 1-13; col. 9, lines 29-44;	FIG. 3; and FIG. 4

less chargeable battery and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that the charging power transmitted to the contact-less chargeable battery is adjusted,	col. 11, lines 13-45; col. 11, lines 62-65; and col. 12, lines 46-52.	
wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.	Col. 3, lines 35-39; col. 6, line 66 – col. 7, line 4; col. 9, lines 35-38; col. 11, lines 13-45; and col. 12, lines 46-52.	FIG. 5
21. A battery charging set including a contact-less chargeable battery and a contact-less charging device, wherein the contact-less chargeable battery includes:	Col. 3, lines 35-39; col. 6, line 66 – col. 7, line 4; and col. 11, lines 52-65.	FIGS. 1 – 7.
a high frequency AC current inducing unit to which a high frequency AC current is induced by a magnetic field intermittently generated from an external contactless charging device;	Col. 2, lines 21-32; col. 6, lines 10-24; col. 10, lines 26-32; and col. 11, lines 13-45.	FIG. 1; FIG. 3; FIG. 4; and FIG. 6.
a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;	Col. 2, lines 5-12; and col. 10, lines 33-36.	FIG.1; FIG. 3; FIG. 4; and FIG. 5

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to a battery cell in a constant voltage/constant current mode; and	Col. 10, lines 33-36.	FIG. 1; FIG. 3; FIG. 4; and FIG. 5.
a first microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device while a high frequency AC current is not induced, wherein the contact-less charging device includes:	Col. 7, lines 43-49; and Col 11, lines 52-65.	FIG. 3; FIG. 4; and FIG. 5.
a magnetic field generating unit for receiving an AC current and forming the magnetic field in an outer space;	Col. 3, line 64 - col. 4, line 11; col, 9, lines 19-21; and col, 10, lines 1-13.	FIG. 3; and FIG. 4.
a high frequency power driving unit for intermittently applying a high frequency AC current to the magnetic field generating unit; and	Col. 3, line 64 - col 4, line 11.	FIG. 3; FIG. 4; and FIG. 6.
a second microprocessor, while a high frequency AC current is not applied to the magnetic field generating unit, wirelessly receiving the monitoring result and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the	Col. 3, line 64 - col 4, line 11; and col. 9, lines 29-44.	FIG. 3; FIG. 4; and FIG. 5.

magnetic field generating unit so that a charging power transmitted from the contact-less charging device to the contact-less chargeable battery is adjusted,		
wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.	Col. 3, lines 35-39; col. 9, lines 29-44; col. 11, lines 13-45; and col. 12, lines 46-52.	FIGS. 3 – 7.
23. A method for controlling charging of a contact-less chargeable battery using a contact-less charging device by electromagnetic induction, the method comprising:	Col. 3, lines 35-39; col. 5, lines 8-11; col. 6, line 66 - col. 7, line 4; and col. 11, lines 52-65.	FIGS. 1 – 7.
(a) intermittently applying a high frequency AC current to a primary coil provided to the charging device so as to intermittently generate a magnetic field in an outer region;	Col. 2, lines 21-32; col. 5, lines 8-15; col. 6, lines 10-24; col. 10, lines 26-32; and col. 11, lines 13-45.	FIG. 3; FIG. 4; and FIG. 6.
(b) linking a magnetic flux of the generated magnetic field to a secondary coil provided to the battery so as to intermittently output an electromagnetically-induced high frequency AC current;	Col. 2, lines 21-32; col. 5, lines 8-18; col. 6, lines 10-24; col. 10, lines 26-32; and col. 11, lines 13-45.	FIG. 3; FIG. 5; and FIG. 6.

(c) rectifying the output high frequency AC current to be converted into a DC current;	Col. 2, lines 5-12; col. 5, lines 18-19; and col. 10, lines 33-36.	FIG.1; FIG. 3; FIG. 4; and FIG. 5
(d) applying the DC current to a battery cell through a constant voltage/constant current supplier so as to charge the battery cell in a constant voltage/constant current mode;	Col. 5, lines 19-22.	FIG. 3; FIG. 4; and FIG. 5.
(e) monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the charging device while a high frequency AC current is not induced in the secondary coil; and	Col. 5, lines 22-26.	FIG. 4; and FIG. 5.
(f) adjusting a power of the high frequency AC current applied to the primary coil according to the transmitted monitoring result,	Col. 3, lines 35-39; col. 5, lines 26-28 col. 9, lines 29-44; col. 11, lines 13-45; and col. 12, lines 46-52.	FIG. 3; FIG. 4.
wherein the adjusting the power of the high frequency AC current applied to the primary coil is based on relative positions of the contact-less chargeable battery and the contact-less charging device.	Col. 3, lines 35-39; col. 9, lines 29-44; col. 11, lines 13-45; and col. 12, lines 46-52.	FIGS. 3 – 7.
49. A contact-less charging circuit module electrically connected to a battery cell and used for charging an	Col. 3, lines 35-48; col. 6, lines 10-24;	FIG. 1; FIG. 2; FIG. 3; and

electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:	col. 6, line 66 - col. 7, line 4; and col. 9, lines 29-44.	FIG. 7.
a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;	Col. 2, lines 5-32; col. 3, lines 49-52; col. 6, lines 10-24; col. 6, line 66 - col. 7, line 4; and col. 11, lines 62-65.	FIG. 1; FIG. 3; and FIG. 4.
a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;	Col. 2, lines 5-12; and col. 10, lines 33-36.	FIG.1; FIG. 3; FIG. 4; and FIG. 5
a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage; and	Col. 7, lines 33-42; and col. 10, lines 33-36.	FIG. 3; FIG. 4; and FIG. 5.
an overvoltage monitoring unit that includes first and second voltage detectors respectively detecting voltages at both ends of the constant	Col. 7, lines 43-49; col. 8, lines 32-41; col. 9, lines 29-44; col. 10, lines 55-58; and	FIG. 4; and FIG. 5.

voltage/constant current supplier, and a microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,	col. 11, lines 13-45.	
wherein the microprocessor transmits the monitoring result to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device to solve an overvoltage state according to relative positions of the primary coil and the secondary coil.	Col. 3, lines 35-39; col. 9, lines 29-44; col. 11, lines 13-45; and col. 12, lines 46-52.	FIGS. 3 – 7.
55. A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:	Col. 3, lines 35-48; col. 6, lines 10-24; col. 6, line 66 - col. 7, line 4; and col. 9, lines 29-44.	FIG. 1; FIG. 2; FIG. 3; and FIG. 7.
a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by a magnetic field generated	Col. 2, lines 21-32; col. 6, lines 10-24; col. 10, lines 26-32; and col. 11, lines 13-45.	FIG. 1; FIG. 3; and FIG. 4.

from a primary coil in an external contact-less charging device;		
a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;	Col. 2, lines 5-12; and col. 10, lines 33-36.	FIG.1; FIG. 3; FIG. 4; and FIG. 5
a constant voltage/constant current supplier that includes circuitry controlled by at least one microprocessor, the constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage; and	Col. 10, lines 33-36.	FIG. 3; FIG. 4; and FIG. 5.
an overvoltage monitoring unit that includes a wireless transmitter, first and second voltage detectors respectively detecting voltages at both ends of the constant voltage/constant current supplier, and the at least one microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and	Col. 7, lines 43-49; col. 8, lines 32-41; col. 9, lines 29-44; col. 10, lines 55-58; and col. 11, lines 13-45.	FIG. 3; FIG. 4; and FIG. 5.

wirelessly transmitting a monitoring result to the external contact-less charging device using the wireless transmitter so as to induce a change of intensity of the magnetic field,		
wherein the at least one microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting a power applied to the primary coil by up to a predetermined level,	Col. 11, lines 23-26 and 35-43.	FIG. 3; FIG. 4; and FIG. 5.
wherein the at least one microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the power applied to the primary coil by up to the predetermined level.	Col. 11, lines 23-26 and 35-43.	FIG. 3; FIG. 4; and FIG. 5
60. A contact-less charging circuit module electrically connected to a battery cell and used for receiving a charging power from an external contact-less charging device and charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:	Col. 3, lines 35-48; col. 6, lines 10-24; col. 6, line 66 - col. 7, line 4; and col. 9, lines 29-44.	FIG. 1; FIG. 2; FIG. 3; and FIG. 7.
a high frequency AC current inducing unit to which a high frequency AC current	Col. 2, lines 5-32; col. 3, lines 49-52;	FIG. 1; FIG. 3; and

is induced by a magnetic field generated from the external contact-less charging device;	col. 6, lines 10-24; col. 6, line 66 – col. 7, line 4; and col. 11, lines 62-65.	FIG. 4.
a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;	Col. 2, lines 5-12; and col. 10, lines 33-36.	FIG.1; FIG. 3; FIG. 4; and FIG. 5
a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and	Col. 10, lines 33-36.	FIG. 1; FIG. 3; FIG. 4; and FIG. 5.
a microprocessor monitoring the voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device so as to induce a change of intensity of the magnetic field,	Col. 9, lines 29-44; col. 11, lines 13-45; col. 11, lines 62-65; and col. 12, lines 46-52.	FIG. 3; FIG. 4; and FIG. 5.
wherein the microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device by up to a predetermined level, and	Col. 11, lines 23-26 and 35-46.	FIG. 3; FIG. 4; and FIG. 5.
wherein the microprocessor transmits a second charging power adjustment	Col. 11, lines 35-46.	FIG. 3; FIG. 4; and

request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device by up to the predetermined level.		FIG. 5.
65. A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:	Col. 3, lines 35-48; col. 6, lines 10-24; col. 6, line 66 – col. 7, line 4; and col. 9, lines 29-44.	FIG. 1; FIG. 2; FIG. 3; and FIG. 7.
a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;	Col. 2, lines 21-32; col. 6, lines 10-24; col. 10, lines 26-32; and col. 11, lines 13-45.	FIG. 1; FIG. 3; and FIG. 4.
a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;	Col. 2, lines 5-12; and col. 10, lines 33-36.	FIG.1; FIG. 3; FIG. 4; and FIG. 5
a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and	Col. 10, lines 33-36.	FIG. 1; FIG. 3; FIG. 4; and FIG. 5.
an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant	Col. 7, lines 43-49; col. 8, lines 32-41; col. 9, lines 29-44;	FIG. 3; FIG. 4; and FIG. 5.

voltage/constant current supplier, and a wireless transmitting unit transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,	col. 10, lines 55-58; and col. 11, lines 13-45.	
wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.	Col. 3, lines 35-39; col. 9, lines 29-44; col. 11, lines 13-45; and col. 12, lines 49-50.	FIGS. 3 – 7.
66. A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:	Col. 3, lines 35-48; col. 6, lines 10-24; col. 6, line 66 - col 7, line 4; col. 7, lines 17-22; and col. 9, lines 29-44.	FIG. 1; FIG. 2; FIG. 3; FIG. 6; and FIG. 7.
a high frequency AC current inducing unit including a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil in an external contact-less charging device;	Col. 2, lines 21-32; col. 6, lines 10-24; col. 10, lines 26-32; and col. 11, lines 13-45.	FIG. 1; FIG. 3; and FIG. 4.
a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;	Col. 2, lines 5-12; and col. 10, lines 33-36.	FIG.1; FIG. 3; FIG. 4; and FIG. 5

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and	Col. 10, lines 33-36.	FIG. 1; FIG. 3; FIG. 4; and FIG. 5.
an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting unit transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,	Col. 7, lines 43-49; col. 8, lines 32-41; col. 9, lines 29-44; col. 10, lines 55-58; and col. 11, lines 13-45.	FIG. 3; FIG. 4; and FIG. 5.
wherein the secondary coil is movable relative to the primary coil during the charging of the battery cell by the contact-less charging circuit module, and	Col. 7, lines 17-22; and col. 9, lines 35-44.	FIG. 3
wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting the intensity of the magnetic field.	Col; 4, lines 4-10 and 46-52; and col. 10, lines 14-25.	FIG. 3; FIG. 4; FIG. 5; and FIG. 6.
68. A contact-less charging circuit module electrically connected to a battery cell and used for charging an	Col. 3, lines 35-48; col. 6, lines 10-24;	FIG. 1; FIG. 2; FIG. 3; and

electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:	col. 6, line 66 - col. 7, line 4; col. 7, lines 17-22; and col. 9, lines 29-44.	FIG. 7.
a high frequency AC current inducing unit including a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil in an external contact-less charging device;	Col. 2, lines 21-32; col. 6, lines 10-24; col. 10, lines 26-32; and col. 11, lines 13-45.	FIG. 1; FIG. 3; and FIG. 4.
a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;	Col. 2, lines 5-12; and col. 10, lines 33-36.	FIG.1; FIG. 3; FIG. 4; and FIG. 5
a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and	Col. 10, lines 33-36.	FIG. 1; FIG. 3; FIG. 4; and FIG. 5.
an overvoltage monitoring unit detecting first and second voltages at both ends of the constant voltage/constant current supplier, monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as	Col. 7, lines 43-49; col. 8, lines 32-41; col. 9, lines 29-44; col. 10, lines 55-58; and col. 11, lines 13-45.	FIG. 3; FIG. 4; and FIG. 5.

to induce a change of intensity of the magnetic field,		
wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device.	Col. 3, lines 35-39; col. 9, lines 29-44; col. 11, lines 13-45; and col. 12, lines 46-52.	FIG. 3; FIG. 4; FIG. 5; and FIG. 6.
69. A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:	Col. 3, lines 35-48; col. 6, lines 10-24; col. 6, line 66-col. 7, line 4; and col. 9, lines 29-44.	FIG. 1; FIG. 2; FIG. 3; and FIG. 7.
a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;	Col. 2, lines 21-32; col. 6, lines 10-24; col. 10, lines 26-32; and col. 11, lines 13-45.	FIG. 1; FIG. 3; and FIG. 4.
a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;	Col. 2, lines 5-12; and col. 10, lines 33-36.	FIG.1; FIG. 3; FIG. 4; and FIG. 5
a constant voltage/constant current supplier for receiving the DC current	Col. 10, lines 33-36.	FIG. 1; FIG. 3;

from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and		FIG. 4; and FIG. 5.
an overvoltage monitoring unit for monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,	Col. 7, lines 43-49; col. 8, lines 32-41; col. 9, lines 29-44; col. 10, lines 55-58; and col. 11, lines 13-45.	FIG. 4; and FIG. 5.
wherein the monitoring result is a charging power adjustment request signal.	Col. 11, lines 13-26; and col. 12, lines 49-50.	FIG. 3; FIG. 4; and FIG. 5.
74. A contact-less charging device for transmitting a charging power by means of electromagnetic induction phenomenon to a contact-less chargeable battery that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode and wirelessly transmits a monitoring result for voltages at both ends of the constant voltage/constant current supplier, the contact-less charging device comprising:	Col. 3, lines 35-39; col. 9, lines 29-44; col. 11, lines 13-45; col. 12, lines 49-50; and col. 11, lines 13-26.	FIG. 1; FIG. 3; and FIG. 4.

a magnetic field generating unit for receiving an AC current and forming a magnetic field in an outer space;	Col. 3, line 64 - col. 4, line 11; col. 9, lines 19-21; and col. 10, lines 1-13.	FIG. 3; FIG. 5; and FIG. 6.
a high frequency power driving unit for applying a high frequency AC current to the magnetic field generating unit; and	Col. 2, lines 5-32; col. 6, line 66 - col 7, line 4; and col. 11, lines 62-65.	FIG. 3; FIG. 4; and FIG. 6.
a charging power adjusting unit that includes: a wireless receiving unit receiving the monitoring result from the contact-less chargeable battery by means of wireless communication, and a microprocessor controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that the charging power transmitted to the contact-less chargeable battery is adjusted,	Col. 4, lines 4-10 and 46-52; and col. 10, lines 14-25.	FIG. 3; FIG. 4; and FIG. 5.
wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.	Col. 3, lines 35-39; col. 9, lines 29-44; col. 11, lines 13-45; and col. 12, lines 46-52.	FIGS. 3 – 7.
75. A contact-less charging circuit module electrically connected to a	Col. 3, lines 35-48; col. 6, lines 10-24;	FIG. 1; FIG. 2;

battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:	col. 6, line 66 - col 7, line 4; and col. 9, lines 29-44.	FIG. 3; and FIG. 7.
a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;	Col. 2, lines 21-32; col. 6, lines 10-24; col. 10, lines 26-32; and col. 11, lines 13-45.	FIG. 1; FIG. 3; and FIG. 4.
a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;	Col. 2, lines 5-12; and col. 10, lines 33-36.	FIG.1; FIG. 3; FIG. 4; and FIG. 5
a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and	Col. 10, lines 33-36.	FIG. 1; FIG. 3; FIG. 4; and FIG. 5.
an overvoltage monitoring unit that includes a microprocessor, the microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,	Col. 6, line 66 - col. 7, line 4.	FIG. 3; FIG. 4; and FIG. 5.

wherein the change of intensity of the magnetic field includes a change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less charging circuit module and the external contact-less charging device.	Col. 3, lines 35-39; col. 9, lines 29-44 and 35-39; col. 11, lines 13-45; and col. 12, lines 46-52.	FIGS. 3 – 7.

Although specification citations are given in accordance with 37 C.F.R. § 41.37(c)(1)(iii), these figure numbers and citations are merely examples of where support may be found in the specification for the terms used in this section. The citations are not intended to suggest in any way that the terms of the claims are limited to the examples listed. The claims are fully supported by the specification as required by law. However, it is improper under the law to read limitations from the specification into the claims. The specification support for the claim terminology is done here to comply with MPEP § 1205 and 37 C.F.R. § 41.37 only, and is not intended to limit the scope of the claims to those support examples. Nor does this exercise provide a mechanism for circumventing the law precluding the reading of limitations into the claims from the specification. In short, the paragraph and figure citations are not to be construed as claim limitations or used to limit the scope of the claims.

V. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The Final Office Action mailed March 3, 2022 (the "Final Office Action") rejected claims 55 and 60 under 35 U.S.C. § 112, first paragraph, and rejected Claims 1, 21, and 65 under 35 U.S.C. § 112, second paragraph.

The Final Office Action rejected claims 1-15, 19-54, 56, 61, 65-68, and 73-75 under 35 U.S.C. § 103(a) as being obvious over Chung-Sik KR 950005819B1 ("Chung-Sik") and Matsuki JP H0145230 Y2 ("Matsuki"), or, in the alternative, as being obvious over Chung-Sik in view of Kaite et al. U.S. Patent No. 6,016,046 ("Kaite") in further view of Matsuki.

The Final Office Action rejected claims 16-18 under pre-AIA 35 U.S.C. § 103(a) as being unpatentable over Chung-Sik and Matsuki as applied to claim 15, and further in view of Cho Gyu Hyeong et al. KR 100451606 ("Cho").

The Final Office Action rejected claims 55, 57-60, 62-64, and 69-72 under 35 U.S.C. § 102(b) as anticipated by Chung-Sik, or, in the alternative, under pre-AIA 35 U.S.C. § 103(a) as obvious over Chung-Sik and Kaite.

A first After Final Response to the Final Office Action was filed May 23, 2022 (the "First Response"). In the First Response to the Final Office Action, claims 1, 3, 4, 7, 9, 10, 13, 15, 17, 19, 21, 23, 26, 31, 41, 49, 51, 55, 57, 58, 60, 62, 63, 66, 68, and 75 were amended and claims 2 and 67 were cancelled.

An Advisory Action was mailed on June 15, 2022 (the "First Advisory Action"). The First Advisory Action states the amendments presented in the First Response were not entered. (First Advisory Action at p. 1).

In reply, a second After Final Response to the Final Office Action was filed July 26, 2022 (the "Second Response"). In the Second Response to the Final Office Action and the First Advisory Action, claims 1, 3, 4, 7, 9, 10, 13, 15, 17, 19, 21, 23, 26, 31, 41, 49, 51, 55, 57, 58, 60, 62, 63, 66, 68, and 75 were amended. The Second Response notes that the amendments to claims 1, 3, 4, 7, 9, 10, 13, 15, 17, 19, 21, 23, 26, 31, and 41 present the rejected claims in better form for consideration on appeal per 37 C.F.R. § 1.116(b). Furthermore, with respect to the amendments to claims 49, 51, 55, 57, 58, 60,

62, 63, 66, 68, and 75, the Second Response notes that the amendments could not have been presented earlier as the Final Office Action presents the first rejection of these claims.

A Second Advisory Action was mailed on August 16, 2022 (the "Second Advisory Action"). In the Second Advisory Action, the amendments to the claims filed on July 26, 2022 in the Second Response are entered for purposes of appeal. (Second Advisory Action at PTOL-467). The Second Advisory Action recites the following rejections. Claims 1, 13, 21, 23, 49, 56, 61, 68, 73, 74, and 75 are rejected under 35 U.S.C. § 112, first paragraph as failing to comply with the written description requirement. (*Id.* at p. 10). Claims 1, 3-15, 19-35, 37-54, 56, 61, 65-66, 68, and 73-75 are rejected under 35 U.S.C. § 103(a) as being obvious over Chung-Sik and Matsuki, or, in the alternative, as being obvious over Chung-Sik in view of Kaite in further view of Matsuki. (*Id.* at pp. 11-13). Claims 16-18 are rejected under pre-AIA 35 U.S.C. § 103(a) as being unpatentable over Chung-Sik and Matsuki as applied to claim 15, and further in view of Cho. (*Id.* at p. 13). Claims 55, 57-60, 62-64, and 69-72 are rejected under 35 U.S.C. § 102(b) as anticipated by Chung-Sik, or, in the alternative, under pre-AIA 35 U.S.C. § 103(a) as obvious over Chung-Sik and Kaite. (*Id.* at pp. 13-14).

VI. GROUNDS OF REJECTION PREVIOUSLY OVERCOME AND NO LONGER PENDING ON APPEAL

The Final Office Action rejected claims 1, 21, and 65 under 35 U.S.C. § 112(b), or 35 U.S.C. § 112 (pre-AIA), second paragraph. Further, the Final Office Action rejected claims 55 and 60 under 35 U.S.C. § 112(a), or 35 U.S.C. § 112 (pre-AIA), first paragraph. In the Second Response, Appellant submitted amendments, and as seen in the Second Advisory Action, the Examiners agree that the presented amendments overcome these rejections. (Second Advisory Action at p. 2). Therefore, the rejections of claims 1, 21, and 65 under 35 U.S.C. § 112(b), or 35 U.S.C. § 112 (pre-AIA), second paragraph and the rejections of claims 55 and 60 under 35 U.S.C. § 112(a), or 35 U.S.C. § 112 (pre-AIA), first paragraph are no longer pending.

The Final Office Action invoked an interpretation under 35 U.S.C. § 112, sixth paragraph with respect to the claims terms: “overvoltage monitoring unit,” “wireless transmitting unit,” “charging pause detecting unit,” “charging power adjustment unit,” and “wireless receiving unit.” In the Second Response, Appellant submitted amendments and arguments, and as seen in the Second Advisory Action, the Examiners agrees with Appellant that the claims will not be interpreted under 35 U.S.C. § 112, sixth paragraph. (*Id*. at pp. 3-6).

VII. Argument

A. THE PATENT OFFICE'S 35 U.S.C. § 112, FIRST PARAGRAPH REJECTIONS OF CLAIMS 1, 13, 21, 23, 49, 56, 61, 68, AND 73-75 ARE IMPROPER

Appellant respectfully submits the rejections of claims 1, 13, 21, 23, 49, 56, 61, 68, 73, 74, and 75 under 35 U.S.C. § 112, first paragraph as failing to comply with the written description requirement, are deficient for several reasons and should be reversed.

First, the '568 Patent, as a whole, describes that the problem to be solved is adjusting on the basis of positions so as to avoid requiring fixed positions. See, for example, column 3 lines 18-21 (e.g., "in order to maximize the convenience of the user, a new technical alternative capable of overcoming the restriction of the relative positions of the battery … and the charger … is needed"). See also, for example, column 3, lines 27-34 (e.g., "The present invention is designed in consideration of the above problems, and therefore it is an object of the invention to provide contact-less chargeable battery and charging device capable of preventing any damage of an internal battery circuit together with solving a restriction for relative positions between the chargeable battery and the charging device when charging the battery in a contact-less charging method, and a battery charging set including them"). The Second Advisory Action states that the language "adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contactless charging device," recited in claims 1, 13, 21, 23, 49, 56, 61, 68, 73, 74, and 75 is not supported in the '568 Patent and would be subject to a rejection under 35 U.S.C. § 112, first paragraph. (Second Advisory Action at p. 10). Appellant respectfully disagrees. *As an initial matter, Appellant notes that language similar to the objected to language was first introduced in the response to the second non-final Office Action filed November 29, 2021, and the Final Office Action made no objection or rejection to this language*. As such, Appellant notes that these rejections, if made, would constitute new grounds of rejection and therefore constitute sufficient justification for withdrawing

the Final Office Action and reopening prosecution under MPEP § 2275 and 37 CFR § 41.39(b)(1).

Furthermore, Appellant notes that the cited language is fully supported in the '568 Patent as described in the Second Response and referenced by the First Response. See, for example, column 3, lines 35-39 (e.g., "Another object of the present invention is to provide a battery charging control method capable of preventing any damage of an internal battery circuit together with solving a restriction for relative positions between the battery and the charger that employ a contact-less charging method"); column 9, lines 29-44 (e.g., "the contact-less charging device and chargeable battery need not be fixed to a certain relative position as in the prior art so as to constantly keep an intensity of magnetic flux linked to the secondary coil"); column 11, lines 13-45; and column 12, lines 46-52. Appellant further notes that this claim language is fully supported in the '568 Patent at column 2, lines 21 - 32; column 6, lines 10 - 24; column 6, lines 28-39; column 6, line 66 - column 7, line 4; and column 9, lines 35-38 (emphasis added):

> Referring to FIG. 3, the contact-less charging device C of this embodiment includes a primary coil 200, a high frequency power driving unit 210, a primary antenna 220, a wireless receiving unit 230, a microprocessor 240, and a power supply 260. **The high frequency power driving unit 210 applies a high frequency AC current of several tens KHz to the primary coil 200 by means of rapid switching operation to generate a magnetic field.** For example, the high frequency power driving unit 210 applies a high frequency AC current of 50 KHz to the primary coil 200. If a magnetic field is generated to the primary coil 200 by the high frequency AC current, a charging power is transferred to the chargeable battery B in a contactless method by means of electromagnetic induction phenomenon. (column 6, lines 10 - 24)
>
> According to the charger 10 and the battery 50 adopting the contact-less charging method of the prior art, an intensity of **the high frequency AC current induced to the secondary coil 70 is proportional to an intensity of the magnetic flux linked to the secondary coil 70.** In addition, **the intensity of the magnetic flux linked to the secondary coil 70 is changed according to a relative position with the primary coil 40. That is to say, as the secondary coil 70 is positioned closer to the primary**

> **coil 40 of the charger 10, an intensity of the magnetic flux linked to the secondary coil 70 is increased, and as a result an intensity of the high frequency AC current induced by the secondary coil 70 is also increased.** (column 2, lines 21-32)
>
> **The wireless receiving unit 230 receives an adjustment request signal of charging power transmitted from the chargeable battery B** through the antenna 220, and then inputs the signal to the microprocessor 240. **The adjustment request signal is transmitted when an excessive charging power is transferred to the battery to probably cause a damage on circuit parts that supply constant voltage/constant current.** The adjustment request signal is modulated and transmitted from the chargeable battery B, and thus the wireless receiving unit 230 demodulates the adjustment request signal and then [sic] inputs it to the microprocessor 240. (column 6, lines 28-39)
>
> **The microprocessor 240** controls the whole operation of the charging device C, and particularly it **controls the high frequency power driving unit 210 to adjust a power of the high frequency AC current applied to the primary coil 200 if an adjustment request signal of the charging power is received from the wireless receiving unit 230**. (column 6, line 66 - column 7, line 4)
>
> Thus, **the contact-less charging device and chargeable battery of the present invention need not be fixed to a certain relative position** as in the prior art so as to constantly keep an intensity of magnetic flux linked to the secondary coil 270. (column 9, lines 35-38)

That is, the chargeable battery B in Fig. 3 provides an adjustment request signal based on an excessive charging power being transmitted to the chargeable battery B. This excessive charging power is generated based on the relative position of the secondary coil of the chargeable battery and the primary coil of the contact-less charging device. The contact-less charging device then adjusts the power applied to its primary coil based on the adjustment request signal, ***which is based on the relative positions of the chargeable battery and the contact-less charging device***. "[I]t is … well accepted that a satisfactory description may be found in originally-filed claims or *any other*

portion of the originally-filed specification. See *In re Koller*, 613 F.2d 819, 204 USPQ 702 (CCPA 1980); *In re Gardner*, 475 F.2d 1389, 177 USPQ 396 (CCPA 1973); *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976) (emphasis added). Furthermore, "the focus of the inquiry regarding the meaning of a claim should be what would be reasonable from the perspective of one of ordinary skill in the art. *In re Suitco Surface, Inc.*, 603 F.3d 1255, 1260, 94 USPQ2d 1640, 1644 (Fed. Cir. 2010); *see, e.g.*, *In re Buszard*, 504 F.3d 1364, 1367 84 USPQ2d 1749 (Fed. Cir. 2007) (finding the Board's interpretation that equated a "flexible" foam with a crushed "rigid" foam was not reasonable).

Accordingly, the '568 Patent supports the claim language "adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contactless charging device."

Accordingly, Appellant submits that the cited claim language is fully supported in the '568 Patent and, that if any rejection of this claim language is made, that the Final Office Action should be withdrawn and prosecution should be reopened.

B. THE PATENT OFFICE'S 35 U.S.C. § 102 AND 35 U.S.C. § 103 REJECTIONS OF CLAIMS 1, 3-35, 37-66, 68-75 ARE IMPROPER

The Final Office Action rejected claims 1-15, 19-54, 56, 61, 65-68, and 73-75 under 35 U.S.C. § 103(a) as being obvious over Chung-Sik and Matsuki, or in the alternative, as being obvious over Chung-Sik, Kaite, and Matsuki. (Final Office Action at p. 14). The First Response amended claims 1, 3, 4, 7, 9, 10, 13, 15, 17, 19, 21, 23, 26, 31, 41, 49, 51, 55, 57, 58, 60, 62, 63, 66, 68, and 75, and cancelled claims 2 and 67. The First Advisory Action states the amendments presented in the First Response were not entered. In response to the First Advisory Action, the Second Response was submitted and amended the claims mentioned above. No new matter was added thereby.

The Second Advisory Action entered, for the purpose of appeal, all of the claim amendments set forth in the Second Response.

Appellant respectfully submits that the rejections of claims 1, 3-35, 37-66, and 68-75 under 35 U.S.C. § 103, and the rejection of claims 55, 57-60, 62-64, and 69-72 under 35 U.S.C. §102 are improper for several reasons and should be reversed.

1. The Rejections of Claims 1, 3-35, 37-66, and 68-75 Under 35 U.S.C. § 103 are Improper Because There is No Motivation Supporting Any Combination of *Chung-Sik*, *Matsuki*, and/or *Kaite*

Chung-Sik and Matsuki

The Second Advisory Action states that claims 1, 3-35, 37-66, and 68-75 would be rejected under 35 U.S.C. § 103 as being obvious over a combination of Chung-Sik and Matsuki. For example, the Second Advisory Action states "[o]ne of ordinary skill in the art would be motivated to combine the charger disclosed by Chung-Sik and Matsuki so that charging can be performed without connection to the charging device making charging work exceptionally simple that allows the charging current to be adjusted and the charging time of the batter to be changed as required. Moreover, Matsuki specifically teaches changing the distance between the output coil of the charging device and the input coil of the storage battery allows the charging current of the battery to be adjusted."" (Second

Advisory Action at p. 12). Appellant notes the Second Advisory Action simply assumes it would have been obvious to make the modification and provides no justification for the modification or rationale explaining a motivation to combine in violation of the MPEP and case law precedent. Accordingly, Appellant submits that the obviousness rejections of the claims cannot be sustained.

MPEP § 2143.01 states:

> The mere fact that references can be combined or modified does not render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417, 82 USPQ2d 1385, 1396 (2007).
>
> A statement that modifications of the prior art to meet the claimed invention would have been "'well within the ordinary skill of the art at the time the claimed invention was made'" because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a prima facie case of obviousness without some objective reason to combine the teachings of the references. *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993). "'[R]ejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.'" *KSR*, 550 U.S. at 418, 82 USPQ2d at 1396 (quoting *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006)).

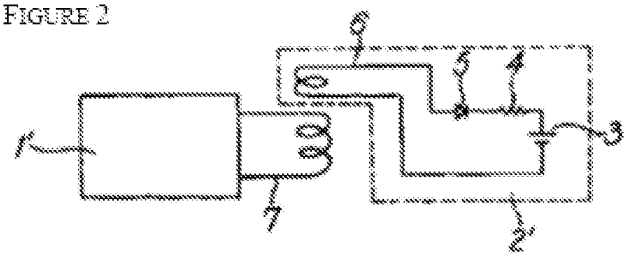
MPEP § 2143.02 states "[w]here there is a reason to modify or combine the prior art to achieve the claimed invention, the claims may be rejected as prima facie obvious provided there is also a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986)." "An invention 'composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.'" *Volkswagen Grp. of Am., Inc. v. Velocity Patent LLC*, IPR2015-00276, Paper 8, slip op. at 10 (PTAB Jun. 1, 2015) (quoting *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 418 (2007). In order to show that it would be obvious to make a particular combination, "a skilled artisan would have been motivated to combine

the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.'" *Apotex Inc. v. Wyeth LLC*, IPR2014-00115, Paper 94, slip op. at 11 (Apr. 20, 2015) (quoting *Procter & Gamble Co. v. Teva Pharms. USA, Inc.*, 566 F.3d 989, 994 (Fed. Cir. 2009))." The proposed combination of Chung-Sik and Matsuki fails to meet the requirements of the MPEP and case law precedent as a skilled artisan would not have been motivated to combine the teachings and would not have had a reasonable expectation of success in making the proposed combination.

Chung-Sik teaches "the battery may be recharged only when the portable device 18 is installed on the base unit 12" (emphasis added). (Chung-Sik, page 8-2, lines 59-60). In Chung-Sik, "when the portable device 18 is installed on the base unit 12, the charge switch 30 is switched 'on' according to mechanical input" (emphasis added). (Chung-Sik, page 8-4, lines 30-40). Further, in Chung-Sik, "when a portion of the contactless charging unit 38 of the portable device 18 is mounted (positioned) on the power transmitter 28 of the base unit 12, a charge switch 30 of the base unit 12 is started (turned 'on') by the mounting of the portable device 18." (Chung-Sik, page 8-2, line 62 to page 8-3, line 2). Further, in Chung-Sik "when the portable device 18 is separated from the base unit 12, operation of the contactless charging unit 28 and the power transmitter 28 are stopped to stop charging the battery 32." (Chung-Sik, page 8-3, lines 11-14). Further, in Chung-Sik, "when the two devices are coupled to each other, the core 78 of the induced voltage detecting unit 81 installed on the contactless charging unit 38 in the portable device 18 is positioned on an opposite surface of the core 76 of the induced voltage generating unit 46 in the power transmitter 28 and is space coupled thereto" (emphasis added). (Chung-Sik, page 8-4, lines 20-25).

Matsuki describes a storage battery that can be charged without connection to a charging device. (Matsuki, column 1, lines 16-17). As shown in FIG. 2 of Matsuki, a storage battery 2' includes a resistor 4, a diode 5, and an input coil 6 connected in series between positive and negative electrodes of a storage battery body 3 so that current flows only in the direction of charging the storage battery body**:**

FIGURE 2



Matsuki discloses charging the storage battery using a charging device 1' having an output coil 7, also shown in FIG. 2. Matsuki recognizes that the charging current can be adjusted by changing the distance between the output coil 7 of the charging device 1' and the input coil 6. (Matsuki, column 2, lines 24 - 27). This is not a new disclosure. This is one of the problems recognized in the '568 Patent (column 2, lines 37-41): "However, the intensity of the AC current induced by the secondary coil 70 is changed according to a relative position between the primary coil 40 and the secondary coil 70 as mentioned above." Matsuki does not solve this problem, nor does it disclose circuitry in the battery for causing a change in the charging current. In fact, Matsuki fails to disclose any type of feedback circuitry in the battery or in the charging device. Rather, in Matsuki, although the relative positions of the output coil and the input coil are changed, the *intensity* of the magnetic field does not change.

The combination proposed in the Second Advisory Action requires modifying the relative positions of the base 12 and the portable device 18 of Chung-Sik, as disclosed in Matsuki, in order to adjust the charging current. See, for example, Second Advisory Action at pp. 11-13. However, Chung-Sik describes a system where signals transmitted from the portable device 18 to the base 12 will only occur "when the two devices are coupled to each other" in a fixed arrangement at which the core 78 of the portable device 18 is positioned on a surface of the core 76 of the transmitter 28 of the base unit 12. (Chung-Sik, page 8-4, lines 20-25). In fact, Chung-Sik does not teach or suggest making any change to the intensity of the magnetic field based on relative positions of the base 12 and the portable device 18 because Chung-Sik understands that their relative positions are fixed whenever the battery 32 is being charged.

> The Second Advisory Action states:
>
> One of ordinary skill in the art would be motivated to combine the charger disclosed by Chung-Sik and Matsuki so that charging can be performed without connection to the charging device, making charging work exceptionally simple that allows the charging current to be adjusted and the charging time of the battery to be changed as required. Moreover, Matsuki specifically teaches changing the distance between the output coil of the charging device and the input coil of the storage battery allows the charging current of the battery to be adjusted. (See Matsuki, English Translation, column 2, last paragraph and column 3). (Second Advisory Action at p. 12).

Appellant respectfully disagrees and notes that this proposed modification would not have a reasonable chance of success as the modified system would be non-operable; therefore, a person having ordinary skill in the art would not be motivated to make the modification proposed in the Second Advisory Action. *See, e.g.* MPEP § 2143.02 and *In re Merck & Co., Inc.*, 800 F.2d 1091. As described in the '568 Patent and above, if a high frequency AC current induced in a coil exceeds standards defined for a circuit part in battery, then it could cause damage to the circuit, battery, and other components. The prior art contact-less charging methods, such as those disclosed in Chung-Sik, employ a structure that fixes the relative positions between the charger and the battery so that the induced current remains in a range that prevents damage to the circuit or other components. Accordingly, a person having ordinary skill in the art would understand that varying the relative positions of (e.g. the distance between) the portable device 18 and the base 12, as proposed in the Second Advisory Action in view of Matsuki, would render the device of Chunk-Sik non-operable. For example, varying the relative positions of the portable device 18 and the base 12 would damage the circuity, battery, and/or other components of the portable device 18 and/or the base 12. It is for precisely this reason that Chung-Sik describes a system where the portable device 18 and the base 12 operate when the devices are coupled to each other in a fixed arrangement. *See, e.g.*, *McGinley v. Franklin Sports, Inc.*, 262 F.3d 1339, 1354 (Fed. Cir. 2001) ("If references taken in combination would produce a "seemingly inoperative device," we have held that such references teach away from the combination and thus cannot serve as predicates for a

prima facie case of obviousness."); *In re Sponnoble*, 405 F.2d 578, 587, 160 USPQ 237, 244, 56 C.C.P.A. 823 (1969) (references teach away from combination if combination produces seemingly inoperative device); *In re Gordon*, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed.Cir.1984) (inoperable modification teaches away).

Appellant notes that these limitations of the prior art designs of Chung-Sik and Matsuki are well known to a person having ordinary skill in the art and explained in the '568 Patent (column 2, lines 21-53, emphasis added):

> **According to the charger 10 and the battery 50 adopting the contact-less charging method of the prior art**, **an intensity of the high frequency AC current induced to the secondary coil 70 is proportional to an intensity of the magnetic flux linked to the secondary coil 70**. In addition, **the intensity of the magnetic flux linked to the secondary coil 70 is changed according to a relative position with the primary coil 40.** That is to say, as the secondary coil 70 is positioned closer to the primary coil 40 of the charger 10, an intensity of the magnetic 30 flux linked to the secondary coil 70 is increased, and as a result an intensity of the high frequency AC current induced by the secondary coil 70 is also increased.
>
> Meanwhile, **standards of the constant current/constant voltage supplier 90, which is an essential element of a charging circuit module provided to the contact-less chargeable battery 50, are defined according to an intensity of the high frequency AC current induced by the secondary coil 70**. However, the intensity of the AC current induced by the secondary coil 70 is changed according to a relative position between the primary coil 40 and the secondary coil 70 as mentioned above.
>
> Thus, if standards of the constant current/constant voltage supplier 90 are defined using a small high frequency AC current, **in case the battery 50 is positioned at a position where a large high frequency AC current is induced, overvoltage exceeding the standards may be applied to both ends of the constant current/constant voltage supplier 90 while charging the battery 10, thereby possibly causing a damage on parts**.
>
> Considering the above, the charger 10 and the battery 50 adopting **the contact-less charging method of the prior art generally employs a structure capable of relatively fixing positions between them at a position where the standards of the constant current/constant voltage supplier 90 are defined**.

Chung-Sik describes a system that operates "when the two devices are coupled to each other" in a fixed arrangement at which the core 78 of the portable device 18 is positioned on a surface of the core 76 of the transmitter 28 of the base unit 12. (Chung-Sik, page 8-4, lines 20-25). This fixed position is to ensure that the portable device of Chung-Sik has a constant reference voltage as described in more detail below. (Chung-Sik, page 8-5, lines 1-8). However, as noted in the '568 Patent, by removing the fixed positioning of the base unit and the portable device according to proposed combination with Matsuki, a higher current would be induced in the portable device of Chung-Sik. This would be damaging to the portable device. A person having ordinary skill in the art would not be motivated to make a combination that damages the device being modified (e.g. is not operable) as the combination does not have any expectation of success. Therefore, there is no motivation to combine Chung-Sik and Matsuki as proposed in the Final Office Action and the combination of Chung-Sik and Matsuki fails to support a *prima facie* obviousness rejection as required by MPEP § 2143.02 and case law precedent.

However, even if a person having ordinary skill in the art would have been motivated to make the proposed combination (and they would not), the proposed combination of Chung-Sik and Matsuki fails to support a *prima facie* obviousness rejection. MPEP § 2143.01 states "[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious. *In re Ratti*, 270 F.2d 810, 813, 123 USPQ 349, 352 (CCPA 1959)." As described above, Chung-Sik describes a system that operates "when the two devices are coupled to each other" in a fixed arrangement at which the core 78 of the portable device 18 is positioned on a surface of the core 76 of the transmitter 28 of the base unit 12. (Chung-Sik, page 8-4, lines 20-25). This fixed arrangement is critical to the portable device of Chung-Sik as the monitoring of the battery voltage of the portable device is dependent on a constant reference voltage. Chung-Sik discloses:

> **The first voltage splitter 89 for inputting the rectified voltage IDC splits the voltage IDC into a reference voltage VI at a predetermined level** using internal resistors 88 and 90, and inputs the voltage to an inverse

> terminal (-) of the comparator [9]6. A charge level detection voltage V2 from a split voltage circuit 93 which is connected between the cathode and ground of the diode 86 and which splits and detects the voltage of an output node of the charging unit 52 is applied to the non-inverting terminal (+) of the comparator 96. **In this case, the reference voltage VI is constant and the charge level detection voltage V2 varies depending on a charge voltage level of the battery 32.** Thus, when the first microcomputer 48 outputs the control signal (SCTL) of 10 KHZ to an output port PI, a charge voltage via inductive coupling between the induced voltage generating unit 46 and the induced voltage detecting unit 81 is applied to the battery 32 to initiate charge of the battery 32. (Chung-Sik, page 8-5, lines 1-8, emphases added).

The combination proposed in the Second Advisory Action requires modifying the relative positions of the base 12 and the portable device 18 of Chung-Sik as allegedly disclosed in Matsuki. This combination changes the principle of operation of the system disclosed in Chung-Sik as the devices would not be coupled to each other in a fixed arrangement. Further, the proposed combination requires varying the charging current, and thereby varying the reference voltage, and as such the reference voltage would not be constant in the system suggested in the Second Advisory Action. However, if the reference voltage is variable, the comparator will not be able to correctly determine the charge level of the battery as the comparator relies on the reference voltage being constant. Accordingly, the proposed combination changes the principle of operation of the system disclosed in Chung-Sik as the system would not be able to determine the charge level of the battery based on a constant reference voltage. Therefore, for at least these reasons, the proposed combination of Chung-Sik and Matsuki fails to support a *prima facie* obviousness rejection of the claims.

Chung-Sik and Kaite

The Second Advisory Action states claims 55, 57-60, 62-64, and 69-72 are rejected under 35 U.S.C. § 103(a) as being obvious over Chung-Sik in view of Kaite. (Second Advisory Action at pp. 13-14). Appellant respectfully disagrees. For example,

contrary to the requirements of MPEP § 2142, the Final Office Action merely provides the following conclusory statement: "[t]o the extent that Chung-Sik may not specifically disclose constant voltage/constant current supplier for receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode it would have been obvious over Kaite et al." (Final Office Action at p. 126).

The Second Advisory Action states:

> [T]he Examiner specifically articulated the motivation to combine so as to modify the constant voltage supplier disclosed by Chung-Sik by adding the constant current constant voltage circuit discussed by Kaite et al. to stabilize output from rectifying circuit for efficient charging of the battery (See Final Rejection page 126 and 128). (Second Advisory Action at p. 10).

Appellant respectfully disagrees. Neither the Final Office Action nor the Second Advisory Action articulate how the proposed combination of Chung-Sik and Kaite would have been predictable to one of ordinary skill in the art, how the resultant combination would have been predictable, or how a person having ordinary skill in the art would have a reasonable expectation of success in making the proposed combination as required by MPEP § 2143.01, MPEP § 2143.02, and case law precedent. Accordingly, Appellant submits that the combination of Chung-Sik and Kaite fails to support a *prima facie* obviousness rejection.

2. The Rejections of Claims 1, 3-15, 19-54, 56, 61, 65-68, and 73-75 Under 35 U.S.C. § 103 are Improper Because *Chung-Sik, Matsuki, and Kaite*, Alone or in Combination, Fail to Teach All Aspects of the Claimed Invention

i. Claims 1, 3-6, and 25-29

The Second Advisory Action states claim 1 is rejected under 35 U.S.C. § 103 as being obvious over Chung-Sik in view of Matsuki, or in the alternative, under 35 U.S.C. § 103 as being obvious over Chung-Sik in view of Kaite in view of Matsuki. (Second

Advisory Action at p. 11). Appellant respectfully disagrees. Independent Claim 1 recites "wherein the monitoring result includes a wireless feedback control signal to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device." The Second Advisory Action relies on Chung-Sik and Matsuki to disclose the cited aspect of claim 1. Chung-Sik discloses:

> When the temperature is determined to be normal in operation 106, the first microcomputer 48 scans the input port P3 and searches for the status of the charge switch 30 in the process of operation 108. In operation 108, when the charge switch 30 is switched "off" and the hand-set status signal (HSS) is input as "high", the portable device 18 is determined to be separated and the aforementioned operation 112 is performed. In operation 108, when the charge switch 30 is turned "on", the first microcomputer 48 analyzes the data input to line 49 in operation 110 and searches whether or not the portable device is normal. In this case, the data input to the line 49 is input as data that is wirelessly transmitted from the portable device 18 when the battery 32 is completely charged. If analysis of input data in operation 110 indicates the portable device is abnormal (i.e. charge is incomplete), the first microcomputer 48 jumps to the aforementioned step 106 to continuously generate a charge voltage, and when the portable device is normal, the first microcomputer 48 jumps to operation 112 to stop charging. (Chung-Sik, p. 8-5, lines 22-30).

Appellant submits that Chung-Sik fails to teach the cited aspect of claim 1. Chung-Sik discloses stopping charging when the battery 32 is completely charged. This does not teach, suggest, or constitute "induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device

based on relative positions of the contact-less chargeable battery and the external contact-less charging device."

First, stopping charging when a battery is completely charged does not teach, suggest, or constitute "relative positions of the contact-less chargeable battery and the external contact-less charging device" as in claim 1. Second, stopping charging when the battery is completely charged does not teach, suggest, or constitute inducing a change of intensity of a magnetic field as in claim 1. Chung-Sik discloses stopping charging when a battery is completely charged. However, when the charging is stopped, the magnetic field is not present and therefore does not have an intensity. This does not constitute changing the intensity of a magnetic field. That is, Chung-Sik fails to teach, suggest, or disclose a *variable* intensity of a magnetic field or varying the intensity of a magnetic field. Further, Appellant cannot locate any teachings in Kaite or Matsuki that cure this deficiency in Chung-Sik.

The Second Advisory Action further states Chung-Sik "fixes the relative positions between the charger and the battery." (Second Advisory Action at pp. 11-12). The Second Advisory Action relies on Matsuki to teach the cited aspect of claim 1. (Second Advisory Action at p. 11-12). Matsuki discloses "[c]ontrolling the high-frequency output or changing the distance between the output coil 7 of the charging device 1′ and the input coil 6 of the storage battery 2′ allows the charging current to be adjusted and the charging time of the storage battery 2′ to be changed." (Matsuki, column 2, lines 24 - 27). This does not teach, suggest, or constitute "induc[ing] the change of intensity of the magnetic field […] based on relative positions of the contact-less chargeable battery and the external contact-less charging device" as in claim 1. Specifically, Matsuki observes that the distance between the charging device and the storage battery would result in a change in charging time of the storage battery. However, this does not constitute changing the intensity of a magnetic field based on a distance. That is, in Matsuki, the intensity of the magnetic field generated from a primary coil does not change. In fact, if the position of the output coil and the input coil of Matsuki were to change, no change would be made in the operation of the charging device of Matsuki. This is in contrast to the claimed invention, where a wireless feedback

control signal would be transmitted to control the operation of the claimed external contact-less charging device. Accordingly, Matsuki fails to teach the cited aspect of claim 1. Appellant cannot locate any teachings in Kaite that cure this deficiency in Matsuki.

Furthermore, the proposed combination of Chung-Sik and Matsuki fails to disclose "wherein the monitoring result includes a wireless feedback control signal to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device." That is, none of the cited references disclose the feedback power adjustment control.

The Second Advisory Action states:

> One of ordinary skill in the art would be motivated to combine the charger disclosed by Chung-Sik and Matsuki so that charging can be performed without connection to the charging device making charging work exceptionally simple that allows the charging current to be adjusted and the charging time of the battery to be changed as required. Moreover, Matsuki specifically disclosed changing the distance between the output coil of the charging device and the input coil of the storage battery allows the charging current of the battery to be adjusted. (See Matsuki, English Translation, column 2, last paragraph and column 3). (Second Advisory Action at p. 11-12).

Appellant respectfully disagrees. MPEP § 2143.01 states "[t]he mere fact that references can be combined or modified does not render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art. KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 417, 82 USPQ2d 1385, 1396 (2007)." MPEP § 2143.02 states "[w]here there is a reason to modify or combine the prior art to achieve the claimed invention, the claims may be rejected as prima facie obvious provided there is also a reasonable expectation of success. In re Merck & Co., Inc., 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986)." For reasons including those stated above, Appellant notes that the proposed combination of Chung-Sik, Kaite, and/or Matsuki does not support the rejection of claim 1, as the results of the proposed combination would not have been predictable to one of ordinary skill in the art, would not have a reasonable expectation of

success, and change the principle of operation of the system disclosed in Chung-Sik in violation of the MPEP and case law precedent.

For reasons including those stated above, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 1 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 1. Therefore, Appellant submits the rejection of claim 1 should be reversed.

Claims 3-6 and 25-29 depend from claim 1. Accordingly, the rejections of dependent claims 3-6 and 25-29 are improper and should be reversed for reasons including they depend from an allowable base claim.

ii. Claims 7-12 and 30-34

The Second Advisory Action states claim 7 is rejected under 35 U.S.C. § 103 as being obvious over Chung-Sik in view of Matsuki, or in the alternative, under 35 U.S.C. § 103 as being obvious over Chung-Sik in view of Kaite in view of Matsuki. (Second Advisory Action at p. 11). Appellant respectfully disagrees. One element of independent claim 7 reads "wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 7 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 7. Therefore, Appellant submits the rejection of claim 7 should be reversed.

Claims 8-12 and 30-34 depend from claim 7. Accordingly, the rejections of dependent claims 8-12 and 30-34 are improper and should be reversed for reasons including they depend from an allowable base claim.

iii. Claims 13-20, 35, and 37-39

The Second Advisory Action states claim 13 is rejected under 35 U.S.C. § 103 as being obvious over Chung-Sik in view of Matsuki, or in the alternative, under 35 U.S.C. §

103 as being obvious over Chung-Sik in view of Kaite in view of Matsuki. (Second Advisory Action at p. 11). Appellant respectfully disagrees. One element of independent claim 13 reads "wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 13 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 13. Therefore, Appellant submits the rejection of claim 13 should be reversed.

Claims 14-20, 35, and 37-39 depend from claim 13. Accordingly, the rejections of dependent claims 14-20 and 37-39 are improper and should be reversed for reasons including they depend from an allowable base claim.

iv. Claims 21, 22, and 40-44

The Second Advisory Action states independent claim 21 is rejected under 35 U.S.C. § 103 as being obvious over Chung-Sik in view of Matsuki, or in the alternative, under 35 U.S.C. § 103 as being obvious over Chung-Sik in view of Kaite in view of Matsuki. (Second Advisory Action at p. 11). Appellant respectfully disagrees. One element of claim 21 reads "wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 21 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 21. Therefore, Appellant submits the rejection of claim 21 should be reversed.

Claims 22 and 40-44 depend from claim 21. Accordingly, the rejections of dependent claims 22 and 40-44 are improper and should be reversed for reasons including they depend from an allowable base claim.

v. Claims 23, 24, and 45-48

The Second Advisory Action states independent claim 23 is rejected under 35 U.S.C. § 103 as being obvious over Chung-Sik in view of Matsuki, or in the alternative, under 35 U.S.C. § 103 as being obvious over Chung-Sik in view of Kaite in view of Matsuki. (Second Advisory Action at p. 11). Appellant respectfully disagrees. One element of claim 23 reads "wherein the adjusting the power of the high frequency AC current applied to the primary coil is based on relative positions of the contact-less chargeable battery and the contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 23 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 23. Therefore, Appellant submits the rejection of claim 23 should be reversed.

Claims 24 and 45-48 depend from claim 23. Accordingly, the rejections of dependent claims 24 and 45-48 are improper and should be reversed for reasons including they depend from an allowable base claim.

vi. Claims 49-54

The Second Advisory Action states claim 49 is rejected under 35 U.S.C. § 103 as being obvious over Chung-Sik in view of Matsuki, or in the alternative, under 35 U.S.C. § 103 as being obvious over Chung-Sik in view of Kaite in view of Matsuki. (Second Advisory Action at p. 11). Appellant respectfully disagrees. One element of claim 49 reads "wherein the microprocessor transmits the monitoring result to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device to solve an overvoltage state according to relative positions of the primary coil and the secondary coil." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 49 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 49. Therefore, Appellant submits the rejection of claim 49 should be reversed.

Claims 50-54 depend from claim 49. Accordingly, the rejections of dependent claims 50-54 are improper and should be reversed for reasons including they depend from an allowable base claim.

vii. Claim 65

The Second Advisory Action states independent claim 65 is rejected under 35 U.S.C. § 103 as being obvious over Chung-Sik in view of Matsuki and under 35 U.S.C. § 103 as being unpatentable over Chung-Sik in view of Kaite in view of Matsuki. (Second Advisory Action at p. 11). Appellant respectfully disagrees. One element of claim 65 reads "wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 65 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a prima facie obviousness rejection of claim 65. Therefore, Appellant submits the rejection of claim 65 should be reversed.

viii. Claim 66

The Second Advisory Action states claim 66 is rejected under 35 U.S.C. § 103 as being obvious over Chung-Sik in view of Matsuki, or in the alternative, under 35 U.S.C. § 103 as being obvious over Chung-Sik in view of Kaite in view of Matsuki. (Second Advisory Action at p. 11). Appellant respectfully disagrees. One element of claim 66 reads "wherein the secondary coil is movable relative to the primary coil during the charging of the battery cell by the contact-less charging circuit module, and wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting the intensity of the magnetic field." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 66 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie*

obviousness rejection of claim 66. Therefore, Appellant submits the rejection of claim 66 should be reversed.

ix. Claim 68

The Second Advisory Action states claim 68 is rejected under 35 U.S.C. § 103 as being obvious over Chung-Sik in view of Matsuki, or in the alternative, under 35 U.S.C. § 103 as being obvious over Chung-Sik in view of Kaite in view of Matsuki. (Second Advisory Action at p. 11). Appellant respectfully disagrees. One element of claim 68 reads "wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 68 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 68. Therefore, Appellant submits the rejection of claim 68 should be reversed.

x. Claim 74

The Second Advisory Action states claim 74 is rejected under 35 U.S.C. § 103 as being obvious over Chung-Sik in view of Matsuki, or in the alternative, under 35 U.S.C. § 103 as being obvious over Chung-Sik in view of Kaite in view of Matsuki. (Second Advisory Action at p. 11). Appellant respectfully disagrees. One element of claim 74 reads "wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 74 and the proposed combination of Chung-Sik, Kaite, and/or

Matsuki fails to support a *prima facie* obviousness rejection of claim 74. Therefore, Appellant submits the rejection of claim 74 should be reversed.

xi. Claim 75

The Second Advisory Action states claim 75 is rejected under 35 U.S.C. § 103 as being obvious over Chung-Sik in view of Matsuki, or in the alternative, under 35 U.S.C. § 103 as being obvious over Chung-Sik in view of Kaite in view of Matsuki. (Second Advisory Action at p. 11). Appellant respectfully disagrees. One element of claim 75 reads "wherein the change of intensity of the magnetic field includes a change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less charging circuit module and the external contact-less charging device." For reasons including those stated above with respect to claim 1, Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 75 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* obviousness rejection of claim 75. Therefore, Appellant submits the rejection of claim 75 should be reversed.

3. The Rejections of Claims 55, 57-60, 62-64, and 69-72 Under 35 U.S.C. § 102 and 35 U.S.C. § 103 are Improper Because *Chung-Sik*, *Matsuki*, and *Kaite*, Alone or in Combination, Fail to Teach All Aspects of the Claimed Invention

i. Claims 55-59

The Second Advisory Action states independent claim 55 is rejected under 35 U.S.C. § 102(b) as anticipated by Chung-Sik, or in the alternative, under 35 U.S.C. § 103(a) as being obvious over Chung-Sik in view of Kaite. (Second Advisory Action at pp. 13-14). Appellant respectfully disagrees. Claim 55 reads, in part "wherein the at least one microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting a power applied to the primary coil by up to a

predetermined level" and "wherein the at least one microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the power applied to the primary coil by up to the predetermined level." Chung-Sik discloses:

> When the temperature is determined to be normal in operation 106, the first microcomputer 48 scans the input port P3 and searches for the status of the charge switch 30 in the process of operation 108. In operation 108, when the charge switch 30 is switched "off" and the hand-set status signal (HSS) is input as "high", the portable device 18 is determined to be separated and the aforementioned operation 112 is performed. In operation 108, when the charge switch 30 is turned "on", the first microcomputer 48 analyzes the data input to line 49 in operation 110 and searches whether or not the portable device is normal. In this case, the data input to the line 49 is input as data that is wirelessly transmitted from the portable device 18 when the battery 32 is completely charged. If analysis of input data in operation 110 indicates the portable device is abnormal (i.e. charge is incomplete), the first microcomputer 48 jumps to the aforementioned step 106 to continuously generate a charge voltage, and when the portable device is normal, the first microcomputer 48 jumps to operation 112 to stop charging. (Chung-Sik, p. 8-5, lines 22 - 30).

Appellant submits that Chung-Sik fails to teach the cited aspects of claim 55. Chung-Sik discloses stopping charging when the battery 32 is completely charged. This does not teach, suggest, or constitute "a first charging power adjustment request […] for adjusting a power applied to the primary coil by up to a predetermined level." Stopping charging when a battery is completely charged as disclosed in Chung-Sik does not teach, suggest, or constitute "adjusting a power applied to the primary coil by up to a predetermined level" as in claim 55. Specifically, when charging is stopped, power is not being applied to the battery. Therefore, stopping the charging as disclosed in Chung-Sik does not constitute "adjusting a power applied to the primary coil" as in claim 55. Appellant cannot locate any teachings in Kaite that cure this deficiency in Chung-Sik.

Further, Chung-Sik does not teach, suggest, or disclose "a second charging power adjustment request signal […] for adjusting the power applied to the primary coil by up to

the predetermined level." Even under the (incorrect) interpretation that the first adjustment request signal adjusting the power applied to the primary coil up to a predetermined level is disclosed by stopping charging when a battery is completely charged, Chung-Sik does not teach, suggest, or constitute a *second* adjustment. Chung-Sik discloses two charging modes – on and off. Once the charging has stopped, a second adjustment to the power cannot be made as there is no power to adjust. Therefore, Chung-Sik does not teach the cited aspect of claim 55. Appellant cannot locate any teachings in Kaite that cure this deficiency in Chung-Sik.

For reasons including those stated above, Chung-Sik and Kaite, either alone or in combination, fail to teach all aspects of claim 55 and the proposed combination of Chung-Sik and Kaite fails to support a *prima facie* obviousness rejection of claim 55. Therefore, Appellant submits the rejection of claim 55 should be reversed.

Claims 56-59 depend from claim 55. Accordingly, the rejections of dependent claims 56-59 are improper and should be reversed for reasons including they depend from an allowable base claim.

ii. Claims 60-64

The Second Advisory Action states independent claim 60 is rejected under 35 U.S.C. § 102(b) as anticipated by Chung-Sik, or in the alternative, under 35 U.S.C. § 103(a) as being obvious over Chung-Sik in view of Kaite. (Second Advisory Action at p. 13-14). Appellant respectfully disagrees. Claim 60 reads, in part, "wherein the microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device by up to a predetermined level" and "wherein the microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device by up to the predetermined level." For reasons including those stated above with respect to claim 55, Chung-Sik and Kaite either alone or in combination, fail to teach all aspects of claim 60 and the proposed combination of Chung-Sik and Kaite fails to support

a prima facie obviousness rejection of claim 60. Therefore, Appellant submits the rejection of claim 60 should be reversed.

Claims 61-64 depend from claim 60. Accordingly, the rejections of dependent claims 61-64 are improper and should be reversed for reasons including they depend from an allowable base claim.

iii. Claim 69-73

The Second Advisory Action states independent claim 69 is rejected under 35 U.S.C. § 102(b) as anticipated by Chung-Sik, or in the alternative, under 35 U.S.C. § 103 as being obvious over Chung-Sik in view of Kaite. (Second Advisory Action at p. 13-14). Appellant respectfully disagrees. One element of claim 69 reads "wherein the monitoring result is a charging power adjustment request signal." For reasons including those stated above with respect to claim 55, Chung-Sik and Kaite, either alone or in combination, fail to teach all aspects of claim 69 and the proposed combination of Chung-Sik and Kaite fails to support a *prima facie* obviousness rejection of claim 69. Therefore, Appellant submits the rejection of claim 69 should be reversed.

Claims 70-73 depend from claim 69. Accordingly, the rejections of dependent claims 70-73 are improper and should be reversed for reasons including they depend from an allowable base claim.

CONCLUSION

In view of the foregoing arguments, it is submitted that all of the claims are patentable over the prior art. Appellant respectfully submits that the earlier rejections and proposed rejections are improper and should be reversed.

The Director is authorized to charge any fee for the Appeal Brief that may be due and any additional fee that may be required or to credit any overpayment to Deposit Account No. 02-1818. If such a withdrawal is made, please indicate the Attorney Docket No. 0313071.00020 on the account statement.

Respectfully submitted,

/Matthew S. Dicke/

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Dated: October 26, 2022

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
96/000,355	03/12/2021	8013568	0313071.00020	1538

24573 7590 10/31/2022

K&L Gates LLP-Chicago
P.O. Box 1135
Chicago, IL 60690

EXAMINER
DEB, ANJAN K

ART UNIT	PAPER NUMBER
3992	

MAIL DATE	DELIVERY MODE
10/31/2022	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Decision on Petition for Extension of Time in Reexamination	**Application No.:** 96/000,355	**Applicant(s):** 8,013,568 B2
	Examiner Anjan K. DEB	**Art Unit** 3992

1. THIS IS A DECISION ON THE PETITION FILED 10/26/22.

2. THIS DECISION IS ISSUED PURSUANT TO:
   - A. ☐ 37 CFR 1.550(c) – The time for taking any action by a patent owner in a third party requested *ex parte* reexamination proceeding will be extended only for sufficient cause and for a reasonable time specified.
   - B. ☒ 37 CFR 1.550(c) – The time for taking action by a patent owner in a patent owner requested *ex parte* reexamination proceeding will only be extended for more than two months for sufficient cause and for a reasonable time specified.
   - C. ☐ 37 CFR 1.956 – The time for taking any action by a patent owner in an *inter partes* reexamination proceeding will be extended only for sufficient cause and for a reasonable time specified.

   The petition is before the Central Reexamination Unit for consideration.

3. FORMAL MATTERS: Patent Owner requests that the time period for filing an Appeal Brief after the filing of a Notice of Appeal on 08/25/22, which is a two (2) month period for response pursuant to 37 CFR 41.37(a) (i.e., due 10/25/22), be extended by an additional one (1) month (i.e., due 11/25/22).

   - A. Petition fee per 37 CFR §1.17(g)):
     - i. ☒ Petition includes authorization to debit a deposit account.
     - ii. ☐ Petition includes authorization to charge a credit card account.
     - iii. ☐ Other: _____.
   - B. ☐ Proper certificate of service was provided. (Not required in reexamination where patent owner is requester.)
   - C. ☒ Petition was timely filed.
   - D. ☒ Petition properly signed.

4. DECISION (See MPEP 2265 and 2665)

   - A. ☒ Granted or ☐ Granted-in-part for ***one (1) additional month***. (See 37 CFR 1.550(c) and 37 CFR 1.956).
     - i. ☒ Other/comment: See CONCLUSION below.
   - B. ☐ Dismissed because:
     - i. ☐ Formal matters (See unchecked box(es) (A, B, C and/or D) in section 3 above).
     - ii. ☐ Petitioner failed to provide a factual accounting of reasonably diligent behavior by all those responsible for preparing a response to the outstanding Office action within the statutory time period.
     - iii. ☐ Petitioner failed to explain why, in spite of the action taken thus far, the requested additional time is needed.
     - iv. ☐ The statements provided fail to establish sufficient cause to warrant extension of the time for taking action (See attached).
     - v. ☐ The petition is moot.
     - vi. ☐ Other/comment: _____

5. CONCLUSION: **The 10/26/22 "REQUEST FOR EXTENSION OF TIME FOR APPEAL BRIEF PURSUANT TO 37 C.F.R. 1.550(c) and MPEP 2265(V)(D)" is hereby granted under the "no cause" standard. See MPEP 2265, Roman Numeral V, D, 3rd ¶. Therefore, the time period for filing an Appeal Brief after the filing of a Notice of Appeal on 08/25/22 is hereby extended by one (1) additional month from 10/25/22 to the end of the day on Friday, 11/25/22. It is noted that the Appeal Brief was filed concurrently with the request for extension of time on 10/26/22 (i.e., within three (3) months of the date of the appeal commenced by the Notice of Appeal filed on 08/25/22) and that retroactive filing of the request for extension of time is acceptable (see MPEP 2265, V, D, 4th ¶, which indicates that "if the patent owner only specifies a one-month extension in its request, the patent owner must file, in addition to the appeal brief, the written request for the extension and the required fee within three months from the date of the appeal")**.

Telephone inquiries with regard to this decision should be directed to either QAS Stephen J. Stein at 571-272-1544 or SPRS Gay Ann Spahn at 571-272-7731 in the CRU.	/Gay Ann Spahn/ Supervisory Patent Reexamination Specialist Central Reexamination Unit

Electronic Acknowledgement Receipt	
EFS ID:	47700100
Application Number:	96000355
International Application Number:	
Confirmation Number:	1538
Title of Invention:	CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF
First Named Inventor/Applicant Name:	8013568
Customer Number:	24573
Filer:	Matthew S. Dicke/Meg Boinski
Filer Authorized By:	Matthew S. Dicke
Attorney Docket Number:	0313071.00020
Receipt Date:	17-MAR-2023
Filing Date:	12-MAR-2021
Time Stamp:	13:25:23
Application Type:	Supplemental Examination
Patent Number:	

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Request for status of Application	0313071-00020_StatusInquiry.pdf	75655 97e41c3b8e706d5bca99584aba5d1eb73d8afceb	no	1
Warnings:					
Information:					
			Total Files Size (in bytes):	75655	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Owner: LS CABLE & SYSTEM LTD
Control No.: 96/000,355
Patent No.: 8,013,568
Issued: March 12, 2021
Title: CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF
Art Unit: 3992
Conf. no. 1538
Examiner: Anjan K. Deb
Docket No.: 0313071.00020

Attn: Mail Stop Ex Parte Reexamination
Central Reexamination Unit
Commissioner for Patents
U.S. Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

STATUS INQUIRY

Sir:

On October 26, 2022, the Patent Owner filed an Appeal Brief and all associated fees required. To date, no communication has been received from the Patent and Trademark Office regarding the above Ex Parte Reexamination. Please kindly advise the undersigned of the status of this application and when a communication, more specifically, an Examiner's Answer to the Appeal Brief, may be expected.

Respectfully submitted,

K&L GATES LLP

BY /Matthew S. Dicke/
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Customer No. 24573
Telephone: (312) 578-5415

Dated: March 17, 2023

Apple Inc. EX1004B Page 1394

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User Name: Manuel Saldana
Date and Time: Tuesday, May 2, 2023 12:23:00 PM EDT
Job Number: 196208245

Documents (3)

1. *Proceedings of the National Academy of Sciences Issues Research Articles in Vol. 119, No. 49*

Client/Matter: -None-
Search Terms: 8013568 OR 8,013,568
Search Type: Terms and Connectors
Narrowed by:

Content Type	Narrowed by
News	-None-

2. *US Patent Issued to LS Cable & System on Sept. 6 for "Contact-Less Chargeable Battery and Charging Device, Battery Charging Set, and Charging Control Method Thereof" (South Korean Inventors)*

Client/Matter: -None-
Search Terms: 8013568 OR 8,013,568
Search Type: Terms and Connectors
Narrowed by:

Content Type	Narrowed by
News	-None-

3. *LS Cable & System Assigned Patent*

Client/Matter: -None-
Search Terms: 8013568 OR 8,013,568
Search Type: Terms and Connectors
Narrowed by:

Content Type	Narrowed by
News	-None-

Proceedings of the National Academy of Sciences Issues Research Articles in Vol. 119, No. 49

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December 5, 2022 Monday 8:20 AM EST

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Body

The Proceedings of the National Academy of Sciences, a peer-reviewed scientific journal, published research articles on the following topics in its Vol. 119, No. 49 edition:

Biological Sciences:

* Comprehensive mapping of alternative polyadenylation site usage and its dynamics at single-cell resolution

* PROX1 transcription factor controls rhabdomyosarcoma growth, stemness, myogenic properties and therapeutic targets

* Stochastic survival of the densest and mitochondrial DNA clonal expansion in aging

* Eye drift during fixation predicts visual acuity

* The multifaceted role of GCM1 during trophoblast differentiation in the human placenta

* Highly efficient reprogrammable mouse lines with integrated reporters to track the route to pluripotency

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Social Sciences:

* The effect of masks on cognitive performance

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* Neurocomputational evidence that conflicting prosocial motives guide distributive justice

Manuel Saldana

Proceedings of the National Academy of Sciences Issues Research Articles in Vol. 119, No. 49

The Vol. 119, No. 49 edition of the Proceedings of the National Academy of Sciences can be viewed at https://www.pnas.org/toc/pnas/119/49.

[Category: Science]

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Load-Date: December 6, 2022

End of Document

US Patent Issued to LS Cable & System on Sept. 6 for "Contact-Less Chargeable Battery and Charging Device, Battery Charging Set, and Charging Control Method Thereof" (South Korean Inventors)

US Fed News

September 9, 2011 Friday 9:51 AM EST

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Length: 311 words

Dateline: ALEXANDRIA, Va.

Body

ALEXANDRIA, Va., Sept. 9 -- United States Patent no. ***8,013,568***, issued on Sept. 6, was assigned to LS Cable & System Ltd. (Gyeonggi-do, South Korea).

"Contact-Less Chargeable Battery and Charging Device, Battery Charging Set, and Charging Control Method Thereof" was invented by Dong-Young Park (Seoul, South Korea), Sung-Wook Moon (Seoul, South Korea), Sung-Wook Choi (Anyang-si, South Korea), Gwang-Hee Gwon (Anyang-si, South Korea), Sub Han (Yongin-si, South Korea) and Jung-Bum Kim (Anyang-si, South Korea).

According to the abstract released by the U.S. Patent & Trademark Office: "The present invention relates to a wireless charger for a mobile communication terminal, which allows charging a plurality of batteries in a conveniently way without any terminal connection of the batteries to chargers for various mobile communication terminals such as a cellular phone and PDA and also allows intercepting electromagnetic waves while the charger is used, by means of Faraday's law.The wireless charger of the present invention includes a charger body having an electromagnetic wave intercepting means; a charging pad received in the charger body; and at least one battery that is to be charged by means of induced electromotive force generated by the charging pad, wherein the charger body includes a power supply means, a housing having a receiver for receiving the charging pad and connected to the power supply means, and a cover hinged to the housing."

The patent was filed on May 8, 2006, under Application No. 11/997,272.

For further information please visit: http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&p=1&u=%2Fnetahtml%2FPTO%2Fsearch-bool.html&r=1&f=G&l=50&co1=AND&d=PTXT&s1=8013568&OS=8013568&RS=8013568

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Manuel Saldana

LS Cable & System Assigned Patent

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September 9, 2011 Friday 10:59 AM EST

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Body

ALEXANDRIA, Va., Sept. 9 -- LS Cable & System, Anyang, Gyeonggi-do, South Korea, has been assigned a patent (***8,013,568***) developed by six co-inventors for a "contact-less chargeable battery and charging device, battery charging set, and charging control method thereof." The co-inventors are Dong-Young Park, Seoul, South Korea, Sung-Wook Moon, Seoul, South Korea, Sung-Wook Choi, Anyang-si, South Korea, Gwang-Hee Gwon, Anyang-si, South Korea, Sub Han, Yongin-si, South Korea, and Jung-Bum Kim, Anyang-si, South Korea.

The abstract of the patent published by the U.S. Patent and Trademark Office states: "The present invention relates to a wireless charger for a mobile communication terminal, which allows charging a plurality of batteries in a conveniently way without any terminal connection of the batteries to chargers for various mobile communication terminals such as a cellular phone and PDA and also allows intercepting electromagnetic waves while the charger is used, by means of Faraday's law. The wireless charger of the present invention includes a charger body having an electromagnetic wave intercepting means; a charging pad received in the charger body; and at least one battery that is to be charged by means of induced electromotive force generated by the charging pad, wherein the charger body includes a power supply means, a housing having a receiver for receiving the charging pad and connected to the power supply means, and a cover hinged to the housing."

The patent application was filed on May 8, 2006 (11/997,272). The full-text of the patent can be found at *http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&p=1&u=%2Fnetahtml%2FPTO%2Fsearch-bool.html&r=1&f=G&l=50&co1=AND&d=PTXT&s1=80,13,568.PN.&OS=PN/80,13,568&RS=PN/80,13,568*

Written by Ruby Maibam; edited by Jaya Anand.

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RM0908JA0909-628907

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Manuel Saldana

Litigation Search Report CRU 3999

Reexamination Control No. 96/000,355

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	96/000,355	8013568
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CPC - Searched*		
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H02J/00308	09/27/2021	AD
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Updated Litigation search	05/01/2023	AD

/ANJAN K DEB/ Primary Examiner, Art Unit 3992	

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	96/000,355	8013568
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	ANJAN K DEB	3992

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/ANJAN K DEB/ Primary Examiner, Art Unit 3992	

Reexamination	Application/Control No.	Applicant(s)/Patent Under Reexamination
	96/000,355	8013568
	Certificate Date	Certificate Number

Requester Correspondence Address: ☑ Patent Owner ☐ Third Party
K&L Gates LLP-Chicago P.O. Box 1135 Chicago, IL 60690

LITIGATION REVIEW ☑	AD (examiner initials)	01 May 2023 (date)
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
96/000,355	03/12/2021	8013568	0313071.00020	1538

24573 7590 05/08/2023

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EXAMINER	
DEB, ANJAN K	

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3992	

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Application Number: 96/000,355
Filing Date: 12 Mar 2021
Appellant(s): LS CABLE & SYSTEM LTD

Matthew S. Dicke
K&L Gates LLP
70 West Madison Street, Chicago, IL 60602-4207

_____
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 10/26/2022.

(1) Grounds of Rejection to be Reviewed on Appeal

Every ground of rejection set forth in the Office action (Advisory Action) dated 8/16/2022 from which the appeal is taken is being maintained by the examiner except for the grounds of rejection (if any) listed under the subheading "WITHDRAWN REJECTIONS." New grounds of rejection (if any) are provided under the subheading "NEW GROUNDS OF REJECTION."

(1) Grounds of Rejection to be Reviewed on Appeal

The following ground(s) of rejection are applicable to the appealed claims.

Claim Rejections under 35 U.S.C. § 103

Claim(s)[1] 1, 3-15, 19-35, 37-54, 56, 61, 65-66, 68, and 73-75 rejected under 35 U.S.C. 103(a) as being obvious over Chung-Sik (KR 950005819Bl) and Matsuki (JP H0145230 Y2) or in the alternative as being obvious over Chung-Sik (KR 950005819Bl), Kaite et al. (US 6,016,046) and Matsuki (JP H0145230 Y2).

Claims 16-18 rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Chung-Sik and Matsuki as applied to claim 15 above, and further in view of Cho Gyu Hyeong et al. (KR 100451606 B1).

Claim(s) 55, 57-60, 62-64, and 69-72 rejected under pre-AIA 35 U.S.C. 102 (b) as anticipated by Chung-Sik (KR 950005819Bl) or, in the alternative, under pre-AIA 35 U.S.C. 103(a) as obvious over Chung-Sik (KR 950005819Bl) and Kaite et al. (US 6,016,046).

The Examiner withdraws the rejection of claims 1, 3-15, 19-35, 37-54, 56, 61, 65-66, 68, and 73-75 as being obvious over Chung-Sik (KR 950005819Bl) and Matsuki (JP H0145230 Y2) or in the alternative as being obvious over Chung-Sik (KR 950005819Bl), Kaite et al. (US

[1] Claims 2, 36, and 67 cancelled by Patent Owner in the amendment after final filed 7/26/2022

6,016,046) and Matsuki (JP H0145230 Y2).

The Examiner withdraws the rejection of claims 16-18 rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Chung-Sik and Matsuki as applied to claim 15 above, and further in view of Cho Gyu Hyeong et al. (KR 100451606 B1).

The Examiner maintains the Rejection of claims 55, 57-60, 62-64, and 69-72 rejected under pre-AIA 35 U.S.C. 102 (b) as anticipated by Chung-Sik (KR 950005819Bl) or, in the alternative, under pre-AIA 35 U.S.C. 103(a) as obvious over Chung-Sik (KR 950005819Bl) and Kaite et al. (US 6,016,046).

WITHDRAWN REJECTIONS

The following grounds of rejection are not presented for review on appeal because they have been withdrawn by the examiner.

35 U.S.C. § 112, first paragraph

Claims 1, 13, 21, 23, 49, 56, 61, 68, 73, 74, and 75 under 35 U.S.C. § 112, first paragraph for failing to comply with the written description requirement, for failing to provide support in US Patent No. US 8,013,568 (the '568 Patent) the claim language "adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contactless charging device." (Advisory Action mailed 08/16/2022). This rejection is withdrawn by the Examiner in response to Arguments presented in the Appeal Brief by Patent Owner. (See Response to Arguments below).

Claim Rejections 35 U.S.C. § 35 U.S.C. § 103

The rejection of claims 1, 3-15, 19-35, 37-54, 56, 61, 65-66, 68, and 73-75 under 35 U.S.C. 103(a) as being obvious over Chung-Sik (KR 950005819Bl) and Matsuki (JP H0145230

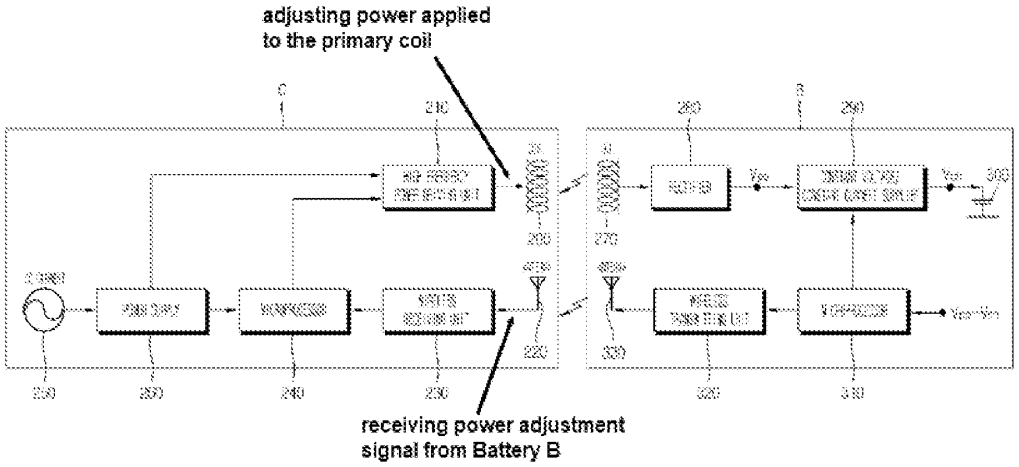
Y2) or in the alternative as being obvious over Chung-Sik (KR 950005819Bl), Kaite et al. (US 6,016,046) and Matsuki (JP H0145230 Y2) are withdrawn in response to Arguments presented in the Appeal Brief by Patent Owner (See Examiners Response to Arguments below).

The rejection of claims 16-18 rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Chung-Sik and Matsuki as applied to claim 15 above, and further in view of Cho Gyu Hyeong et al. (KR 100451606 B1) are withdrawn for the same reason as independent claim 13 noted above (See Examiners Response to Arguments below).

(2) Response to Argument

Claim Rejections under 35 U.S.C. § 112, First Paragraph

In response to the rejection of claims 1, 13, 21, 23, 49, 56, 61, 68, 73, 74, and 75 under 35 U.S.C. § 112, first paragraph for failing to comply with the written description requirement, for failing to provide support in the '568 Patent the claim language "adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contactless charging device." (Advisory Action mailed 08/16/2022), Patent Owner submits that this claim language is fully supported in the '568 Patent (col. 2, lines 21 - 32; col. 6, lines 10 - 24; col. 6, lines 28-39; col. 6, line 66 to col. 7, line 4; and col. 9, lines 35-38). (Appeal Brief. VII. Argument, pages 32-35).



'568 Patent. Fig. 3, annotated by Examiner

In particular, the '568 Patent specification describes that the intensity of the magnetic flux linked to the secondary coil 70 is changed according to a relative position with the primary coil 40 (Fig. 1). That is to say, as the secondary coil 70 is positioned closer to the primary coil 40 of the charger 10, an intensity of the magnetic flux linked to the secondary coil 70 is increased, and as a result an intensity of the high frequency AC current induced by the secondary coil 70 is also increased (col. 2, lines 21 – 32). The wireless receiving unit 230 receives an adjustment request signal of charging power transmitted from the chargeable battery B through the antenna 220, and then inputs the signal to the microprocessor 240. The microprocessor 240, controls the high frequency power driving unit 210 in charging device C to adjust a power of the high frequency AC current applied to the primary coil 200 if an adjustment request signal of the charging power is received from the wireless receiving unit 230 (col. 6, line 66 to col.7, line-12). (Fig. 3, annotated by Examiner).

In view of the above disclosure in the '568 Patent, the Examiner agrees there is sufficient support for the claim language, "adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contactless charging device."

Therefore, the rejection of claims 1, 13, 21, 23, 49, 56, 61, 68, and 73-75 under 35 U.S.C. § 112, first paragraph for failing to comply with the written description requirement is withdrawn by the Examiner.

Claim Rejections 35 U.S.C. § 103

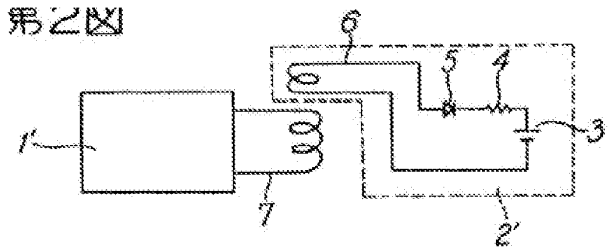
Regarding the Rejection of claims 1, 3-15, 19-35, 37-54, 56, 61, 65-66, 68, and 73-75, under 35 U.S.C. 103(a) as being obvious over Chung-Sik (KR 950005819Bl) and Matsuki (JP H0145230 Y2) or in the alternative as being obvious over Chung-Sik (KR 950005819Bl), Kaite et al. (US 6,016,046) and Matsuki (JP H0145230 Y2), Patent Owner argued that the response to the Advisory Action mailed 8/16/2022 is improper because there is no motivation supporting any combination of Chung-Sik, Matsuki, and/or Kaite. (Appeal Brief VII, Argument, page 36).

In particular, Patent Owner argued that Chung-Sik teaches "the battery may be recharged only when the portable device 18 is installed on the base unit 12" (i.e. the relative positions of the contact-less chargeable battery and the external contactless charging device is fixed). (Chung-Sik, page 8-4, lines 30-40).

Regarding the combination with Matsuki, Patent Owner argued although Matsuki discloses that the charging current can be adjusted by changing the distance between the output coil 7 of the charging device 1' and the input coil 6 (Matsuki, column 2, lines 24 - 27)(Fig. 2), Matsuki fails to disclose any type of feedback circuitry in the battery or in the charging device

for adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contactless charging device. Rather, in Matsuki, although the relative positions of the output coil and the input coil are changed, the intensity of the magnetic field does not change. (Appeal Brief. VII. Argument, page 39).

[Figure 2]



Matsuki. Fig. 2

The Examiner agrees with Patent Owner's above arguments regarding the rejection of claims 1, 3-15, 19-35, 37-54, 56, 61, 65-66, 68, and 73-75 for the following reasons.

Chung-Sik discloses feedback to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil based on battery voltage monitoring, however in Chung-Sik the relative positions between the charger and the battery is fixed (Chung-Sik, English Translation, page 8-5, paragraph 6).

Although Matsuki discloses the relative positions of the output coil 7 of charging device 1 and the input coil 6 are changed, and controlling the high-frequency output or changing the distance between output coil 7 and input coil 6 of battery 2 (Matsuki. Fig. 2) allows charging current to be adjusted (Matsui, col. 2, last paragraph, copied below),

> Controlling the high-frequency output or changing the distance between the output coil 7 of the charging device 1' and the input coil 6 of the storage battery 2' allows the charging current to be adjusted and the charging time of the storage battery 2' to be changed.

Matsuki fails to disclose "adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contactless charging device" recited in independent claim 1 and similar recitations in independent claims 7, 13, 21, 23, 49, 65, 68, 74, and 75.

In view of the above findings the Examiner withdraws the rejection of independent claims 1, 7, 13, 21, 23, 49, 65-66, 68, 74, and 75 under 35 U.S.C. 103(a) as being obvious over Chung-Sik (KR 950005819Bl) and Matsuki (JP H0145230 Y2) or in the alternative as being obvious over Chung-Sik (KR 950005819Bl), Kaite et al. (US 6,016,046) and Matsuki (JP H0145230 Y2).

The rejection of claims 3-6, and 25-29 depending from claim 1; the rejection of claims 8-12, and 30-34 depending from claim 7; the rejection of claims 14-20, and 35, 37-39 depending from claim 13; the rejection of claims 20, 22, and 40-44 depending from claim 23; the rejection of claims 50-54 depending from claim 49 are also withdrawn for the same reasons as the respective base claims.

Additionally, the rejection of dependent claims 56, 61, and 73 are also withdrawn because,

claim 56 recites in part, "..charging power adjustment request signal is based on relative positions of the primary coil and the secondary coil", and

claim 61 recites in part, ".. charging power adjustment request signal is based on relative positions of the contact-less charging circuit module and the external contact-less charging device", and

claim 73 recites in part, "..charging power adjustment request signal is based on relative positions of the contactless charging circuit module and the external contact-less charging device,"

for the same reasons as the rejections of independent claims 1, 7, 13, 21, 23, 49, 65, 68, 74, and 75 are withdrawn.

Claim 66

Regarding the rejection of independent claim 66, the Examiner agrees with Patent Owner's argument that Chung-Sik, Kaite, and Matsuki, either alone or in combination, fail to teach all aspects of claim 66 and the proposed combination of Chung-Sik, Kaite, and/or Matsuki fails to support a *prima facie* maintains (Appeal Brief, page 51-52).

Claim 66, recites in part "..wherein the secondary coil is movable relative to the primary coil during the charging of the battery cell by the contact-less charging circuit module."

Although Matsuki discloses secondary coil is movable relative to the primary coil, Matsuki does not disclose that the secondary coil is movable relative to the primary coil during the charging of the battery cell.

Additionally, it would not have been obvious to modify Chung-Sik and Matsuki to make the secondary coil movable relative to the primary coil during the charging of the battery cell because it would require adjusting the power applied to the primary coil of the external contact-less charging device based on relative positions of the contactless chargeable battery and the external contact-less charging device because in Matsui the intensity of the magnetic field generated from a primary coil does not change. (See Appellants argument, page 46 last paragraph).

For the reasons given above the Examiner withdraws the rejection of claim 66 under 35 U.S.C. 103(a) as being obvious over Chung-Sik (KR 950005819Bl) and Matsuki (JP H0145230 Y2) or in the alternative as being obvious over Chung-Sik (KR 950005819Bl), Kaite et al. (US 6,016,046) and Matsuki (JP H0145230 Y2).

Claims 16-18

The rejection of claims 16-18 rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Chung-Sik and Matsuki as applied to claim 15 above, and further in view of Cho Gyu Hyeong et al. (KR 100451606 B1) are withdrawn for the same reason as independent claim 13 noted above.

Rejection of claims 55, 57-60, 62-64, and 69-72

Regarding the rejection of claims 55, 57-60, 62-64, and 69-72 under pre-AIA 35 U.S.C. 102 (b) as anticipated by Chung-Sik (KR 950005819Bl) or, in the alternative, under pre-AIA 35 U.S.C. 103(a) as obvious over Chung-Sik (KR 950005819Bl) and Kaite et al. (US 6,016,046) Patent Owner made the following arguments (Appeal Brief, pages 53-82):

Claims 55, 57-59

Regarding independent claim 55 rejected under 35 U.S.C. § 102(b) as anticipated by Chung-Sik, or in the alternative, under 35 U.S.C. § 103(a) as being obvious over Chung-Sik in view of Kaite. (Second Advisory Action at pp. 13-14), Patent Owner argued that Chung-Sik does not disclose,

a) "adjusting a power applied to the primary coil by up to a predetermined level" and

b) "a second charging power adjustment request signal[...] for adjusting the power applied to the primary coil by up to the predetermined level." (Appeal Brief, pages 54-55).

Specifically, Patent Owner submits that stopping charging when a battery is completely charged as disclosed in Chung-Sik does not teach, suggest, or constitute "adjusting a power applied to the primary coil by up to a predetermined level" as in claim 55. Furthermore, Patent Owner submits Chung-Sik does not teach, suggest, or disclose "a second charging power adjustment request signal [...] for adjusting the power applied to the primary coil by up to the predetermined level."

Patent Owner submits that Chung-Sik discloses two charging modes - on and off. Once the charging has stopped, a second adjustment to the power cannot be made as there is no power to adjust. Therefore, Chung-Sik does not teach the cited aspect of claim 55.

In view of the above arguments Patent Owner submits Chung-Sik and Kaite, either alone or in combination, fail to teach all aspects of claim 55 and the proposed combination of Chung-Sik and Kaite fails to support a *prima facie* obviousness rejection of claim 55. (Appeal Brief, page 55).

The Examiner does not agree with Patent Owner's above arguments for the following reasons:

Just as a background, Claim 55 was rejected in the Final Rejection under 35 U.S.C. 112 1st Paragraph for reciting, "adjusting a power applied to the primary coil from a first level to a second level", and "adjusting the power applied to the primary coil from the second level to a third level" which are not described in the specification. Specifically, the first, second, and third level failed to comply with the written description requirement. In the Amendment After Final filed 7/26/2022, Patent Owner amended claim 55 by reciting,

wherein the at least one microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting a power applied to the primary coil ~~from a first level~~by up to a ~~second~~predetermined level,

wherein the at least one microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the power applied to the primary coil ~~from~~by up to the ~~second level to a third~~predetermined level.

In view of the after final amendment of claim 55, the Examiner withdrew Rejection of claim 55 under 35 U.S.C. 112 1st Paragraph in the Advisory Action mailed 8/16/2022.

Regarding Patent Owner's argument a), Chung-Sik discloses wherein the at least one microprocessor 56 (MICROCOMPUTER) transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting a power applied to the primary coil from a first level to a second level/predetermined level. Specifically, Chung-Sik discloses to charge the battery to a predetermined level (set voltage level). (Chung-Sik, English Translation, page 8-5, see below).

When a charge level of the battery 32 is increased through the aforementioned operation, the charge level detection voltage V2 of a second voltage splitter 93 increases, and when the detection voltage V2 becomes higher than the reference voltage V1, the output VDL of the comparator 96 is transitioned to logic "high" from logic "low" and is input to the second microcomputer 56.

Here, in the aforementioned operation 120 of FIG. 3B, the second microcomputer 56 that scans the output VDL of the comparator 96 and searches for whether or not the charge voltage is normal determines that the charge voltage of the battery 32 is normal. That is, a voltage of the battery 32 is determined to be completely charged to a set voltage level, and a charge completion alarm signal is output through line 37 in operation 122. The charge completion alarm signal through line 37 is transmitted to the base unit 12 through the audio and logic unit 36 and the radio unit 34, and the radio unit 25 and the audio and logic unit 24 of the base unit 12 receive and demodulate the signal and input the signal to the first microcomputer 48 through the line 49. The first microcomputer 48 that receives a data signal through the line 49 determines that the charge completion signal is received from the portable device 18 in the aforementioned operation 110 of FIG. 3A (the portable device is normal), and performs operation 112.

Regarding Patent Owner's argument b), a second charging power adjustment signal is inherently disclosed because the microprocessor 56 scans battery voltage (output VDL) and the

microprocessor performs operation 112 (Fig. 3A)(Decide to supply current if battery/charge voltage is not normal).(Chung-Sik, English Translation, page 8-5, noted above).

In view of the above rebuttal of Patent Owner's argument the Examiner maintains the rejection of claim 55 and dependent claims 55-59 under 35 U.S.C. § 102(b) as anticipated by Chung-Sik, or in the alternative, under 35 U.S.C. § 103(a) as being obvious over Chung-Sik in view of Kaite[2].

Claims 60, 62-64

Regarding independent claim 60 rejected under 35 U.S.C. § 102(b) as anticipated by Chung-Sik, or in the alternative, under 35 U.S.C. § 103(a) as being obvious over Chung-Sik in view of Kaite. (Second Advisory Action at pp. 13-14), Patent Owner submits that Claim 60 reads, in part, "wherein the microprocessor transmits a first charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device by up to a predetermined level" and "wherein the microprocessor transmits a second charging power adjustment request signal to the external contact-less charging device for adjusting the charging power of the external contact-less charging device by up to the predetermined level." Patent Owner made the same argument as presented above with respect to independent claim 55, that Chung-Sik and Kaite fails to disclose all aspects of claim 60 and the proposed combination of Chung-Sik and Kaite fails to support, a prima facie obviousness rejection of claim 60.(Appeal Brief, page 55).

The Examiner maintains the rejection of claim 60, and dependent claims 61-64 under 35 U.S.C. § 102(b) as anticipated by Chung-Sik, or in the alternative, under 35 U.S.C. § 103(a) as being obvious over Chung-Sik in view of Kaite for the same reasons as claim 55.

[2] Kate was added for specifically teaching constant voltage /constant current supplier recited in claim 55.

Claims 69-72

Regarding independent claim 69 rejected under 35 U.S.C. § 102(b) as anticipated by Chung-Sik, or in the alternative, under 35 U.S.C. § 103(a) as being obvious over Chung-Sik in view of Kaite. (Second Advisory Action at pp. 13-14), Patent Owner submits that Claim 69 reads,

"wherein the monitoring result is a charging power adjustment request signal."

Patent Owner made the same argument as presented above with respect to independent claim 55 that Chung-Sik and Kaite fails to disclose all aspects of claim 69 and the proposed combination of Chung-Sik and Kaite fails to support, a prima facie obviousness rejection of claim 69.(Appeal Brief, page 56).

Patent Owner did not present any arguments regarding the rejection of dependent claims 70-73 other than the arguments presented above with respect to independent claim 69.

The Examiner maintains the rejection of independent claim 69 and its dependent claims 70-72 under 35 U.S.C. § 102(b) as anticipated by Chung-Sik, or in the alternative, under 35 U.S.C. § 103(a) as being obvious over Chung-Sik in view of Kaite[3] for the same reasons as claim 55.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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[3] Kaite was added for specifically teaching constant voltage/constant current supplier recited in claim 55.

Requirement to pay appeal forwarding fee. In order to avoid dismissal of the instant appeal in any application or ex parte reexamination proceeding, 37 CFR 41.45 requires payment of an appeal forwarding fee within the time permitted by 37 CFR 41.45(a), unless appellant had timely paid the fee for filing a brief required by 37 CFR 41.20(b) in effect on March 18, 2013.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Owner:	LS CABLE & SYSTEM LTD.
Reexam Control No.:	96/000,355
Conf. No.:	1538
Art Unit:	3992
Examiner:	Anjan K Deb
Attorney Docket No.:	0313071.00020
Reexam Filing Date:	March 12, 2021
Patent Under Reexam:	8,013,568
Title:	CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF

Mail Stop *Ex Parte* Reexam
Central Reexamination Unit
Commissioner for Patents
United States Patent & Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

NOTICE OF WITHDRAWAL OF APPEAL AND AMENDMENT

This Notice of Withdrawal of Appeal and Amendment is submitted in furtherance of the Examiner's Answer dated May 8, 2023. The Patent Owner respectfully requests entry of the following amendments and requests to withdraw the present appeal.

Amendments to the Claims are reflected in the listing of claims, which begins on page 2 of this paper.

Remarks begin on page 19 of this paper.

Electronic Acknowledgement Receipt	
EFS ID:	48064766
Application Number:	96000355
International Application Number:	
Confirmation Number:	1538
Title of Invention:	CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF
First Named Inventor/Applicant Name:	8013568
Customer Number:	24573
Filer:	Matthew S. Dicke/Meg Boinski
Filer Authorized By:	Matthew S. Dicke
Attorney Docket Number:	0313071.00020
Receipt Date:	26-MAY-2023
Filing Date:	12-MAR-2021
Time Stamp:	14:34:54
Application Type:	Supplemental Examination
Patent Number:	

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1		0313071-00020_NoticeOfWithdrawal-Final.pdf	167651 f6ed23b0f818704ea55c4b168d4c9e05dc280001	yes	19

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Request to Withdraw Appeal by Appellant	1	1
	Claims	2	18
	Applicant Arguments/Remarks Made in an Amendment	19	19

Warnings:	
Information:	
Total Files Size (in bytes):	167651

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

REMARKS

In furtherance of the Examiner's Answer dated May 8, 2023, Patent Owner wishes to withdraw the present appeal. In the Examiner's Answer, the Examiner withdrew all rejections of claims 1, 3-15, 16-35, 37-54, 65-66, 68, and 74-75. However, the Examiner maintained rejections of claims 55-64 and 69-73. Patent Owner hereby withdraws the appeal and cancels claims 55-64 and 69-73 such that there are no rejections presently on Appeal pursuant to MPEP §§ 1215.01-1215.03.

Accordingly, Patent Owner respectfully requests the prompt issuance of an *ex parte reexamination* certificate reflecting the amendments to claims 1, 3-15, 16-35, 37-54, 65-66, 68, and 74-75, given that the Examiner withdrew these rejections in the Examiner's Answer and these claims do not stand rejected. No new amendments have been made to these claims that were not previously entered. Also, for claims marked as new and amended, we are simply maintaining the prior claim designation filed with the Appeal Brief, however for ease of issuance of the *ex parte* reexamination certificate are not showing the amendments made to the new claim in the course of the reexamination. The Commissioner is hereby authorized to charge Deposit Account No. 02-1818 for any fees which are due and owing. If such a withdrawal is made, please indicate the Attorney Docket No. 0313071.00020 on the account statement.

Respectfully submitted,

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Dated: May 26, 2023

AMENDMENTS TO THE CLAIMS

The following Listing of Claims will replace all prior versions and listing(s) of claims.

Listing of Claims:

Claim 1 (Twice Amended): A contact-less chargeable battery including a charging circuit for charging an electric energy to a battery cell, the contact-less chargeable battery comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit [for monitoring] that includes first and second voltage detectors respectively detecting first and second voltages at both ends of the constant voltage/constant current supplier and a microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result includes a wireless feedback control signal to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device.

Claim 2 (Cancelled).

Claim 3 (Thrice Amended): The contact-less chargeable battery according to claim 1, wherein:

the overvoltage monitoring unit includes:

a wireless transmitting unit for wirelessly propagating the monitoring result through an antenna; and

[first and second voltage detectors for respectively detecting voltages at front and rear ends of the constant voltage/constant current supplier;]

a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and [outputs] outputting a voltage comparison result; and the [a] microprocessor [for outputting a] outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 4 (Twice Amended): The contact-less chargeable battery according to claim 3, wherein [a] the magnetic field generated by the external contact-less charging device is generated intermittently,

wherein the microprocessor [overvoltage monitoring unit further includes a charging pause detecting unit for receiving the high frequency AC current output from the high frequency AC current inducing unit to detect] receives an end time point signal indicating a time point when the induction of high frequency AC current ends,[and then outputting the end time point to the microprocessor, and] wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 5 (Original): The contact-less chargeable battery according to claim 1, wherein the monitoring result is a charging power adjustment request signal.

Claim 6 (Original): The contact-less chargeable battery according to claim 1, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values of both ends, or a code indicating that the voltages at both ends are in an overvoltage state.

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Claim 7 (Twice Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by[means of] a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

[an overvoltage monitoring unit for] a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device[by means of wireless communication] so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 8 (Amended): The contact-less charging circuit module according to claim 7, wherein the high frequency AC current inducing unit is a coil to which a magnetic flux of [a] the magnetic field generated from the external contact-less charging device is linked.

Claim 9 (Thrice Amended): The contact-less charging circuit module according to claim 7,[wherein the overvoltage monitoring unit includes] further comprising:

[a wireless transmitting unit for wirelessly propagating the monitoring result through]an antenna;

first and second voltage detectors for respectively detecting first and second voltages at front and rear ends of the constant voltage/constant current supplier; and

a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and [outputs] outputting a voltage comparison result, [;] and

wherein the [a] microprocessor [for outputting a] outputs the monitoring result according to the voltage comparison result[to the wireless transmitting unit] using the antenna.

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Claim 10 (Twice Amended): The contact-less charging circuit module according to claim 9, wherein [a] the magnetic field generated by the external contact-less charging device is generated intermittently,

wherein the[overvoltage monitoring unit further includes a charging pause detecting unit for receiving the high frequency AC current output from the high frequency AC current inducing unit to detect] microprocessor receives a time point indicating when the induction of high frequency AC current ends, and then [outputting] outputs the end time point to the microprocessor, and

wherein the monitoring result is wirelessly transmitted to the external contact-less charging device[by means of wireless communication] while a high frequency AC current is not induced after the end time point is input.

Claim 11 (Amended): The contact-less charging circuit module according to claim [1] 7, wherein the monitoring result is a charging power adjustment request signal.

Claim 12 (Amended): The contact-less charging circuit module according to claim [1] 7, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claim 13 (Twice Amended): A contact-less charging device for transmitting a charging power by[means of] electromagnetic induction[phenomenon] to a contact-less chargeable battery that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode and wirelessly transmits a monitoring result for voltages at both ends of the constant voltage/constant current supplier, the contact-less charging device comprising:

a magnetic field generating unit for receiving an AC current and forming a magnetic field in an outer space;

a high frequency power driving unit for applying a high frequency AC current to the magnetic field generating unit; and

a[charging power adjusting unit for] microprocessor wirelessly receiving the monitoring result from the contact-less chargeable battery[by means of wireless communication] and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that [a] the charging power transmitted to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 14 (Original): The contact-less charging device according to claim 13, wherein the magnetic field generating unit is a coil to both sides of which a high frequency AC current is applied.

Claim 15 (Twice Amended): The contact-less charging device according to claim 13, [wherein the charging power adjusting unit includes]further comprising:

[a wireless receiving unit for wirelessly receiving the monitoring result through]an antenna[;] coupled to the microprocessor and used to receive the monitoring result.[and

a microprocessor for receiving the monitoring result from the wireless receiving unit and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit.]

Claim 16 (Twice Amended): The contact-less [chargeable battery] charging device according to claim 15, further comprising a [constant voltage supplier for] power supply [converting] receiving a common AC current, converting the common AC current into a DC current, and then supplying a constant-voltage current to the high frequency power driving unit, wherein the high frequency power driving unit includes:

a pulse signal generator for receiving a pulse driving signal from the microprocessor and outputting a pulse signal; and

a power driving part for receiving the pulse signal to rapidly switch the constant-voltage current input from the constant voltage supplier, thereby generating a high frequency AC current in a pulse pattern.

Claim 17 (Twice Amended): The contact-less charging device according to claim 16, wherein the[charging power adjusting unit] microprocessor adjusts [a] the charging power by modulating a width of a pulse current, a frequency of the pulse current, an amplitude of a pulse, or [the] a number of pulses.

Claim 18 (Amended): The contact-less charging device according to claim 16, wherein the [constant voltage supplier] power supply includes:

an overvoltage filter for receiving a common AC current and intercepting an overvoltage current;

a rectifier for rectifying the AC current passing through the filter to convert the AC current into a DC current; and

a constant voltage [supplying part for receiving] supplier that receives the converted DC current and outputs a constant voltage current.

Claim 19 (Amended): The contact-less charging device according to claim 13, wherein the high frequency power driving unit intermittently applies a high frequency AC current to the magnetic field generating unit, and

wherein the[charging power adjusting unit] microprocessor receives the monitoring result while a high frequency AC current is not applied to the magnetic field generating unit.

Claim 20 (Original): The contact-less charging device according to claim 13, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 21 (Twice Amended): A battery charging set including a contact-less chargeable battery and a contact-less charging device,

wherein the contact-less chargeable battery includes:

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a high frequency AC current inducing unit to which a high frequency AC current is induced by[means of] a magnetic field intermittently generated from an external contactless charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to a battery cell in a constant voltage/constant current mode; and

[an overvoltage monitoring unit for] a first microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the external contact-less charging device[by means of wireless communication] while a high frequency AC current is not induced,

wherein the contact-less charging device includes:

a magnetic field generating unit for receiving an AC current and forming [a] the magnetic field in an outer space;

a high frequency power driving unit for intermittently applying a high frequency AC current to the magnetic field generating unit; and

a second microprocessor [charging power adjusting unit for], while a high frequency AC current is not applied to the magnetic field generating unit, wirelessly receiving the monitoring result[by means of wireless communication] and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that a charging power transmitted from the contact-less charging device to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 22 (Original): The battery charging set according to claim 21, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 23 (Twice Amended): A method for controlling charging of a contact-less chargeable battery using a contact-less charging device by[means of] electromagnetic induction[phenomenon], the method comprising:

(a) intermittently applying a high frequency AC current to a primary coil provided to the charging device so as to intermittently generate a magnetic field in an outer region;

(b) linking a magnetic flux of the generated magnetic field to a secondary coil provided to the battery so as to intermittently output an electromagnetically-induced high frequency AC current;

(c) rectifying the output high frequency AC current to be converted into a DC current;

(d) applying the DC current to a battery cell through a constant voltage/constant current supplier so as to charge the battery cell in a constant voltage/constant current mode;

(e) monitoring voltages at both ends of the constant voltage/constant current supplier and wirelessly transmitting a monitoring result to the charging device[by means of wireless communication] while a high frequency AC current is not induced in the secondary coil; and

(f) adjusting a power of the high frequency AC current applied to the primary coil according to the transmitted monitoring result,

wherein the adjusting the power of the high frequency AC current applied to the primary coil is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Clam 24 (Original): The method according to claim 23, wherein the monitoring result is a difference of voltages at both ends of the constant voltage/constant current supplier, voltage values at both ends, a code indicating that the voltages at both ends are in an overvoltage state, or a charging power adjustment request signal.

Claim 25 (New, Amended): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 26 (New, Amended): The contact-less chargeable battery according to claim 1, wherein the microprocessor controls, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 27 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 28 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 29 (New): The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 30 (New, Amended): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 31 (New, Amended): The contact-less charging circuit module according to claim 7, wherein the microprocessor controls, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 32 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the

constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 33 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 34 (New): The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 35 (New): The contact-less chargeable battery according to claim 13, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 36 (Cancelled).

Claim 37 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier has a front end and a rear end, and wherein the constant voltage/constant current supplier receives a DC current from a rectifier at the front end and supplies a charging power at the rear end.

Claim 38 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier charges the battery in a constant current mode at an initial charging stage and then charges the battery in a constant voltage mode at a later charging stage.

Claim 39 (New): The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier charges the battery in a constant voltage mode based on a charging voltage of the battery exceeding a predetermined level.

Claim 40 (New, Amended): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

Claim 41 (New, Twice Amended): The battery charging set according to claim 21, wherein the microprocessor controls, through wireless feedback control of charging the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

Claim 42 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

Claim 43 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

Claim 44 (New): The battery charging set according to claim 21, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 45 (New): The method of claim 23, further comprising:

receiving, by the constant voltage/constant current supplier, the DC current at a front end of the constant voltage/constant current supplier; and

supplying, by the constant voltage/constant current supplier, the DC current at a rear end of the constant voltage/constant current supplier to the battery cell.

Claim 46 (New): The method of claim 23, further comprising:

supplying, by the constant voltage/constant current supplier, the DC current to the battery cell in a constant current mode during an initial charging stage and then in a constant voltage mode at a later charging stage.

Claim 47 (New): The method of claim 23, further comprising:

charging, by the constant voltage/constant current supplier, the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

Claim 48 (New, Amended): The method of claim 23, further comprising:

controlling, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing a change of intensity of the magnetic field.

Claim 49 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage; and

an overvoltage monitoring unit that includes first and second voltage detectors respectively detecting voltages at both ends of the constant voltage/constant current supplier, and a microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the microprocessor transmits the monitoring result to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device to solve an overvoltage state according to relative positions of the primary coil and the secondary coil.

Claim 50 (New): The contact-less charging circuit module according to claim 49, wherein a magnetic flux of the magnetic field generated from the external contact-less charging device is linked to the secondary coil of the high frequency AC current inducing unit.

Claim 51 (New, Amended): The contact-less charging circuit module according to claim 49, wherein:

the overvoltage monitoring unit further comprises:

a wireless transmitting unit wirelessly propagating the monitoring result through an antenna~~,~~; and

a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

the microprocessor outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

Claim 52 (New): The contact-less charging circuit module according to claim 51, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the overvoltage monitoring unit further includes a charging pause detecting unit receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, and

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

Claim 53 (New): The contact-less charging circuit module according to claim 49, wherein the monitoring result is a charging power adjustment request signal.

Claim 54 (New): The contact-less charging circuit module according to claim 49, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

Claims 55-64 (Cancelled)

Claim 65 (New): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting unit transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Claim 66 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit including a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting unit transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the secondary coil is movable relative to the primary coil during the charging of the battery cell by the contact-less charging circuit module~~.~~, and

wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting the intensity of the magnetic field.

Claim 67 (Cancelled).

Claim 68 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit including a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit detecting first and second voltages at both ends of the constant voltage/constant current supplier, monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external

contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device.

Claim 69-73 (Cancelled)

Claim 74 (New): A contact-less charging device for transmitting a charging power by means of electromagnetic induction phenomenon to a contact-less chargeable battery that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode and wirelessly transmits a monitoring result for voltages at both ends of the constant voltage/constant current supplier, the contact-less charging device comprising:

a magnetic field generating unit for receiving an AC current and forming a magnetic field in an outer space;

a high frequency power driving unit for applying a high frequency AC current to the magnetic field generating unit; and

a charging power adjusting unit that includes: a wireless receiving unit receiving the monitoring result from the contact-less chargeable battery by means of wireless communication, and a microprocessor controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that the charging power transmitted to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Claim 75 (New, Amended): A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes a microprocessor, the microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field includes a change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

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BIB DATA SHEET

CONFIRMATION NO. 1538

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
96/000,355	03/12/2021 RULE	320	3992	0313071.00020

APPLICANTS

INVENTORS

8013568, Residence Not Provided;
LS CABLE & SYSTEM LTD. (Assignee), GYEONGGI-DO, KOREA, REPUBLIC OF;
PATENT OWNER, Residence Not Provided;

**** CONTINUING DATA ***************************

This application is a SER of 11/997,272 06/17/2008 PAT 8013568
*which is a 371 of PCT/KR2006/001713 05/08/2006

**** FOREIGN APPLICATIONS ***************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****

Foreign Priority claimed ❑ Yes ☑ No		STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
35 USC 119(a-d) conditions met ❑ Yes ☑ No	❑ Met after Allowance				
Verified and Acknowledged /ANJAN K DEB/ Examiner's Signature	AD Initials				

ADDRESS

K&L Gates LLP-Chicago
P.O. Box 1135
Chicago, IL 60690
UNITED STATES

TITLE

CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF

FILING FEE RECEIVED		
0.00	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	❑ All Fees ❑ 1.16 Fees (Filing) ❑ 1.17 Fees (Processing Ext. of time) ❑ 1.18 Fees (Issue) ❑ Other _____ ❑ Credit

BIB (Rev. 05/07).

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	96/000,355	8013568
	Examiner	Art Unit
	ANJAN K DEB	3992

CPC - Searched*		
Symbol	**Date**	**Examiner**
H02J/00308	09/27/2021	AD
H02J/00308	09/27/2021	AD
H02J50/10	09/27/2021	AD
H02J7/025	09/27/2021	AD

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**
320	108	09/27/2021	AD

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	**Date**	**Examiner**
Searched IDS	05/01/2023	AD
Searched Prosecution History	05/01/2023	AD
Searched P-TACTS	05/01/2023	AD
Searched PDP	05/01/2023	AD
Updated Litigation search	05/01/2023	AD

/ANJAN K DEB/ Primary Examiner, Art Unit 3992	

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	96/000,355	8013568
	Examiner	Art Unit
	ANJAN K DEB	3992

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/ANJAN K DEB/ Primary Examiner, Art Unit 3992	

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	96/000,355	8013568
	Examiner	**Art Unit**
	ANJAN K DEB	3992

CPC						
Symbol					**Type**	**Version**
H02J	/	7	/	00304	F	2020-01-01
H02J	/	50	/	80	I	2016-02-01
H02J	/	50	/	90	I	2016-02-01
H02J	/	50	/	10	I	2016-02-01
H02J	/	7	/	00308	I	2020-01-01
H02J	/	5	/	00	I	2013-01-01
H02J	/	7	/	0044	I	2013-01-01

CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	57	
/ANJAN K DEB/ Primary Examiner, Art Unit 3992	18 July 2023	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	3

U.S. Patent and Trademark Office — Part of Paper No.: 20230718

Apple Inc. EX1004B Page 1445

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	96/000,355	8013568
	Examiner	Art Unit
	ANJAN K DEB	3992

INTERNATIONAL CLASSIFICATION					
CLAIMED					
H02J	/	7	/	00	
NON-CLAIMED					
	/		/		

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS
320	108

CROSS REFERENCES(S)						
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)					

NONE (Assistant Examiner)	(Date)	Total Claims Allowed: 57	
/ANJAN K DEB/ Primary Examiner, Art Unit 3992 (Primary Examiner)	18 July 2023 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 3

U.S. Patent and Trademark Office — Part of Paper No.: 20230718

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	96/000,355	8013568
	Examiner	Art Unit
	ANJAN K DEB	3992

☑ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	57	
/ANJAN K DEB/ Primary Examiner, Art Unit 3992	18 July 2023	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	3

U.S. Patent and Trademark Office — Part of Paper No.: 20230718

Reexamination	Application/Control No.	Applicant(s)/Patent Under Reexamination
	96/000,355	8013568
	Certificate Date	Certificate Number
		C1

Requester Correspondence Address: ☑ **Patent Owner** ☐ **Third Party**

K&L Gates LLP-Chicago
P.O. Box 1135
Chicago, IL 60690

LITIGATION REVIEW ☑	AD (examiner initials)	01 May 2023 (date)
Case Name		Director Initials
None		

COPENDING OFFICE PROCEEDINGS	
TYPE OF PROCEEDING	**NUMBER**
None	

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
96/000,355	03/12/2021	8013568	0313071.00020	1538

24573 7590 08/24/2023

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EXAMINER	
DEB, ANJAN K	

ART UNIT	PAPER NUMBER
3992	

MAIL DATE	DELIVERY MODE
08/24/2023	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of Intent to Issue Ex Parte Reexamination Certificate	**Control No.** 96/000,355	**Patent Under Reexamination** 8013568	
	Examiner ANJAN K DEB	**Art Unit** 3992	**AIA Status** No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

1. ☑ Prosecution on the merits is (or remains) closed in this *ex parte* reexamination proceeding. This proceeding is subject to reopening at the initiative of the Office or upon petition. *Cf.* 37 CFR 1.313(a). A Certificate will be issued in view of
   (a) ☑ Patent owner's communication(s) filed: 5/26/2023.
   (b) ☐ Patent owner's failure to file an appropriate timely response to the Office action mailed: _____.
   (c) ☐ Patent owner's failure to timely file an Appeal Brief (37 CFR 41.31).
   (d) ☐ The decision on appeal by the ☐ Board of Patent Appeals and Interferences ☐ Court dated _____
   (e) ☐ Other: _____.
2. The Reexamination Certificate will indicate the following:
   (a) Change in the Specification: ☐ Yes ☑ No
   (b) Change in the Drawing(s): ☐ Yes ☑ No
   (c) Status of the Claim(s):
      (1) Patent claim(s) confirmed: _____.
      (2) Patent claim(s) amended (including dependent on amended claim(s)): 1 and 3-24
      (3) Patent claim(s) canceled: 2.
      (4) Newly presented claim(s) patentable: 25-35,37-54,65-66,68 and 74-75.
      (5) Newly presented canceled claims: 36,55-64,67 and 69-73.
      (6) Patent claim(s) ☐ previously ☐ currently disclaimed: _____
      (7) Patent claim(s) not subject to reexamination: _____.
3. ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.
4. ☑ Note the attached statement of reasons for patentability and/or confirmation. Any comments considered necessary by patent owner regarding reasons for patentability and/or confirmation must be submitted promptly to avoid processing delays. Such submission(s) should be labeled: "Comments On Statement of Reasons for Patentability and/or Confirmation."
5. ☐ Note attached NOTICE OF REFERENCES CITED (PTO-892).
6. ☐ Note attached LIST OF REFERENCES CITED (PTO/SB/08 or PTO/SB/08 substitute).
7. ☐ The drawing correction request filed on _____ is: ☐approved ☐disapproved.
8. ☐ Acknowledgment is made of the priority claim under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐None of the certified copies have
   ☐been received.
   ☐not been received.
   ☐been filed in Application No. _____.
   ☐been filed in reexamination Control No. _____.
   ☐been received by the International Bureau in PCT Application No. _____.
   * Certified copies not received: _____.
9. ☐ Note attached Examiner's Amendment.
10. ☐ Note attached Interview Summary (PTO-474).
11. ☐ Other: _____.

All correspondence relating to this reexamination proceeding should be directed to the **Central Reexamination Unit** at the mail, FAX, or hand-carry addresses given at the end of this Office action.

/ANJAN K DEB/ Primary Examiner, Art Unit 3992	

cc: Requester (if third party requester)

NOTICE OF INTENT TO ISSUE REEXAMINATION CERTIFICATE

SUMMARY

This office action is responsive to Patent Owner's request filed 5/26/2023 to withdraw the Appeal Brief (filed 10/26/2022). In the Amendment/Remarks filed 5/26/2023 Patent Owner cancelled all of the rejected claims 55-64, and 69-73 and requests issuance of an *ex parte* reexamination certificate of claims[1] 1, 3-15, 16-35, 37-54, 65-66, 68, and 74-75.

STATUS OF CLAIMS

Claims 1, 3-35, 37-54, 65-66, 68, and 74-75 are patentable as per Examiner's Answers to Appeal Brief mailed 5/8/2023.

Claims 2, 36, 55-64, 67, and 69-73 are cancelled by Patent Owner.

STATEMENT OF REASONS FOR PATENTABILITY AND/OR CONFIRMATION

The following is an examiner's statement of reasons for patentability and/or confirmation of the claims found patentable in this reexamination proceeding:

The prior art combination fails to disclose or fairly suggest,

Regarding independent claim 1, adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device.

---

[1] Rejection of Claims 1, 3-35, 37-54, 65-66, 68, and 74-75 withdrawn by the Examiner in the Examiner's Answers mailed 5/8/2023.

Regarding independent claim 7, wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Regarding independent claim 13, wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Regarding independent claim 23,wherein the adjusting the power of the high frequency AC current applied to the primary coil is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Regarding independent claim 49, adjusting a power applied to the primary coil of the external contact-less charging device to solve an overvoltage state according to relative positions of the primary coil and the secondary coil.

Regarding independent claim 65, wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Regarding independent claim 68, adjusting a power applied to the primary coil of the external contact-less charging device during the charging based on relative positions of the contact-less chargeable battery and the external contact-less charging device.

Regarding independent claim 74, wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

Regarding independent claim 75, adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

Dependent claims 3-6, and 25-29 depending from claim 1 are patentable for the same reason as claim 1 and for their additional limitations.

Dependent claims 8-12, and 30-34 depending from claim 7 are patentable for the same reason as claim 7 and for their additional limitations.

Dependent claims 14-20, 35 and 37-39 depending from claim 13 are patentable for the same reason as claim 13 and for their additional limitations.

Dependent claims 24, and 45-48 depending from claim 23 are patentable for the same reason as claim 23 and for their additional limitations.

Dependent claims 50-54 depending from claim 49 are patentable for the same reason as claim 49 and for their additional limitations.

Any comments considered necessary by PATENT OWNER regarding the above statement must be submitted promptly to avoid processing delays. Such submission by the patent owner should be labeled: "Comments on Statement of Reasons for Patentability and/or Confirmation" and will be placed in the reexamination file.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANJAN K DEB whose telephone number is (571)272-2228. The examiner can normally be reached M-F 9:00AM-5:00 PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, Patent Owner is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hetul Patel can be reached on 571-272-4184. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is available to registered users. To file and manage patent submissions in Patent Center, visit: https://patentcenter.uspto.gov. Visit https://www.uspto.gov/patents/apply/patent-center for more information about Patent Center and https://www.uspto.gov/patents/docx for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Primary Examiner, Art Unit 3992

Conferees:

/JAMES A MENEFEE/
Reexamination Specialist, Art Unit 3992

/H.B.P/
Supervisory Patent Reexamination Specialist, Art Unit 3992

US008013568C1

(12) EX PARTE REEXAMINATION CERTIFICATE (229th)

Ex Parte Reexamination Ordered under 35 U.S.C. 257

United States Patent

Park et al.

(10) Number: US 8,013,568 C1

(45) Certificate Issued: Sep. 28, 2023

(54) **CONTACT-LESS CHARGEABLE BATTERY AND CHARGING DEVICE, BATTERY CHARGING SET, AND CHARGING CONTROL METHOD THEREOF**

(75) Inventors: **Dong-Young Park**, Seoul (KR); **Sung-Wook Moon**, Seoul (KR); **Sung-Wook Choi**, Anyang-si (KR); **Gwang-Hee Gwon**, Anyang-si (KR); **Sub Han**, Yongin-si (KR); **Jung-Bum Kim**, Anyang-si (KR)

(73) Assignee: **LS CABLE & SYSTEM LTD.**, Anyang-si (KR)

Supplemental Examination Request:
No. 96/000,355, Mar. 12, 2021

Reexamination Certificate for:

Patent No.:	**8,013,568**
Issued:	**Sep. 6, 2011**
Appl. No.:	**11/997,272**
PCT Filed:	**May 8, 2006**
PCT No.:	**PCT/KR2006/001713**
§ 371 (c)(1), (2), (4) Date:	**Jun. 17, 2008**
PCT Pub. No.:	**WO2007/013726**
PCT Pub. Date:	**Feb. 1, 2007**

(51) **Int. Cl.**

H02J 7/00	(2006.01)
H02J 50/80	(2016.01)
H02J 50/90	(2016.01)
H02J 50/10	(2016.01)
H02J 5/00	(2016.01)

(52) **U.S. Cl.**
CPC ***H02J 7/00304*** (2020.01); ***H02J 5/00*** (2013.01); ***H02J 7/0044*** (2013.01); ***H02J 7/00308*** (2020.01); ***H02J 50/10*** (2016.02); ***H02J 50/80*** (2016.02); ***H02J 50/90*** (2016.02)

(58) **Field of Classification Search**
CPC H02J 50/10; H02J 7/025
USPC 320/108
See application file for complete search history.

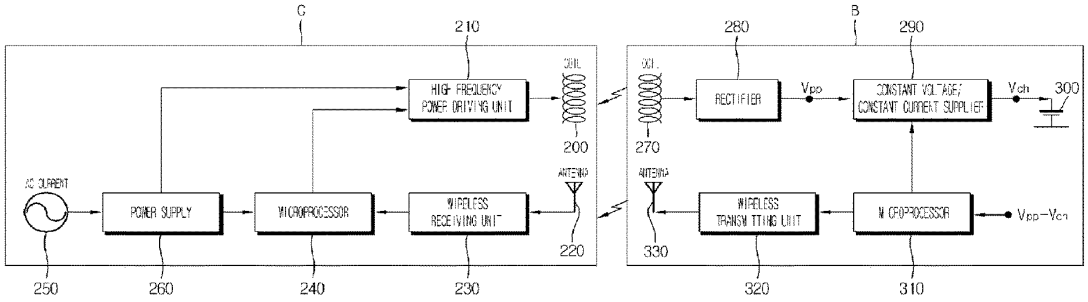
(56) **References Cited**

To view the complete listing of prior art documents cited during the supplemental examination proceeding and the resulting reexamination proceeding for Control Number 96/000,355, please refer to the USPTO's Patent Electronic System.

Primary Examiner — Anjan K Deb

(57) **ABSTRACT**

The present invention relates to a wireless charger for a mobile communication terminal, which allows charging a plurality of batteries in a conveniently way without any terminal connection of the batteries to chargers for various mobile communication terminals such as a cellular phone and PDA and also allows intercepting electromagnetic waves while the charger is used, by means of Faraday's law. The wireless charger of the present invention includes a charger body having an electromagnetic wave intercepting means; a charging pad received in the charger body; and at least one battery that is to be charged by means of induced electromotive force generated by the charging pad, wherein the charger body includes a power supply means, a housing having a receiver for receiving the charging pad and connected to the power supply means, and a cover hinged to the housing.



EX PARTE REEXAMINATION CERTIFICATE

THE PATENT IS HEREBY AMENDED AS INDICATED BELOW.

Matter enclosed in heavy brackets [ ] appeared in the patent, but has been deleted and is no longer a part of the patent; matter printed in italics indicates additions made to the patent.

AS A RESULT OF REEXAMINATION, IT HAS BEEN DETERMINED THAT:

Claim **2** is cancelled.

Claims **1**, **3**, **4**, **7-13**, **15-19**, **21** and **23** are determined to be patentable as amended.

Claims **5**, **6**, **14**, **20**, **22** and **24**, dependent on an amended claim, are determined to be patentable.

New claims **25-58** are added and determined to be patentable.

1. A contact-less chargeable battery including a charging circuit for charging an electric energy to a battery cell, the contact-less chargeable battery comprising:

a high frequency AC current inducing unit *that includes a secondary coil* to which a high frequency AC current is induced by means of a magnetic field generated from *a primary coil of* an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier **[**for**]** receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit **[**for monitoring**]** *that includes first and second voltage detectors respectively detecting first and second voltages at both ends of the constant voltage/constant current supplier and a microprocessor monitoring the detected* voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result includes a wireless feedback control signal to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device.

3. The contact-less chargeable battery according to claim **1**, wherein*:*

the overvoltage monitoring unit includes:

a wireless transmitting unit for wirelessly propagating the monitoring result through an antenna; **[**first and second voltage detectors for respectively detecting voltages at front and rear ends of the constant voltage/constant current supplier;**]** *and*

a voltage comparator for comparing *the* first and second voltages detected by the first and second voltage detectors and **[**outputs**]** *outputting* a voltage comparison result; and **[**a**]** *the* microprocessor **[**for outputting a**]** *outputs the* monitoring result according to the voltage comparison result to the wireless transmitting unit.

4. The contact-less chargeable battery according to claim **3**, wherein **[**a**]** *the* magnetic field generated by the *external* contact-less charging device is generated intermittently,

wherein the **[**overvoltage monitoring unit further includes a charging pause detecting unit for receiving the high frequency AC current output from the high frequency AC current inducing unit to detect**]** *microprocessor receives an end time point signal indicating* a time point when the induction of high frequency AC current ends,**[**and then outputting the end time point to the microprocessor, and**]** wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

7. A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by**[**means of**]** a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier **[**for**]** receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

[an overvoltage monitoring unit for**]** *a microprocessor* monitoring voltages at both ends of the constant voltage/constant current supplier and *wirelessly* transmitting a monitoring result to the external contact-less charging device**[**by means of wireless communication**]** so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

8. The contact-less charging circuit module according to claim **7**, wherein the high frequency AC current inducing unit is a coil to which a magnetic flux of **[**a**]** *the* magnetic field generated from the external contact-less charging device is linked.

9. The contact-less charging circuit module according to claim **7**,**[**wherein the overvoltage monitoring unit includes a wireless transmitting unit for wirelessly propagating the monitoring result through**]** *further comprising*:

an antenna;

first and second voltage detectors for respectively detecting *first and second* voltages at front and rear ends of the constant voltage/constant current supplier; *and*

a voltage comparator for comparing *the* first and second voltages detected by the first and second voltage detectors and **[**outputs**]** *outputting* a voltage comparison result**[**;**]** , and

[a**]** *wherein the* microprocessor **[**for outputting a**]** *outputs the* monitoring result according to the voltage comparison result**[**to the wireless transmitting unit**]** *using the antenna.*

10. The contact-less charging circuit module according to claim 9, wherein [a] *the* magnetic field generated by the *external* contact-less charging device is generated intermittently,

wherein the[overvoltage monitoring unit further includes a charging pause detecting unit for receiving the high frequency AC current output from the high frequency AC current inducing unit to detect] *microprocessor receives* a time point *indicating* when the induction of high frequency AC current ends, and then [outputting] *outputs* the end time point to the microprocessor, and

wherein the monitoring result is *wirelessly* transmitted to the external contact-less charging device[by means of wireless communication] while a high frequency AC current is not induced after the end time point is input.

11. The contact-less charging circuit module according to claim [1] 7, wherein the monitoring result is a charging power adjustment request signal.

12. The contact-less charging circuit module according to claim [1] 7, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

13. A contact-less charging device for transmitting a charging power by[means of] electromagnetic induction[phenomenon] to a contact-less chargeable battery that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode and wirelessly transmits a monitoring result for voltages at both ends of the constant voltage/constant current supplier, the contact-less charging device comprising:

a magnetic field generating unit for receiving an AC current and forming a magnetic field in an outer space;

a high frequency power driving unit for applying a high frequency AC current to the magnetic field generating unit; and

a[charging power adjusting unit for] *microprocessor wirelessly* receiving the monitoring result from the contact-less chargeable battery[by means of wireless communication] and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that [a] *the* charging power transmitted to the *contact-less chargeable* battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

15. The contact-less charging device according to claim 13, [wherein the charging power adjusting unit includes a wireless receiving unit for wirelessly receiving the monitoring result through] *further comprising*:

an antenna[; and a microprocessor for receiving the monitoring result from the wireless receiving unit and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit.] *coupled to the microprocessor and used to receive the monitoring result.*

16. The contact-less [chargeable battery] *charging device* according to claim 15, further comprising a [constant voltage supplier for converting] *power supply receiving* a common AC current, converting the common AC current into a DC current, and then supplying a constant-voltage current to the high frequency power driving unit, wherein the high frequency power driving unit includes:

a pulse signal generator for receiving a pulse driving signal from the microprocessor and outputting a pulse signal; and

a power driving part for receiving the pulse signal to rapidly switch the constant-voltage current input from the constant voltage supplier, thereby generating a high frequency AC current in a pulse pattern.

17. The contact-less charging device according to claim 16, wherein the[charging power adjusting unit] *microprocessor* adjusts [a] *the* charging power by modulating a width of a pulse current, a frequency of the pulse current, an amplitude of a pulse, or [the] *a* number of pulses.

18. The contact-less charging device according to claim 16, wherein the [constant voltage supplier] *power supply* includes:

an overvoltage filter for receiving a common AC current and intercepting an overvoltage current;

a rectifier for rectifying the AC current passing through the filter to convert the AC current into a DC current; and

a constant voltage [supplying part for receiving] *supplier that receives* the converted DC current and outputs a constant voltage current.

19. The contact-less charging device according to claim 13, wherein the high frequency power driving unit intermittently applies a high frequency AC current to the magnetic field generating unit, and

wherein the[charging power adjusting unit] *microprocessor* receives the monitoring result while a high frequency AC current is not applied to the magnetic field generating unit.

21. A battery charging set including a contact-less chargeable battery and a contact-less charging device,

wherein the *contact-less chargeable* battery includes:

a high frequency AC current inducing unit to which a high frequency AC current is induced by[means of] a magnetic field intermittently generated from an external contactless charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier [for] receiving the DC current from the rectifier and supplying a charging power to a battery cell in a constant voltage/constant current mode; and

[an overvoltage monitoring unit for] *a first microprocessor* monitoring voltages at both ends of the constant voltage/constant current supplier and *wirelessly* transmitting a monitoring result to the external contact-less charging device[by means of wireless communication] while a high frequency AC current is not induced,

wherein the *contact-less* charging device includes:

a magnetic field generating unit for receiving an AC current and forming [a] *the* magnetic field in an outer space;

a high frequency power driving unit for intermittently applying a high frequency AC current to the magnetic field generating unit; and

a [charging power adjusting unit for] *second microprocessor*, while a high frequency AC current is not applied to the magnetic field generating unit, *wirelessly* receiving the monitoring result[by means of wireless communication] and controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field

generating unit so that a charging power transmitted *from the contact-less charging device* to the *contact-less chargeable* battery is adjusted, *wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.*

23. A method for controlling charging of a contact-less chargeable battery using a contact-less charging device by[means of] electromagnetic induction[phenomenon], the method comprising:

(a) intermittently applying a high frequency AC current to a primary coil provided to the charging device so as to intermittently generate a magnetic field in an outer region;

(b) linking a magnetic flux of the generated magnetic field to a secondary coil provided to the battery so as to intermittently output an electromagnetically-induced high frequency AC current;

(c) rectifying the output high frequency AC current to be converted into a DC current;

(d) applying the DC current to a battery cell through a constant voltage/constant current supplier so as to charge the battery cell in a constant voltage/constant current mode;

(e) monitoring voltages at both ends of the constant voltage/constant current supplier and *wirelessly* transmitting a monitoring result to the charging device[by means of wireless communication] while a high frequency AC current is not induced in the secondary coil; and

(f) adjusting a power of the high frequency AC current applied to the primary coil according to the transmitted monitoring result,

wherein the adjusting the power of the high frequency AC current applied to the primary coil is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

25. The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

26. The contact-less chargeable battery according to claim 1, wherein the microprocessor controls, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

27. The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

28. The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

29. The contact-less chargeable battery according to claim 1, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

30. The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

31. The contact-less charging circuit module according to claim 7, wherein the microprocessor controls, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

32. The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

33. The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

34. The contact-less charging circuit module according to claim 7, wherein the constant voltage/constant current supplier charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

35. The contact-less chargeable battery according to claim 13, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

36. The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier has a front end and a rear end, and wherein the constant voltage/constant current supplier receives a DC current from a rectifier at the front end and supplies a charging power at the rear end.

37. The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier charges the battery in a constant current mode at an initial charging stage and then charges the battery in a constant voltage mode at a later charging stage.

38. The contact-less charging device according to claim 13, wherein the constant voltage/constant current supplier charges the battery in a constant voltage mode based on a charging voltage of the battery exceeding a predetermined level.

39. The battery charging set according to claim 21, wherein the constant voltage/constant current supplier includes circuitry controlled by at least one microprocessor.

40. The battery charging set according to claim 21, wherein the microprocessor controls, through wireless feedback control of charging the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing the change of intensity of the magnetic field.

41. The battery charging set according to claim 21, wherein the constant voltage/constant current supplier has a front end and a rear end, wherein the constant voltage/constant current supplier receives the DC current at the front end from the rectifier and supplies the charging power at the rear end to the battery cell.

42. The battery charging set according to claim 21, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage.

43. The battery charging set according to claim 21, wherein the constant voltage/constant current supplier

charges the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

44. The method of claim 23, further comprising:

receiving, by the constant voltage/constant current supplier, the DC current at a front end of the constant voltage/constant current supplier; and

supplying, by the constant voltage/constant current supplier, the DC current at a rear end of the constant voltage/constant current supplier to the battery cell.

45. The method of claim 23, further comprising:

supplying, by the constant voltage/constant current supplier, the DC current to the battery cell in a constant current mode during an initial charging stage and then in a constant voltage mode at a later charging stage.

46. The method of claim 23, further comprising:

charging, by the constant voltage/constant current supplier, the battery cell in a constant voltage mode based on a charging voltage of the battery cell exceeding a predetermined level.

47. The method of claim 23, further comprising:

controlling, through wireless feedback control of the charging of the battery cell, the voltages at both ends of the constant voltage/constant current supplier by inducing a change of intensity of the magnetic field.

48. A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;

a rectifier receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode, wherein the constant voltage/constant current supplier supplies the charging power in a constant current mode at an initial charging stage and then supplies the charging power in a constant voltage mode at a later charging stage; and

an overvoltage monitoring unit that includes first and second voltage detectors respectively detecting voltages at both ends of the constant voltage/constant current supplier, and a microprocessor monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the microprocessor transmits the monitoring result to induce the change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device to solve an overvoltage state according to relative positions of the primary coil and the secondary coil.

49. The contact-less charging circuit module according to claim 48, wherein a magnetic flux of the magnetic field generated from the external contact-less charging device is linked to the secondary coil of the high frequency AC current inducing unit.

50. The contact-less charging circuit module according to claim 48, wherein:

the overvoltage monitoring unit further comprises:

a wireless transmitting unit wirelessly propagating the monitoring result through an antenna; and

a voltage comparator for comparing the first and second voltages detected by the first and second voltage detectors and outputting a voltage comparison result, and

the microprocessor outputs the monitoring result according to the voltage comparison result to the wireless transmitting unit.

51. The contact-less charging circuit module according to claim 50, wherein the magnetic field generated by the contact-less charging device is generated intermittently,

wherein the overvoltage monitoring unit further includes a charging pause detecting unit receiving the high frequency AC current output from the high frequency AC current inducing unit to detect a time point when the induction of high frequency AC current ends, and then outputting the end time point to the microprocessor, and

wherein the monitoring result is transmitted to the external contact-less charging device by means of wireless communication while a high frequency AC current is not induced after the end time point is input.

52. The contact-less charging circuit module according to claim 48, wherein the monitoring result is a charging power adjustment request signal.

53. The contact-less charging circuit module according to claim 48, wherein the monitoring result is a difference of voltages at front and rear ends of the constant voltage/constant current supplier, voltage values of the front and rear ends, or a code indicating that the voltages at both ends are in an overvoltage state.

54. A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit to which a high frequency AC current is induced by means of a magnetic field generated from an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting unit transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field is based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

55. A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit including a secondary coil to which a high frequency AC current is

induced by means of a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes: a microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier, and a wireless transmitting unit transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the secondary coil is movable relative to the primary coil during the charging of the battery cell by the contact-less charging circuit module, and

wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting the intensity of the magnetic field.

56. A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit including a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil in an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit detecting first and second voltages at both ends of the constant voltage/constant current supplier, monitoring the detected voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the monitoring result includes an adjustment request signal being transmitted repeatedly during the battery charging process for adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less chargeable battery and the external contact-less charging device.

57. A contact-less charging device for transmitting a charging power by means of electromagnetic induction phenomenon to a contact-less chargeable battery that has a constant-voltage/constant current supplier to be capable of being charged in a constant voltage/constant current mode and wirelessly transmits a monitoring result for voltages at both ends of the constant voltage/constant current supplier, the contact-less charging device comprising:

a magnetic field generating unit for receiving an AC current and forming a magnetic field in an outer space;

a high frequency power driving unit for applying a high frequency AC current to the magnetic field generating unit; and

a charging power adjusting unit that includes: a wireless receiving unit receiving the monitoring result from the contact-less chargeable battery by means of wireless communication, and a microprocessor controlling the high frequency power driving unit to adjust a power of the high frequency AC current applied to the magnetic field generating unit so that the charging power transmitted to the contact-less chargeable battery is adjusted,

wherein the adjustment to the power of the high frequency AC current applied to the magnetic field generating unit is based on relative positions of the contact-less chargeable battery and the contact-less charging device.

58. A contact-less charging circuit module electrically connected to a battery cell and used for charging an electric energy to the battery cell in a contact-less method, the contact-less charging circuit module comprising:

a high frequency AC current inducing unit that includes a secondary coil to which a high frequency AC current is induced by means of a magnetic field generated from a primary coil of an external contact-less charging device;

a rectifier for receiving the induced high frequency AC current and converting the induced high frequency AC current into a DC current;

a constant voltage/constant current supplier receiving the DC current from the rectifier and supplying a charging power to the battery cell in a constant voltage/constant current mode; and

an overvoltage monitoring unit that includes a microprocessor, the microprocessor monitoring voltages at both ends of the constant voltage/constant current supplier and transmitting a monitoring result to the external contact-less charging device by means of wireless communication so as to induce a change of intensity of the magnetic field,

wherein the change of intensity of the magnetic field includes a change of intensity of the magnetic field by adjusting a power applied to the primary coil of the external contact-less charging device based on relative positions of the contact-less charging circuit module and the external contact-less charging device.

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