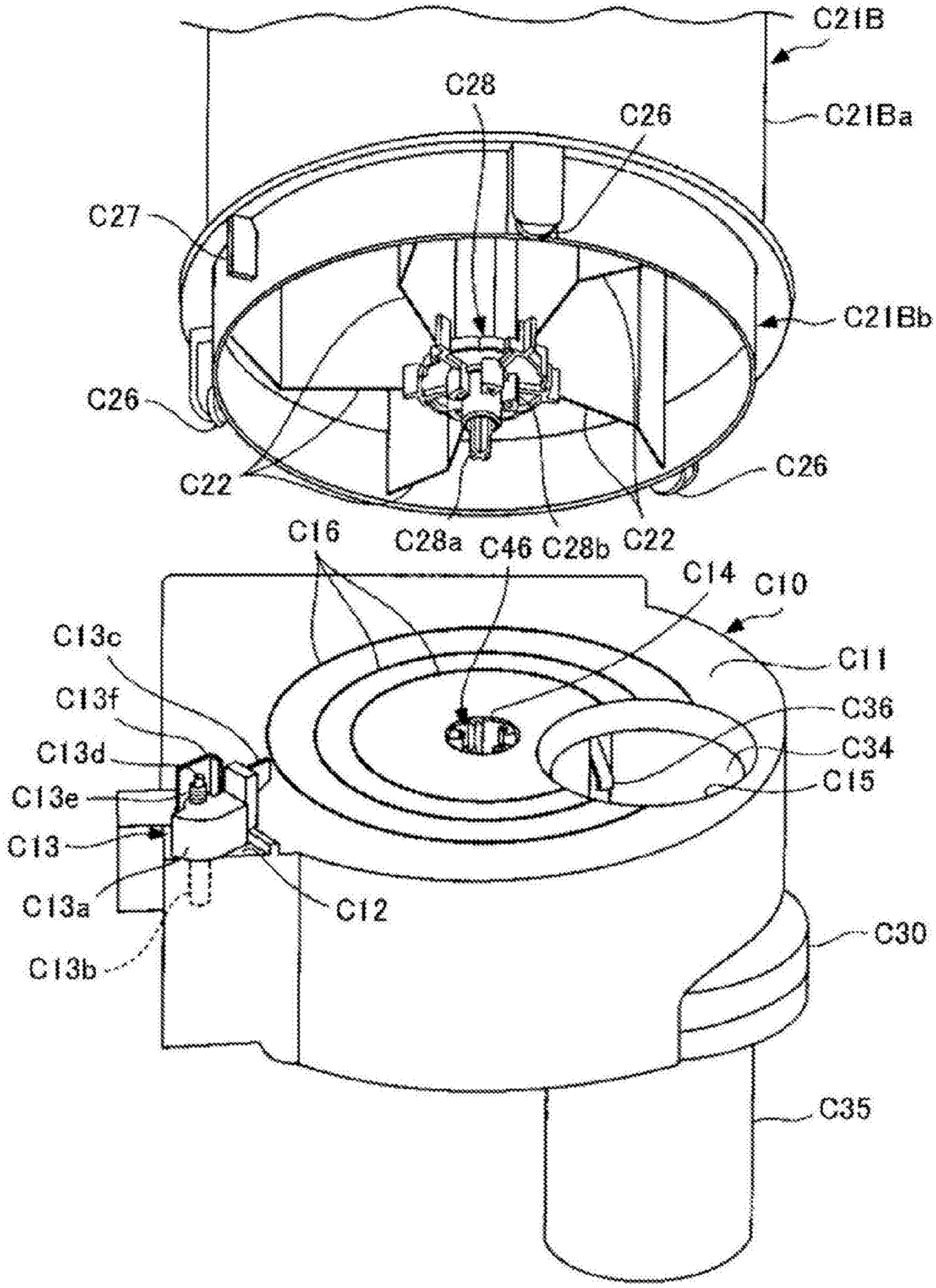


图6

Petitioner Exhibit 1002-2096

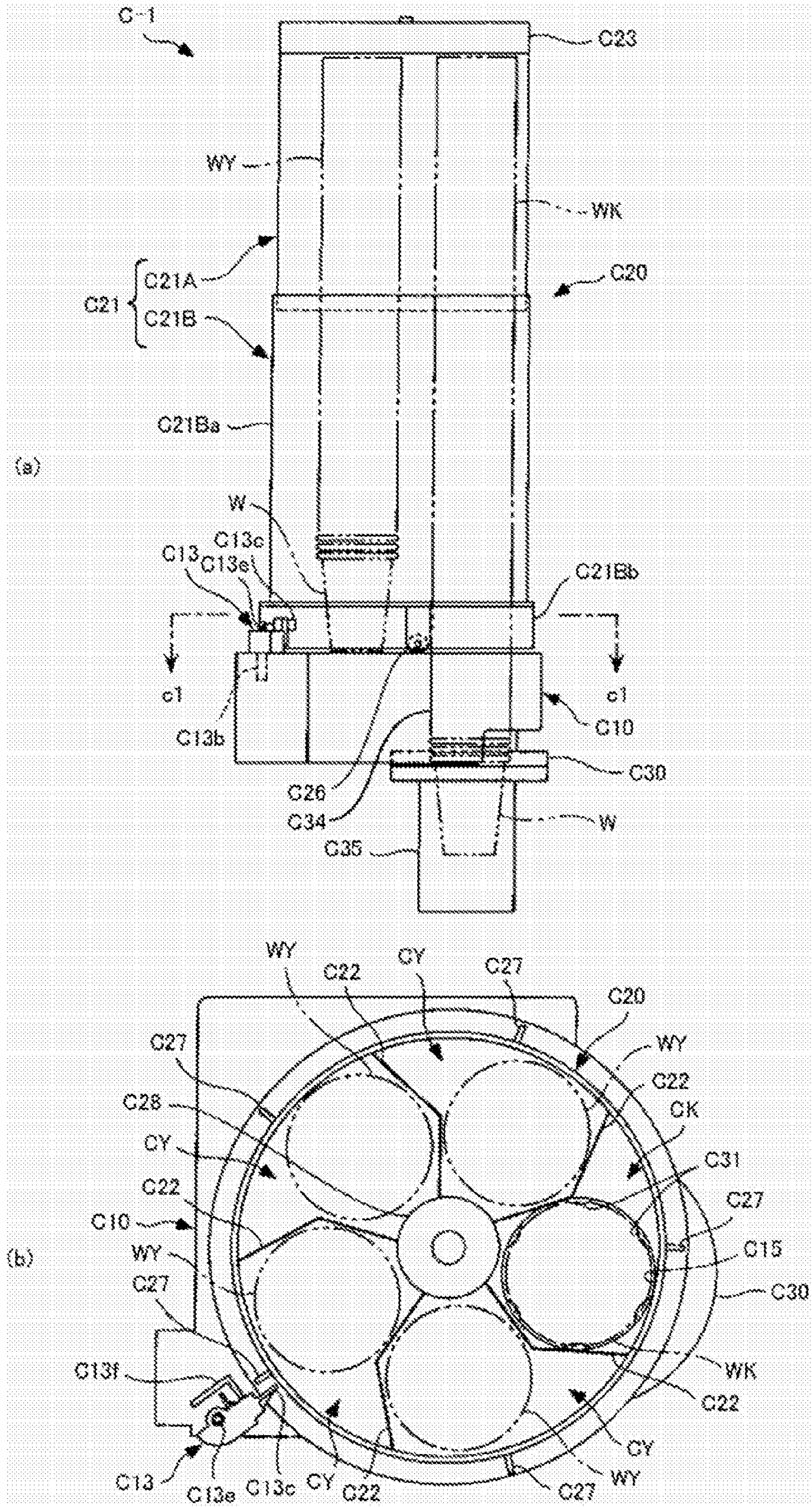

C-1
C23
WY
WK
C21
C21A
C21B
C20
C21Ba
(a)
W
C13c
C13
C13a
C21Bb
c1
c1
C13b
C10
C30
C26
C34
W
C35
WY
C22
CY
C27
C20
C27
WY
C22
C28
CK
CY
C31
C22
C27
C10
C15
(b)
WY
C30
C27
C13f
WK
C22
CY
C13
C13e
C13c
CY
C22
C27
WY

图7

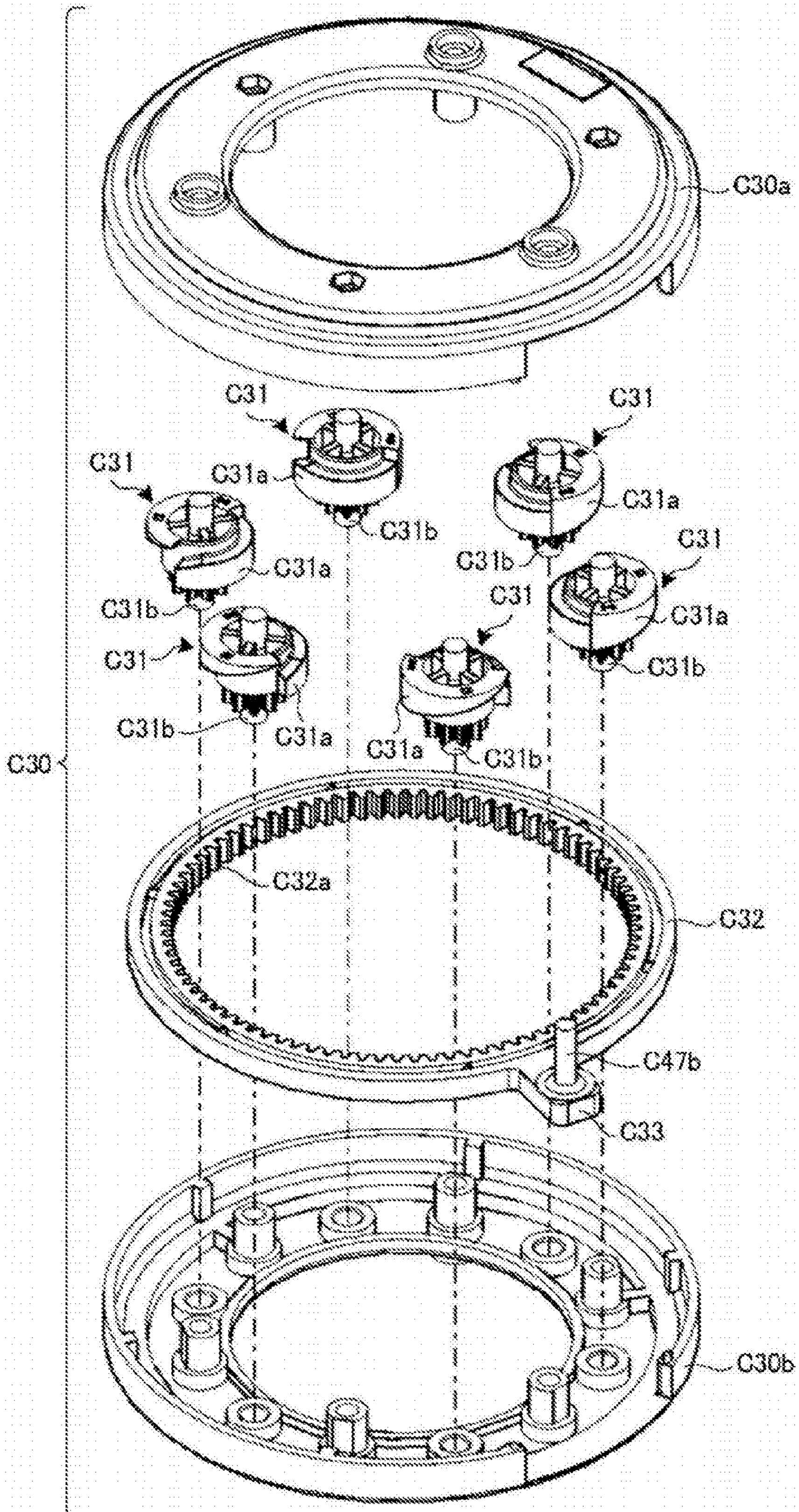


图8

Petitioner Exhibit 1002-2098

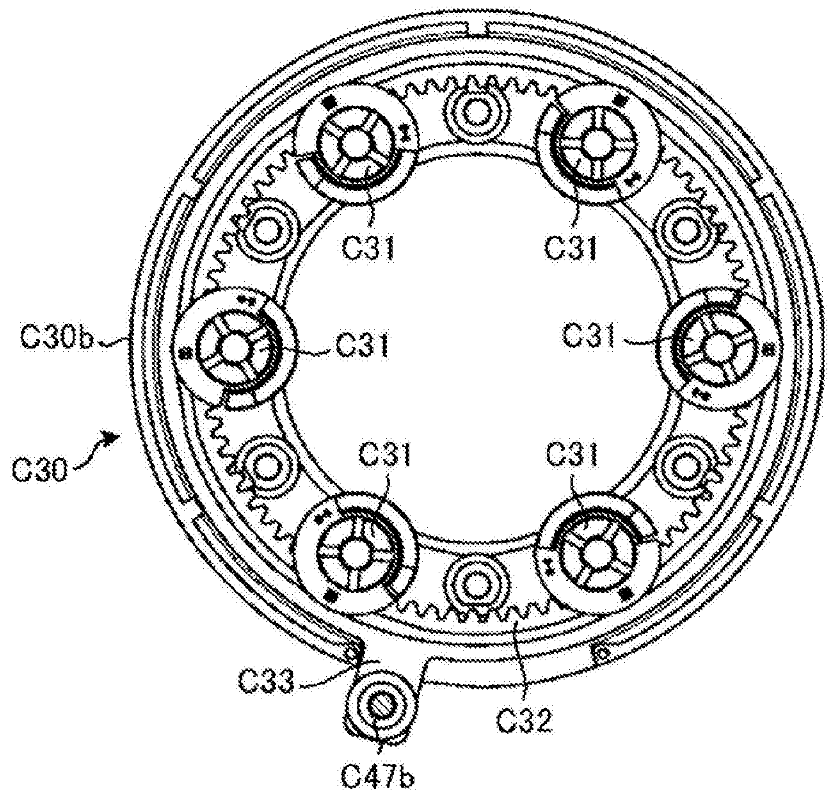
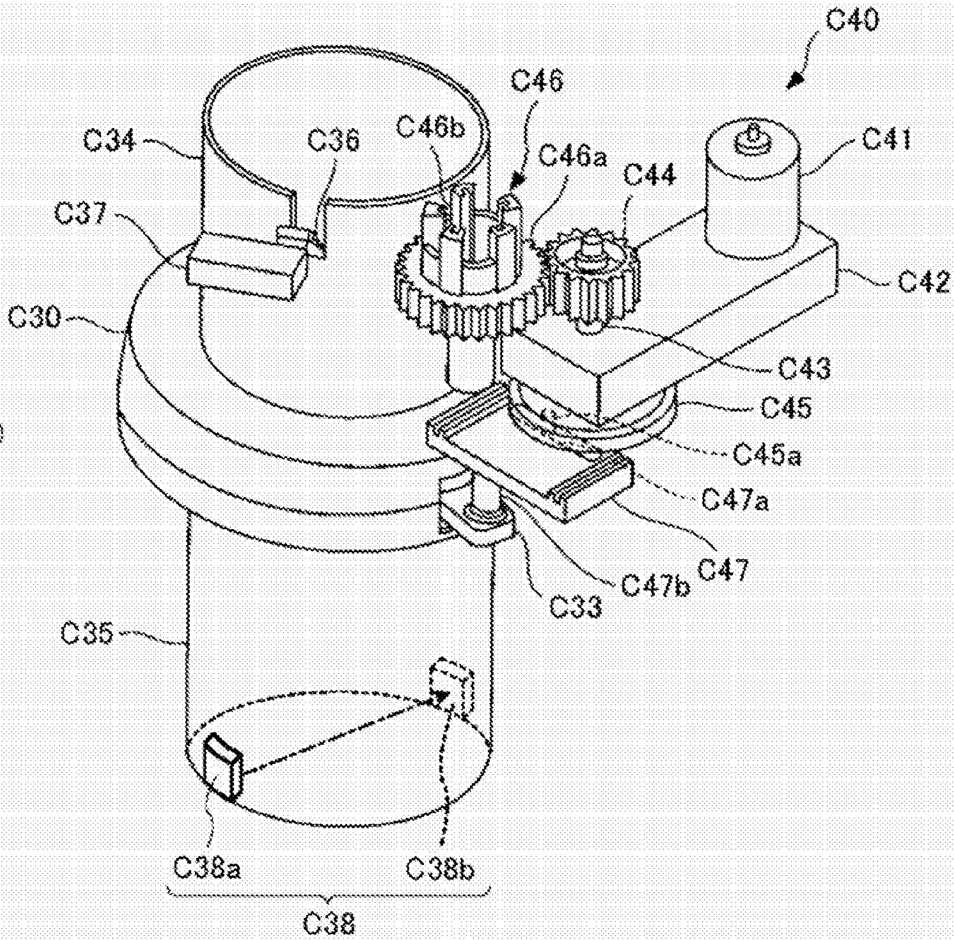


图9

Petitioner Exhibit 1002-2099

(a)



(b)

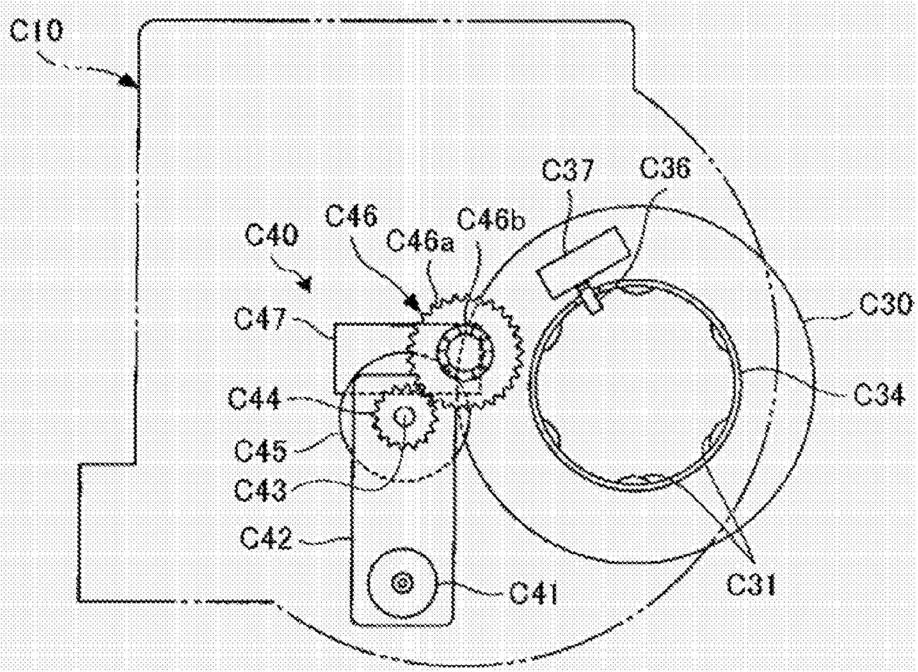


图10

Petitioner Exhibit 1002-2100

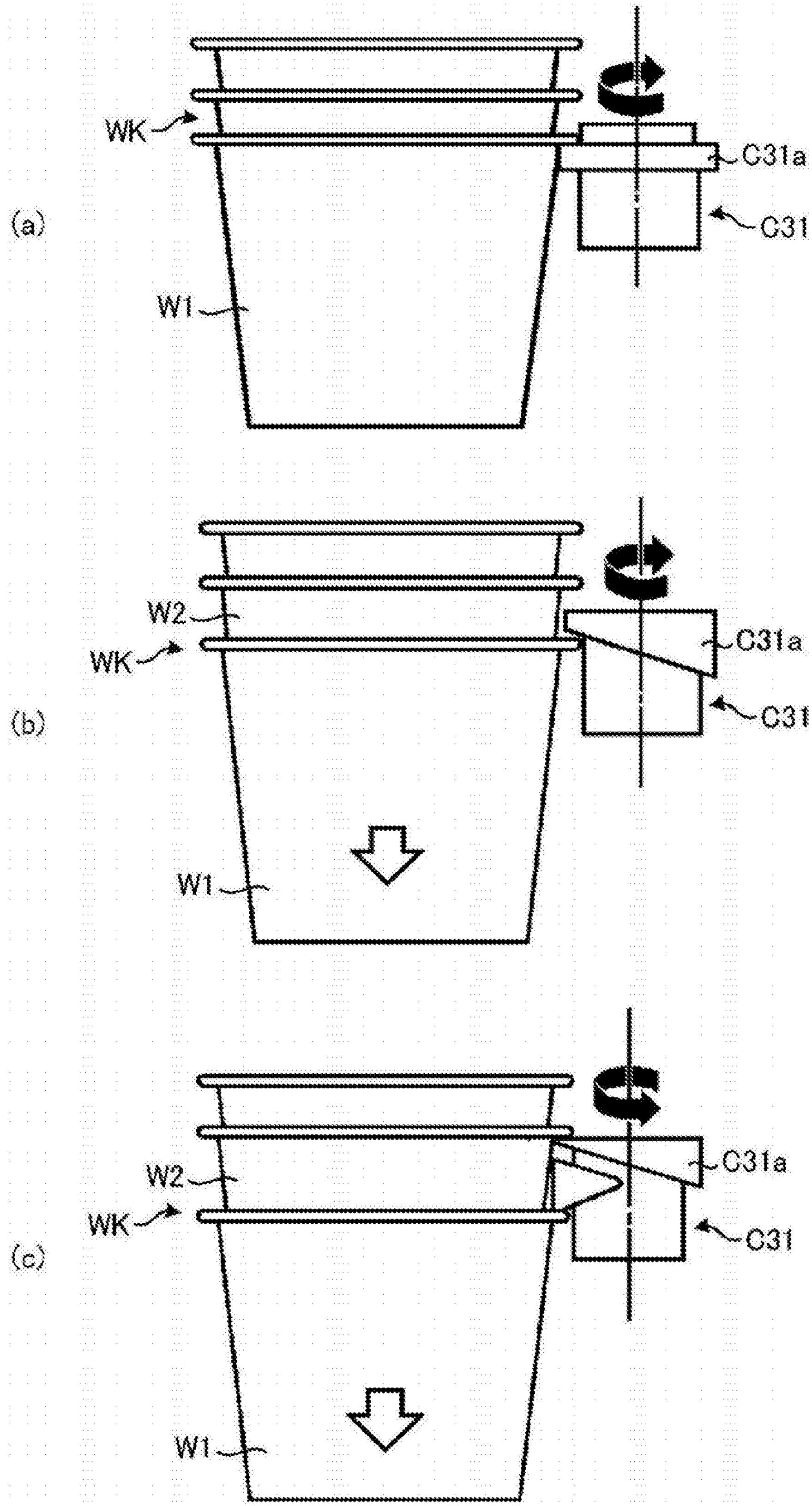


图11

Petitioner Exhibit 1002-2101

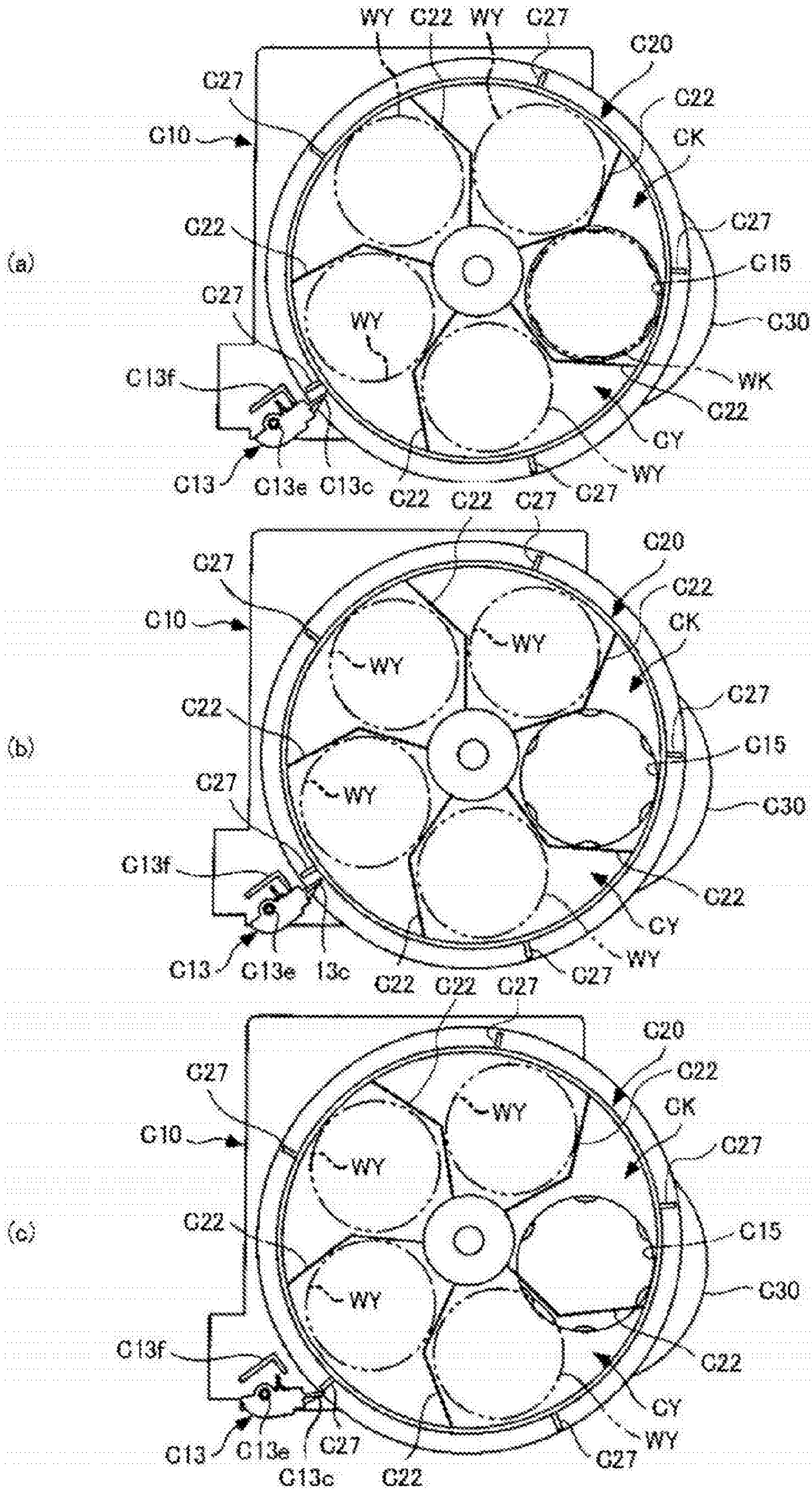
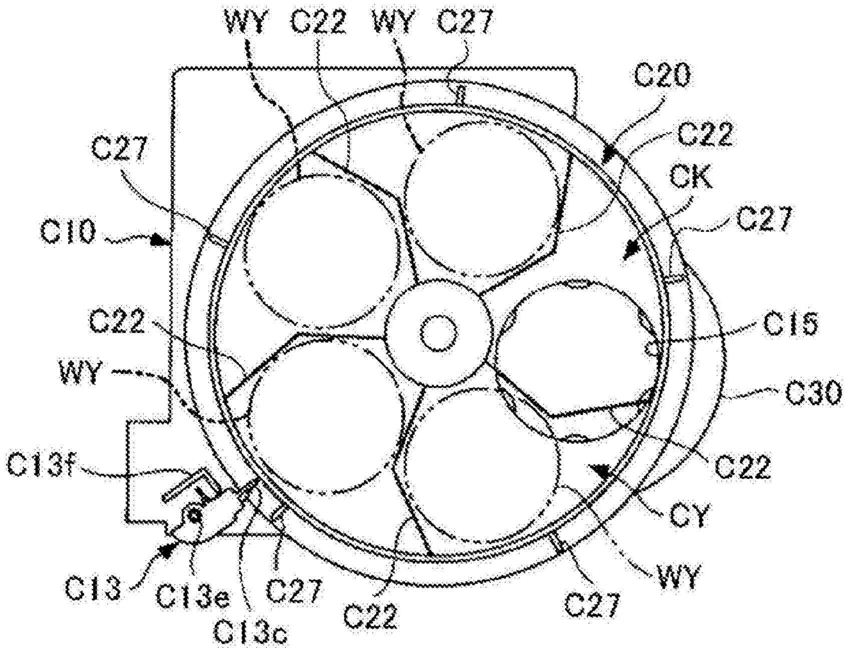


图12

Petitioner Exhibit 1002-2102



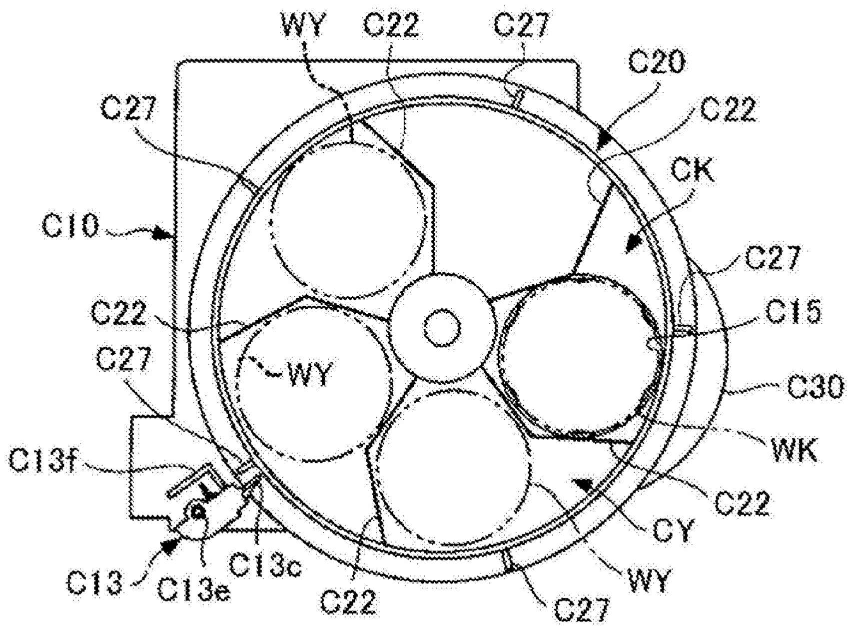


图13

Petitioner Exhibit 1002-2103

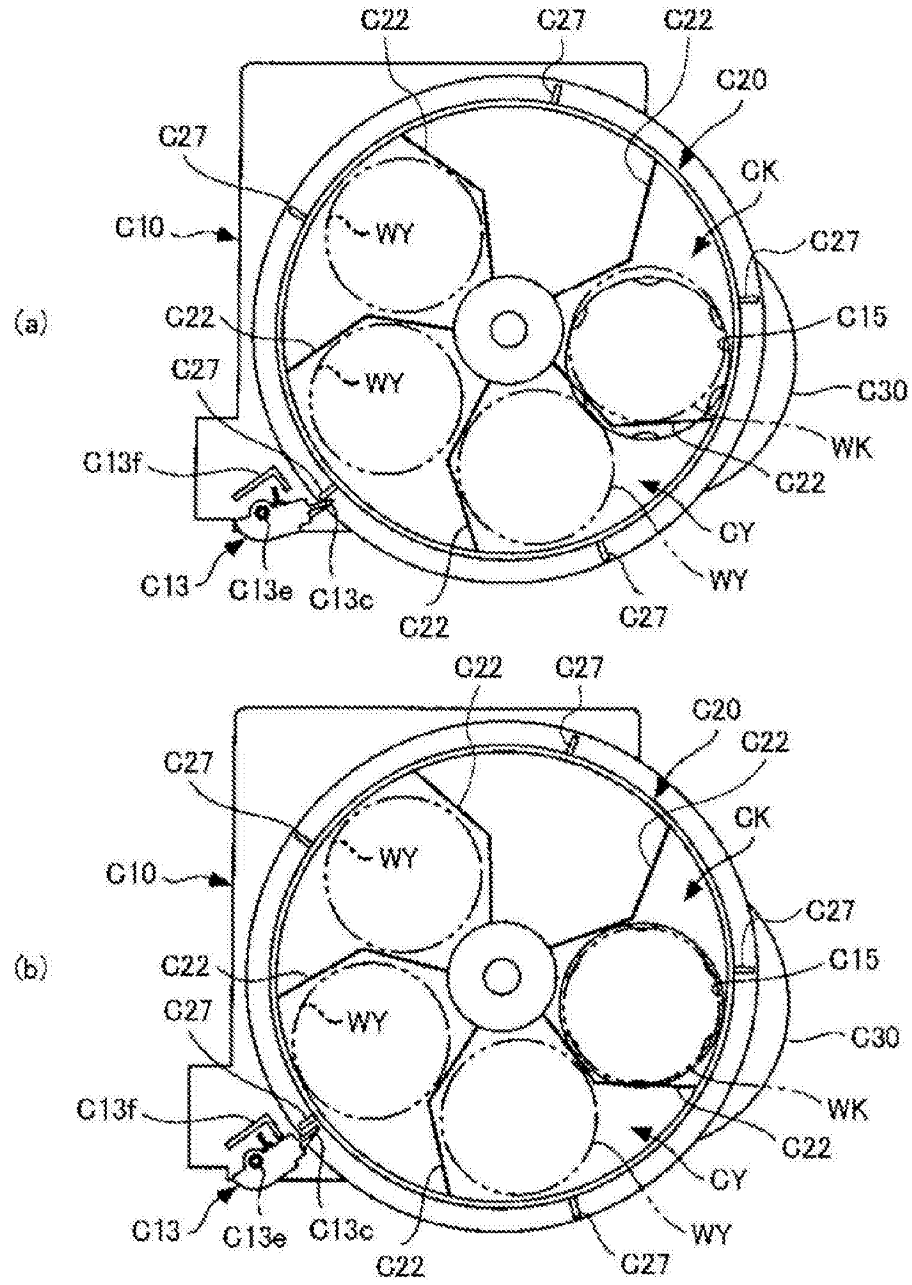


图14

Petitioner Exhibit 1002-2104

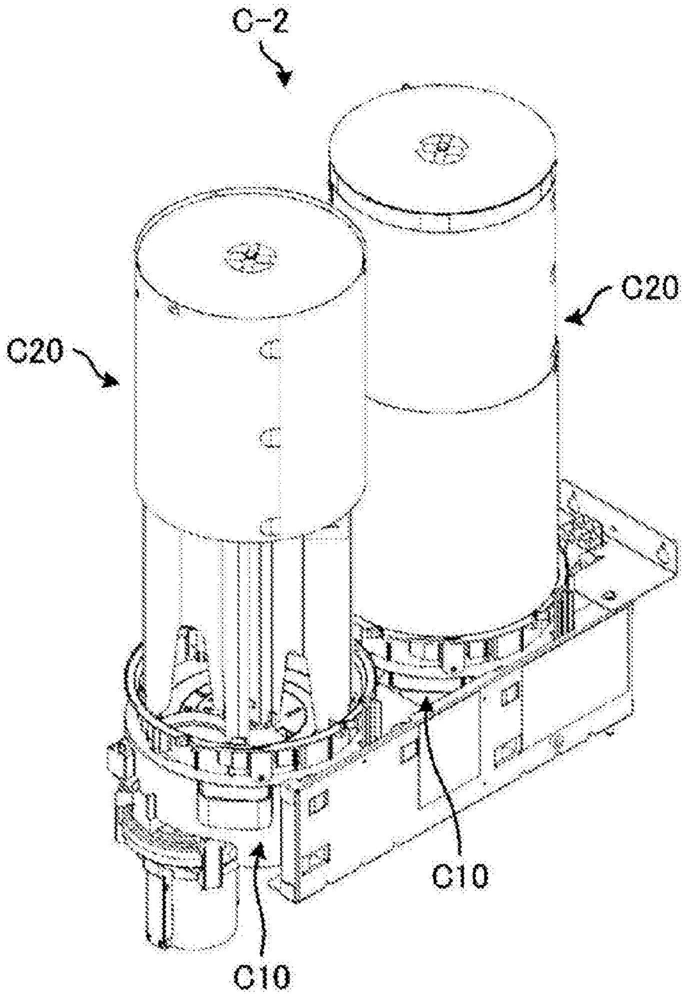


图15

Petitioner Exhibit 1002-2105

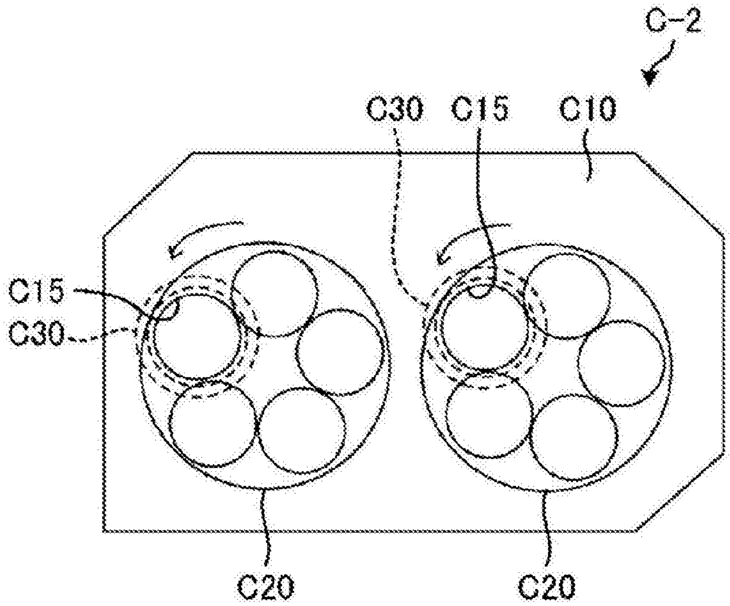


图16

Petitioner Exhibit 1002-2106

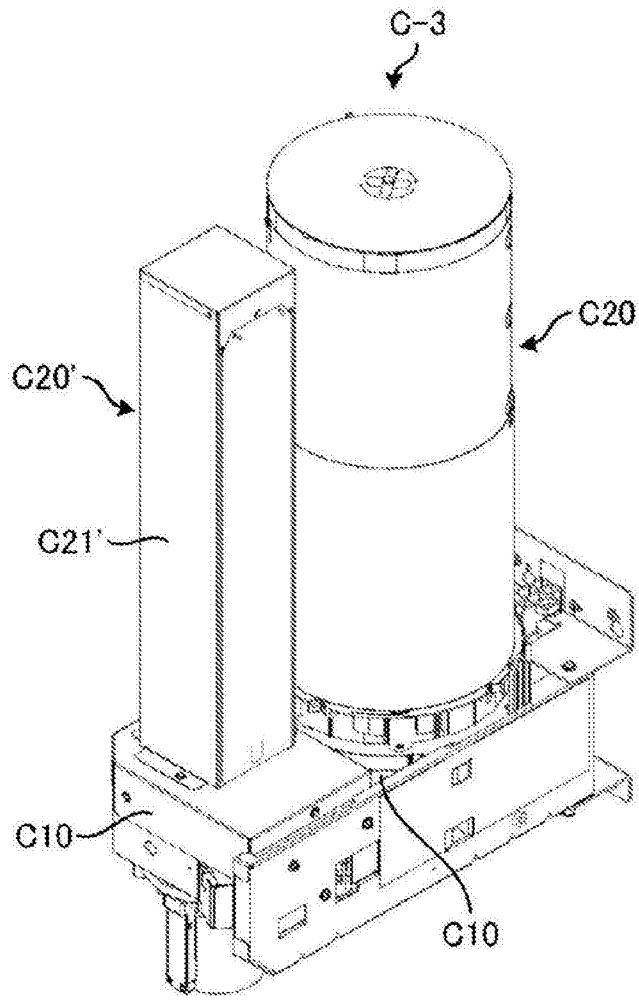


图17

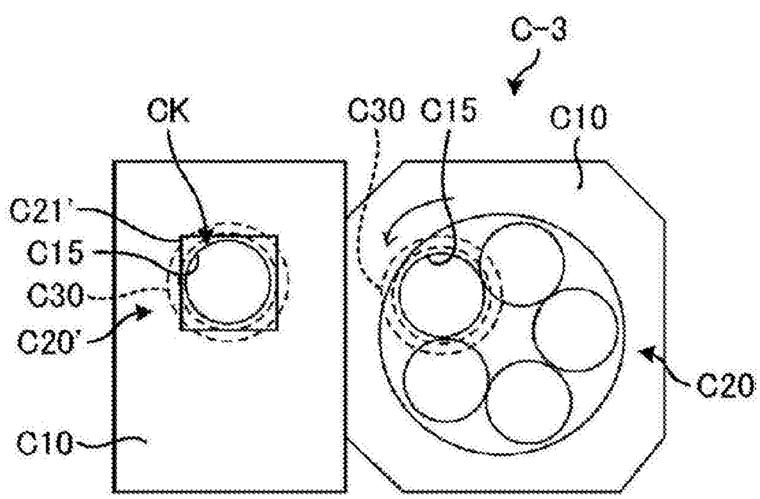


图18

Petitioner Exhibit 1002-2107

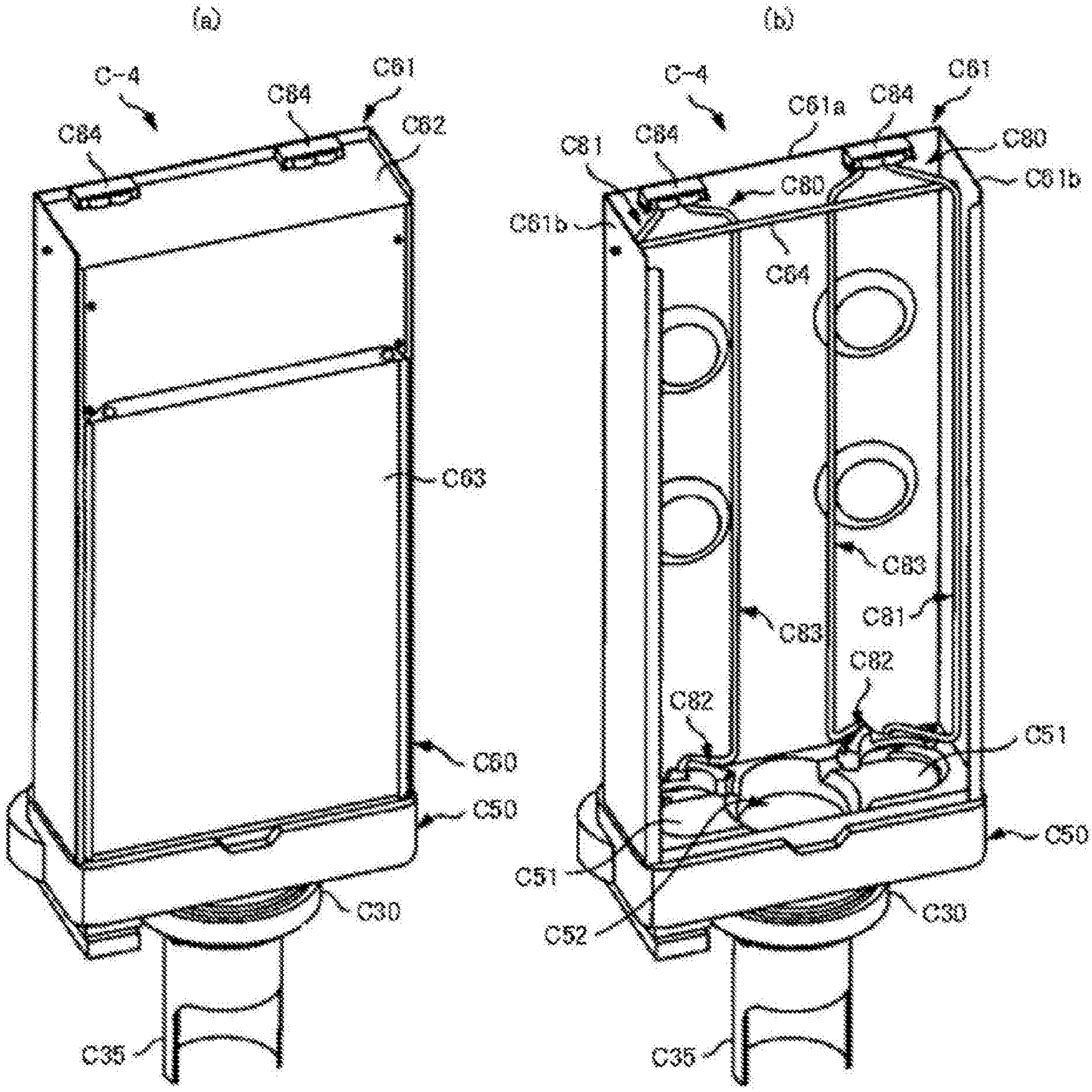


图19

Petitioner Exhibit 1002-2108

(a)

(b)

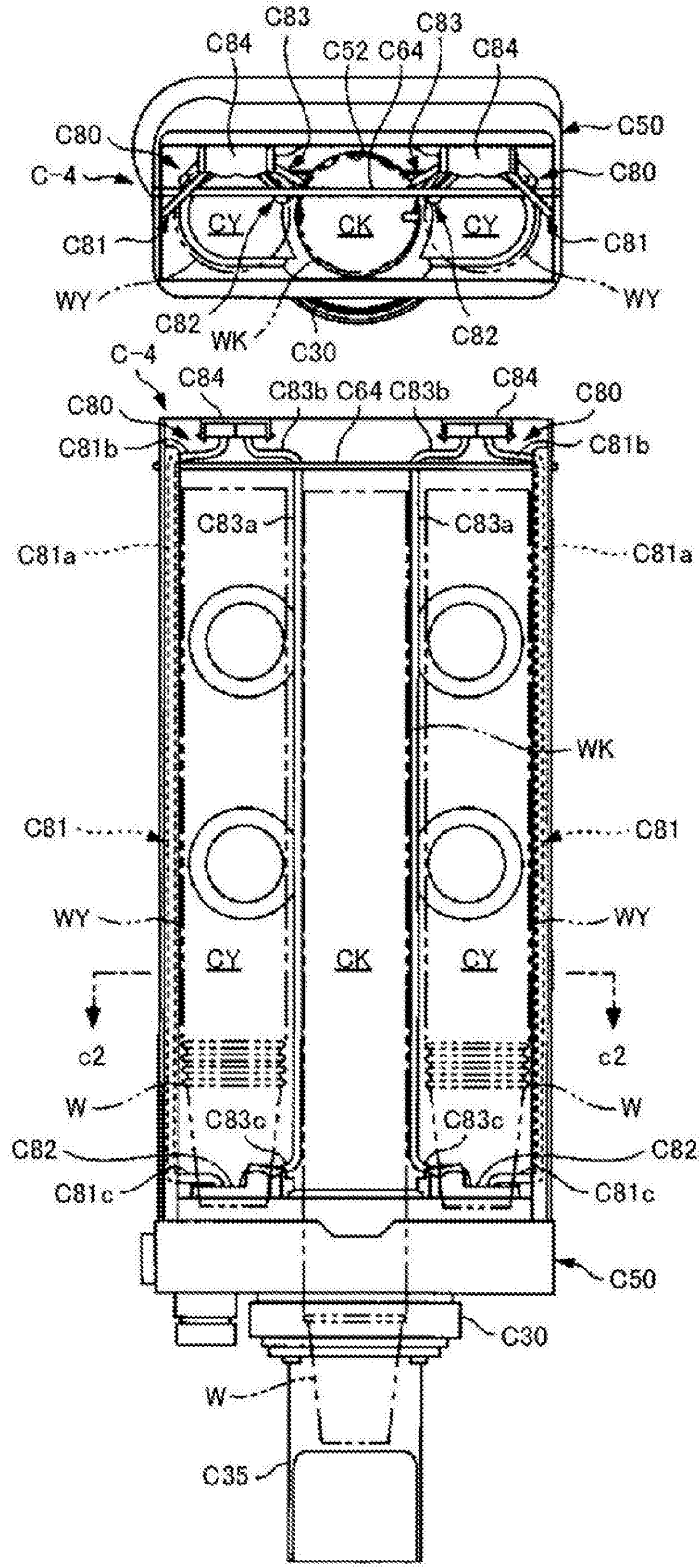


图20

Petitioner Exhibit 1002-2109

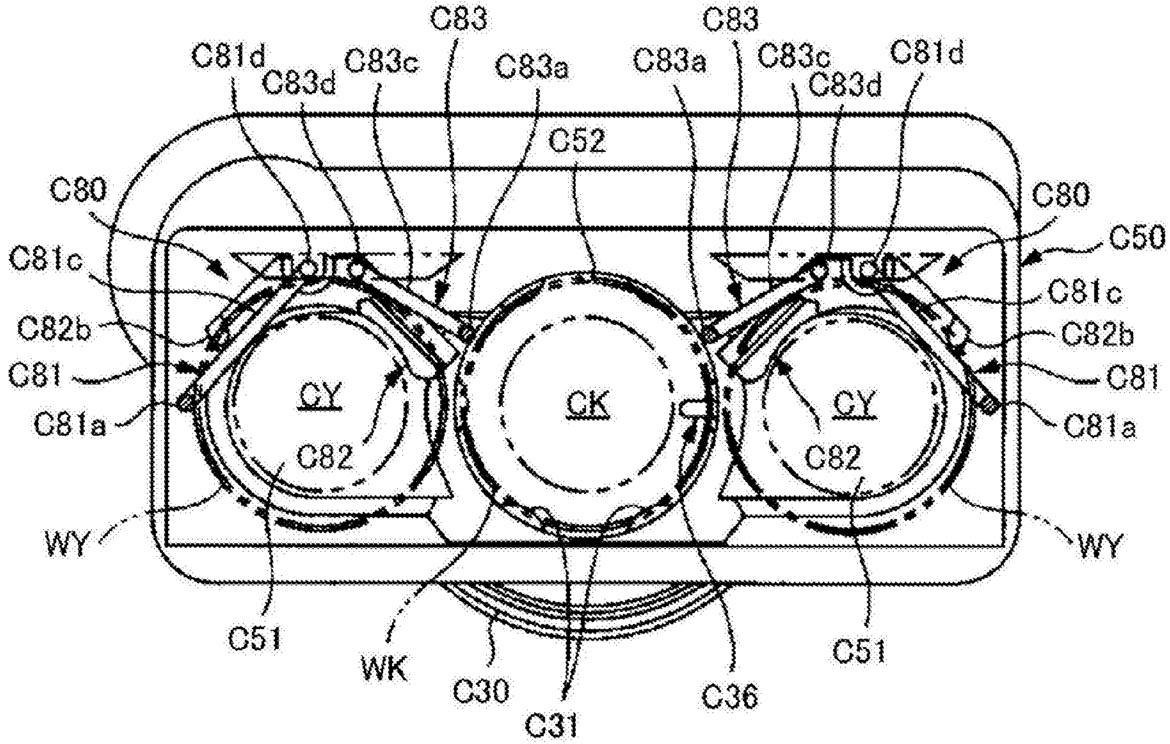


图21

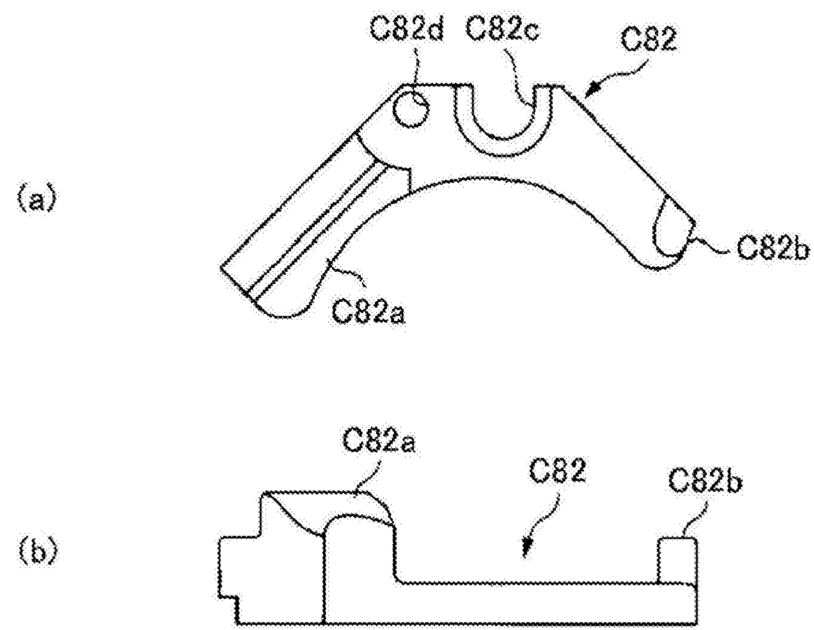


图22

Petitioner Exhibit 1002-2110

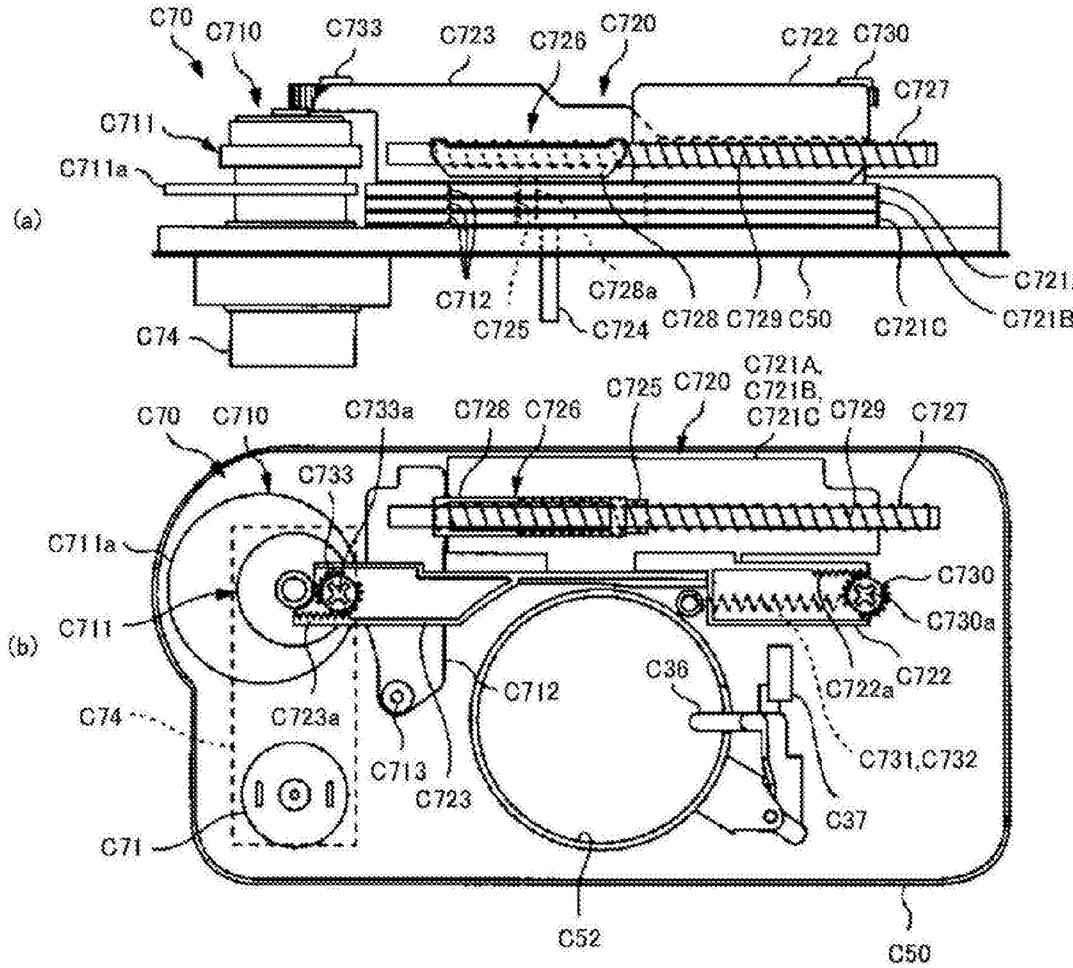


图23

Petitioner Exhibit 1002-2111

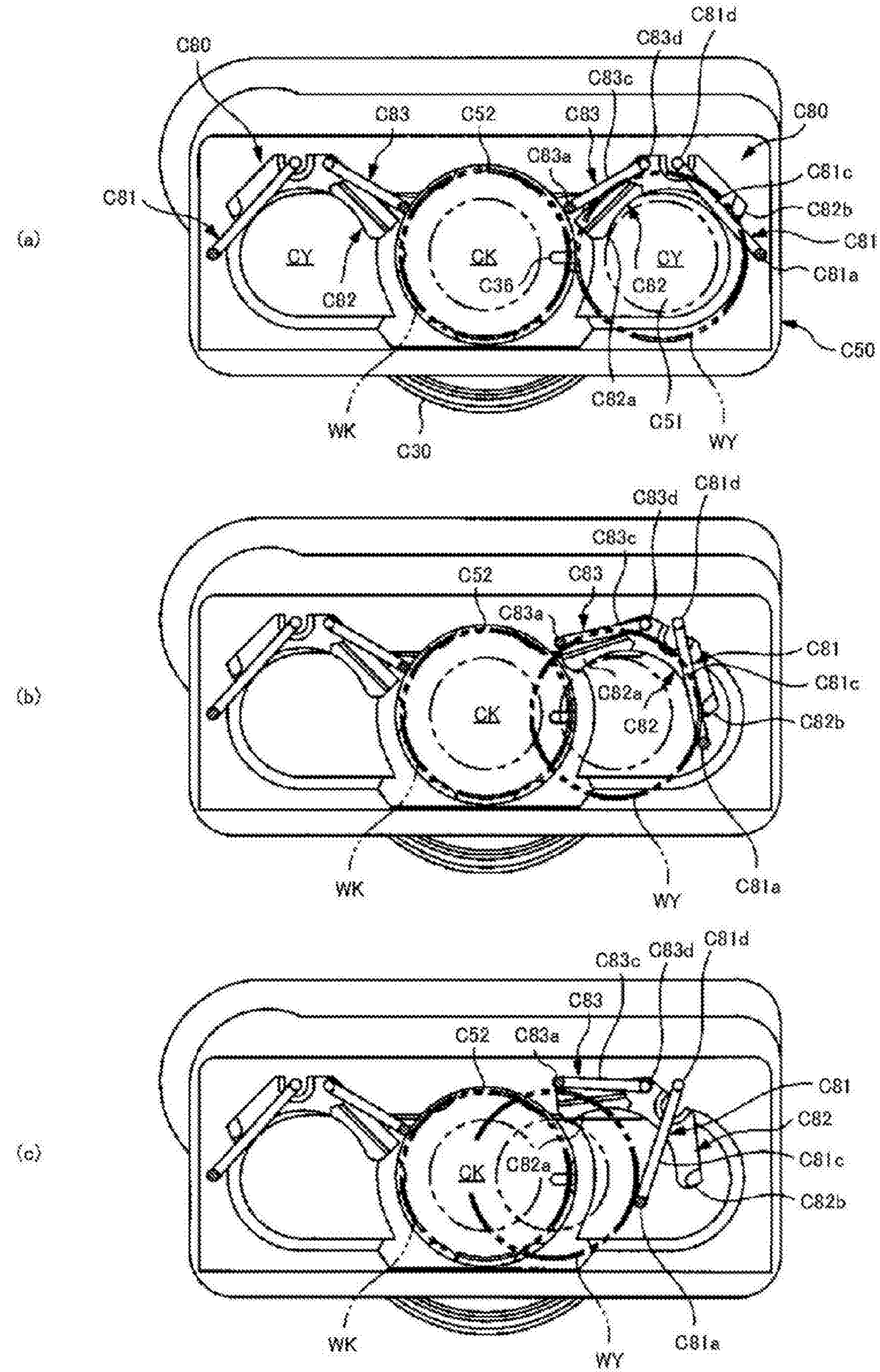


图24

Petitioner Exhibit 1002-2112

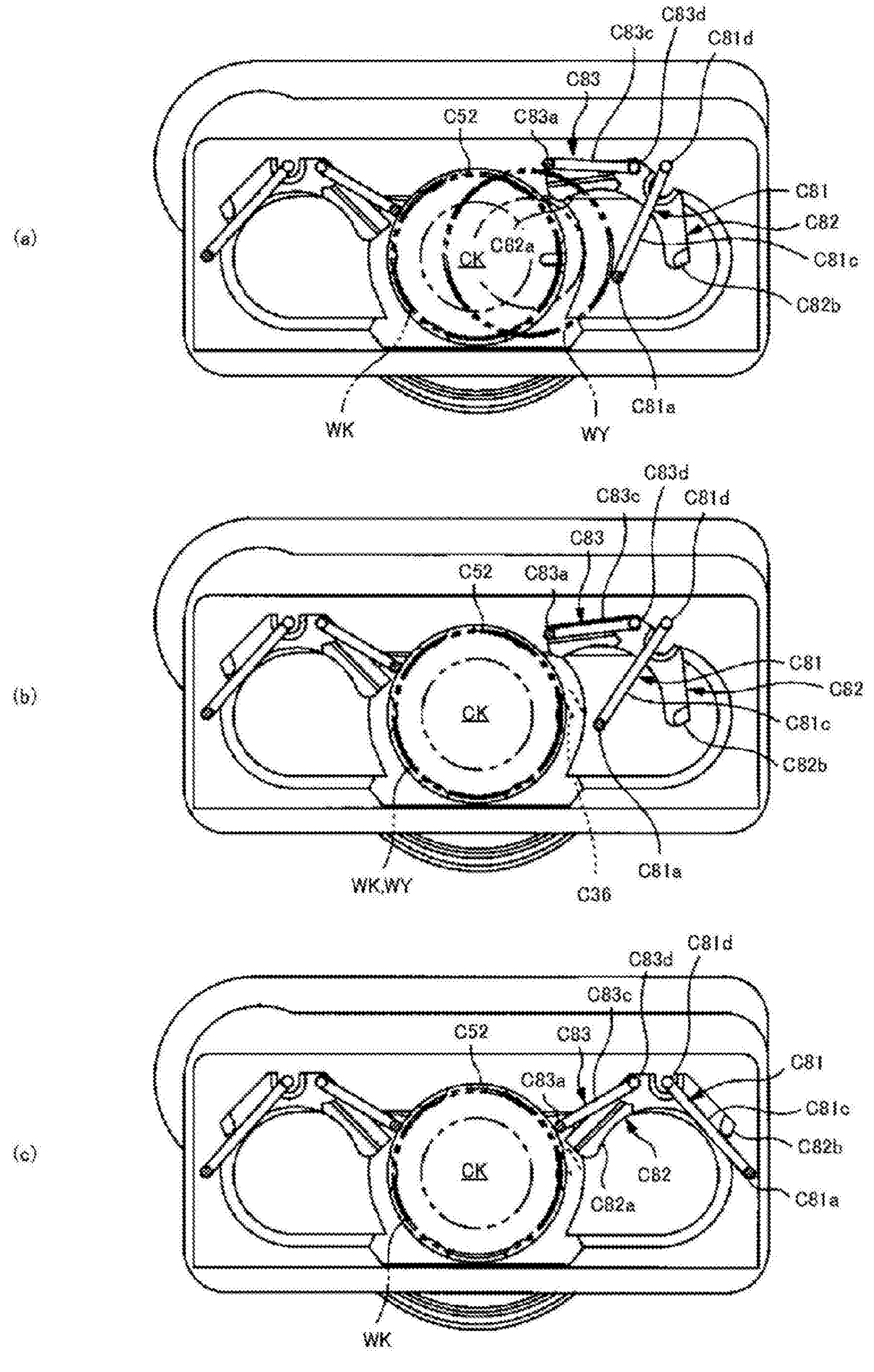


图25

Petitioner Exhibit 1002-2113

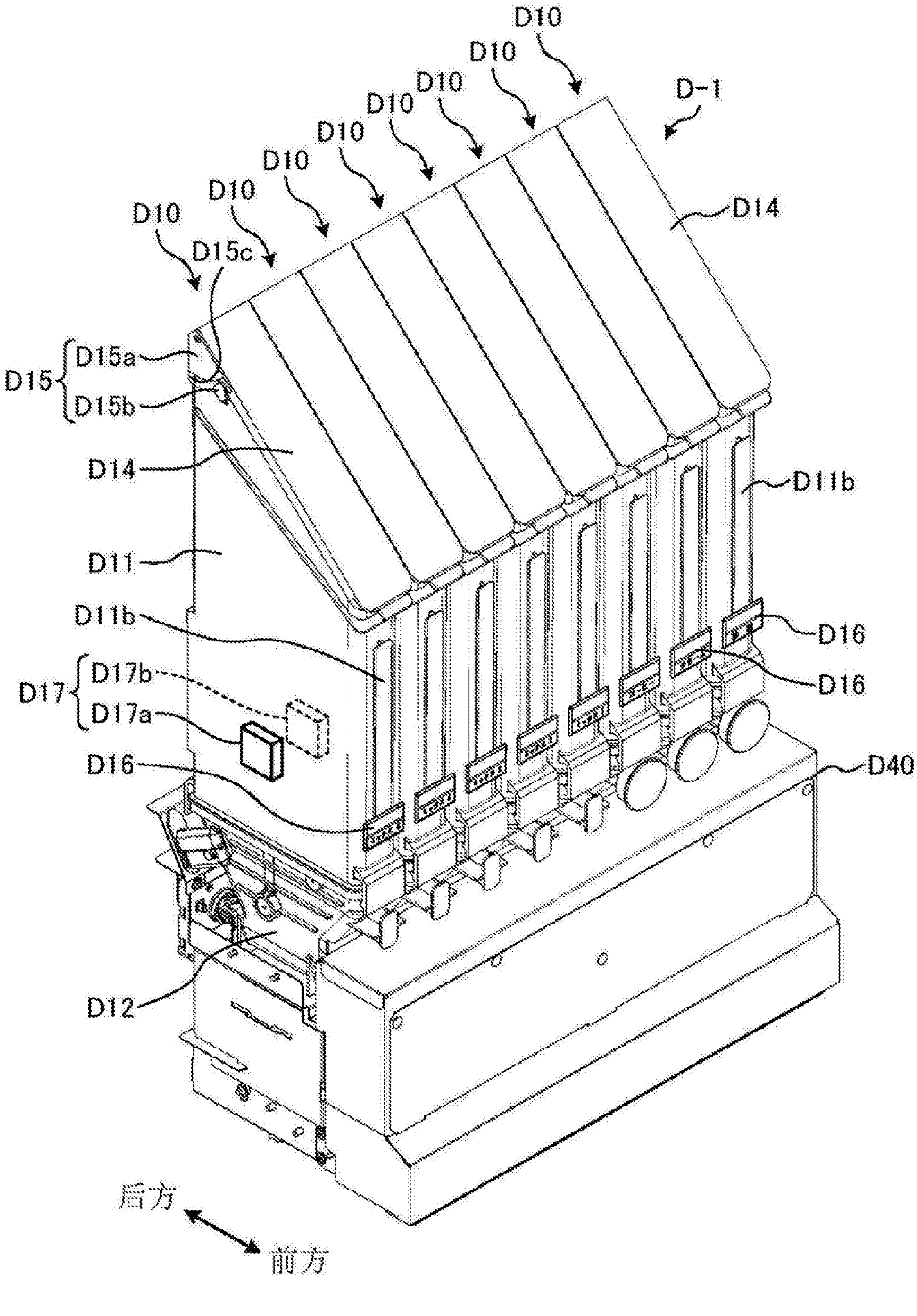


图26

Petitioner Exhibit 1002-2114

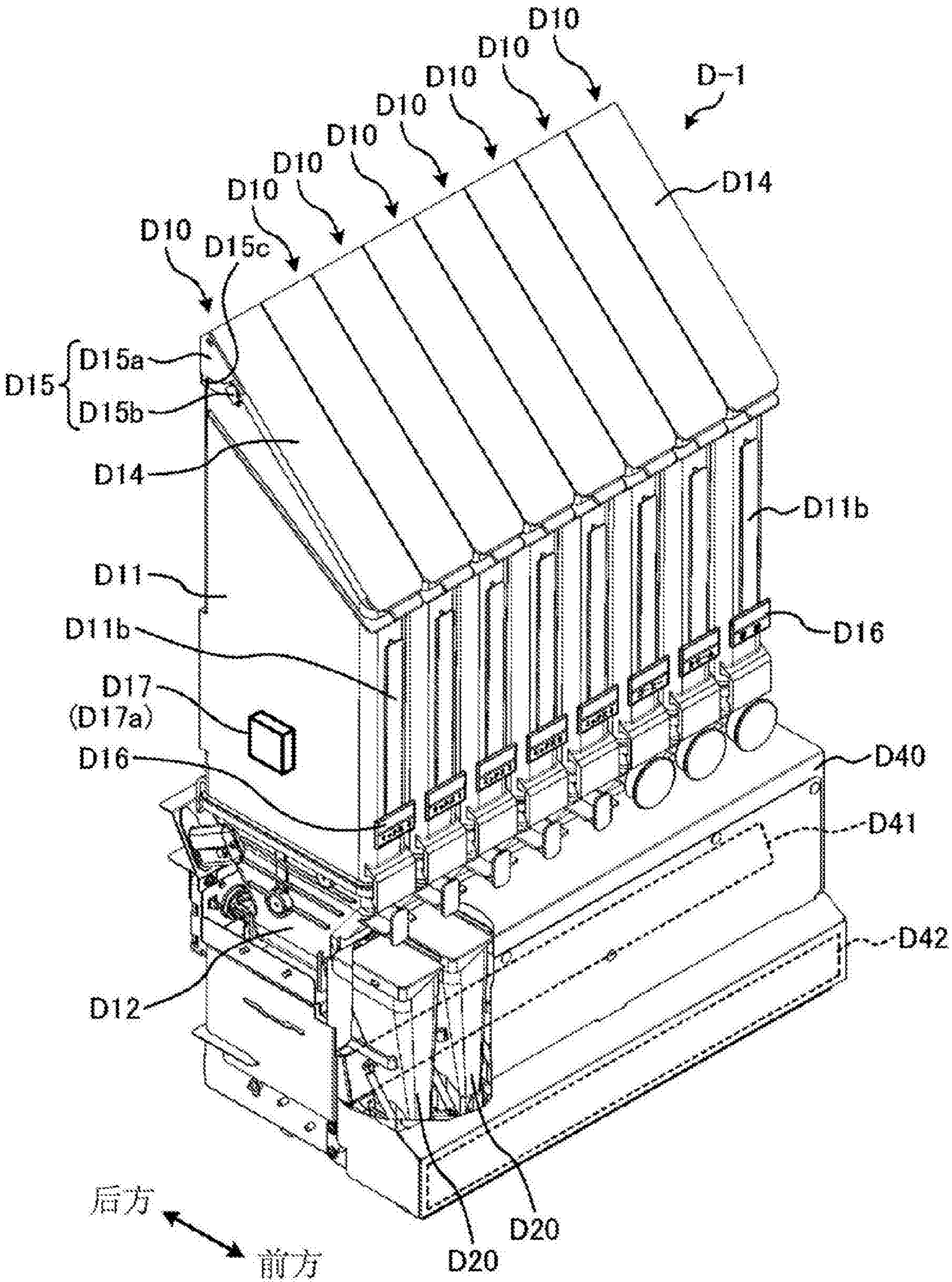


图27

Petitioner Exhibit 1002-2115

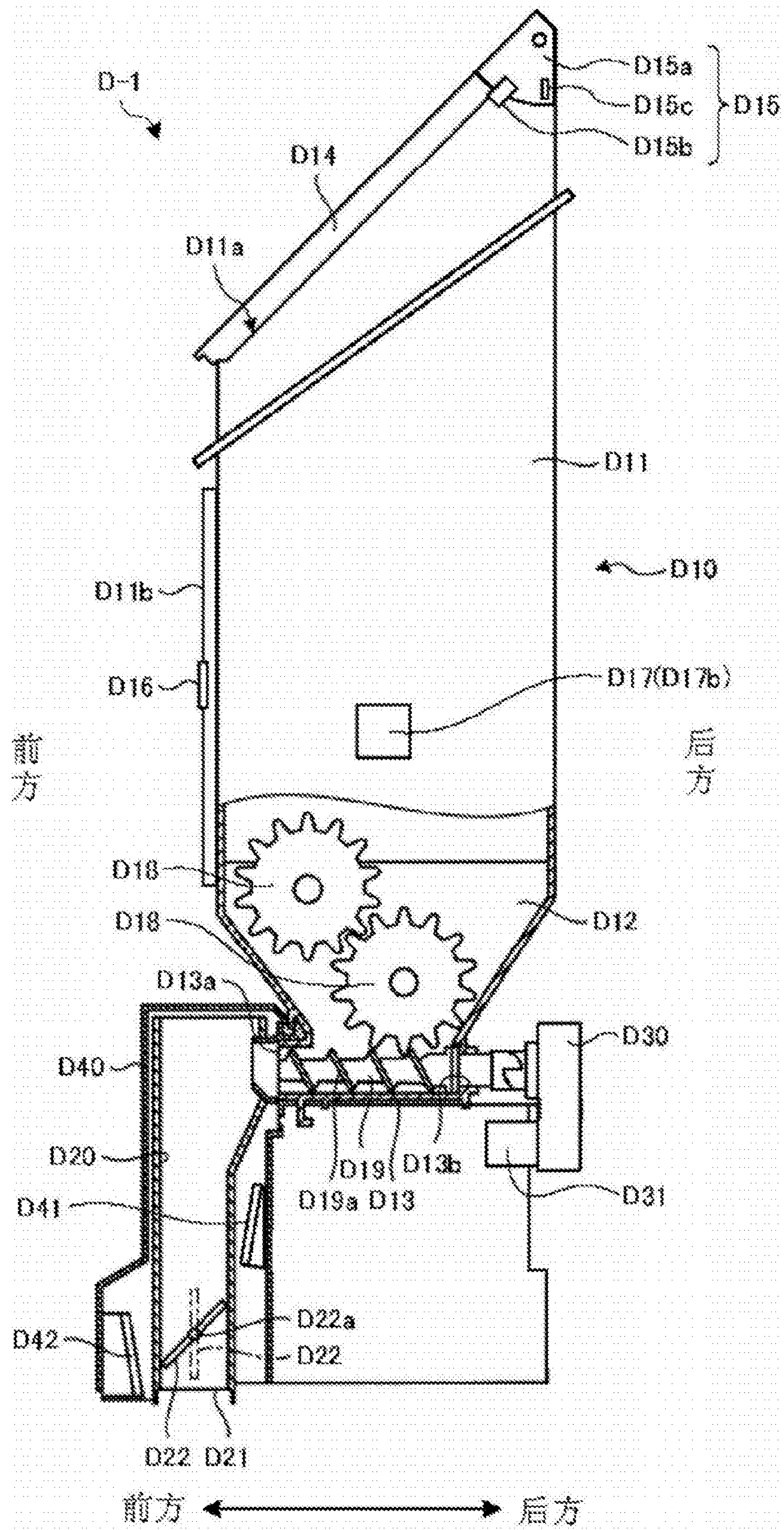


图28

Petitioner Exhibit 1002-2116

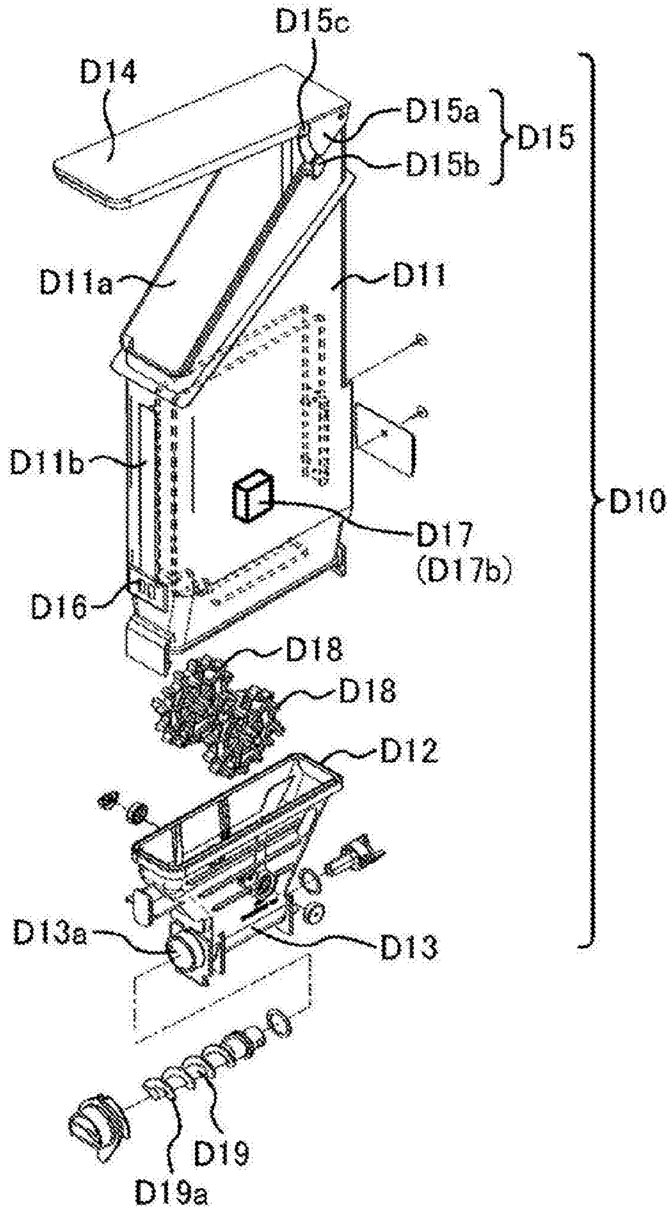


图29

Petitioner Exhibit 1002-2117

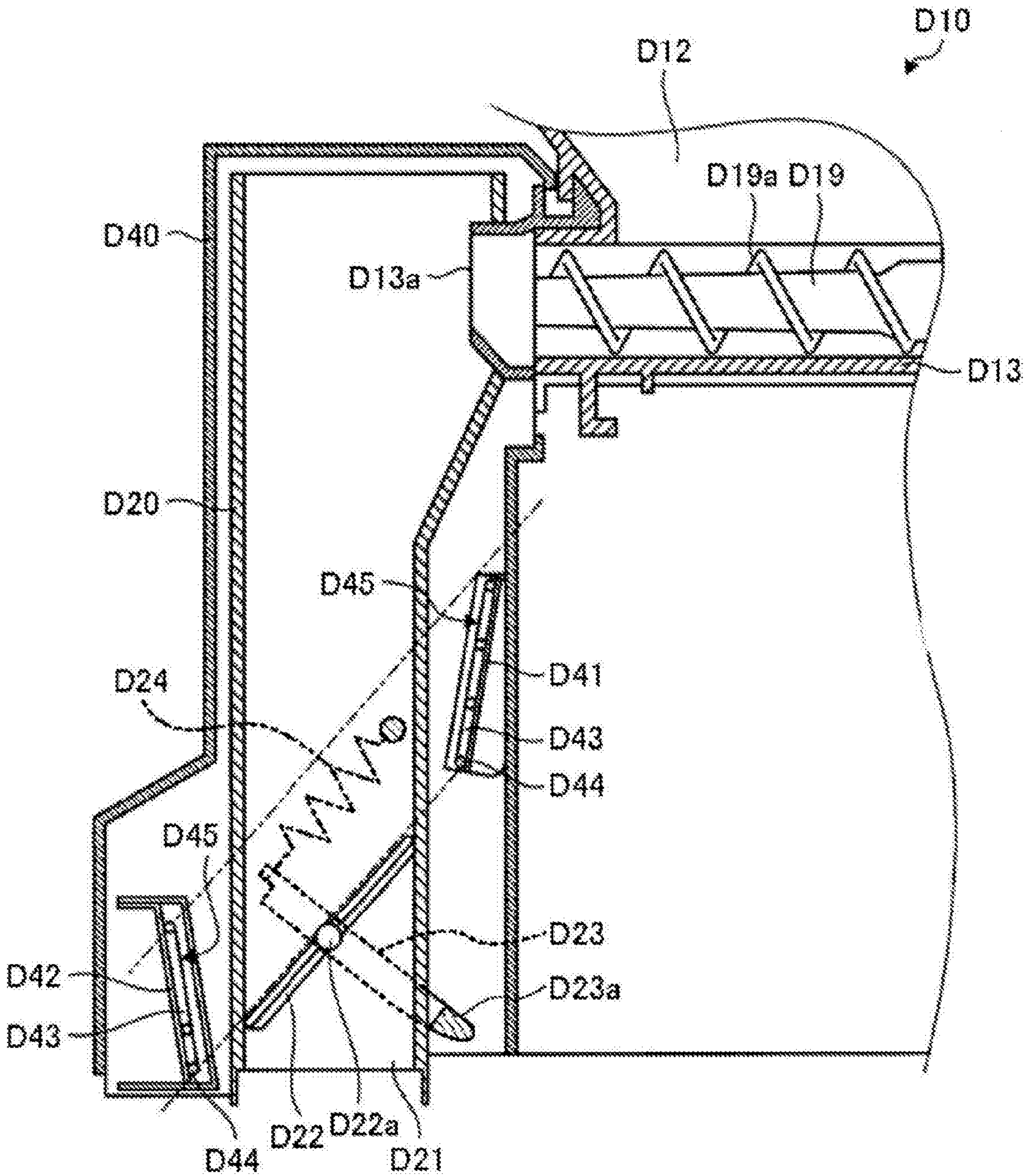


图30

Petitioner Exhibit 1002-2118

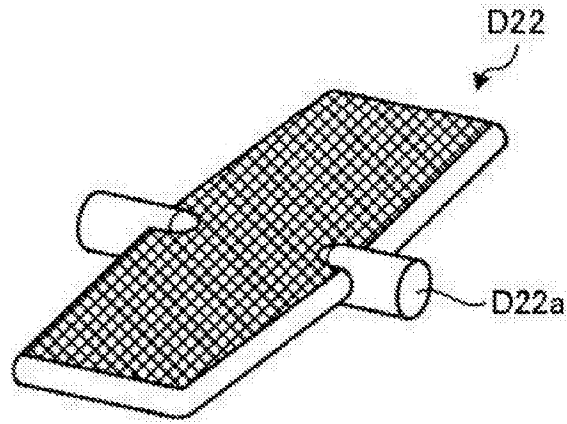


图31

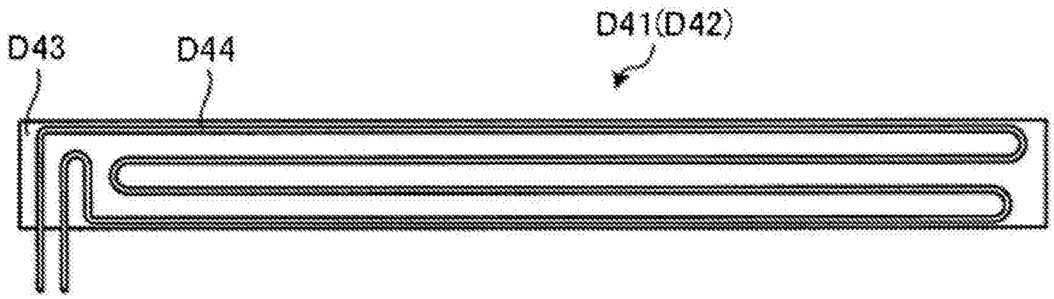


图32

Petitioner Exhibit 1002-2119

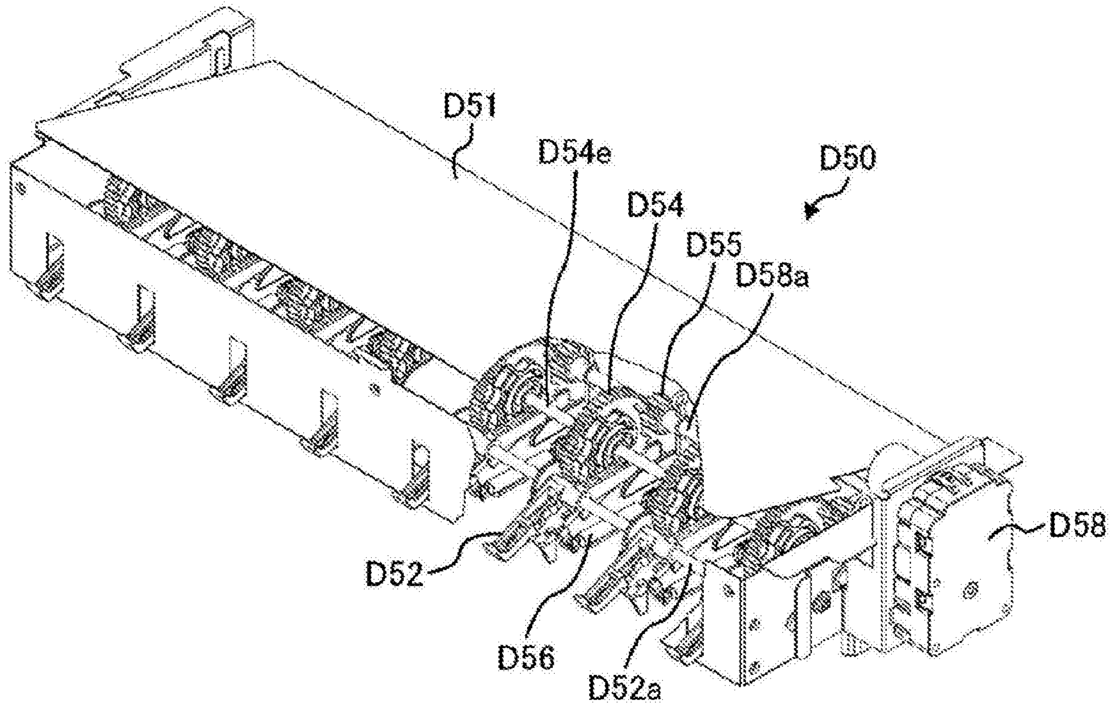

D51
D54e
D50
D54
D55
D58a
D58
D52
D56
D52a

图33

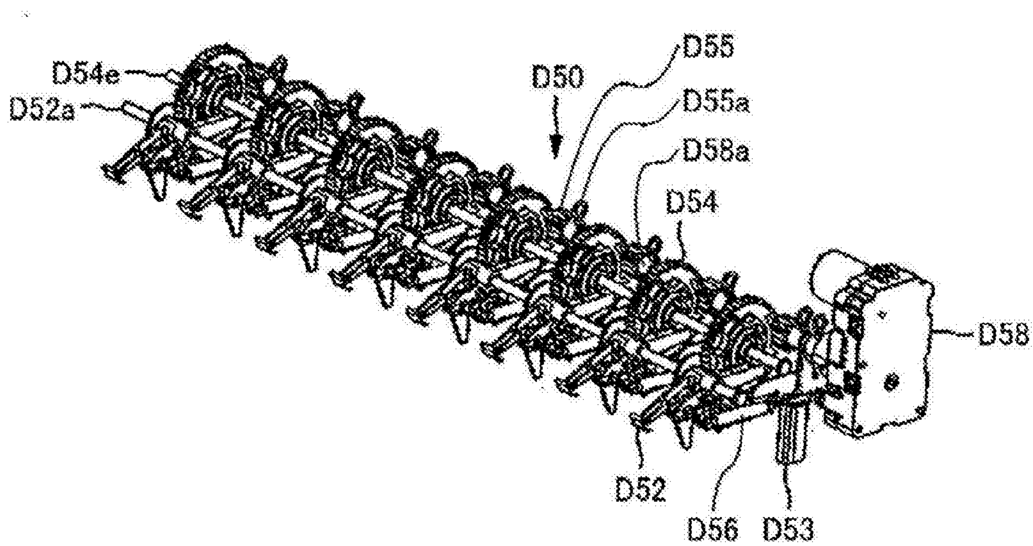

D54e
D52a
D50
D55
D55a
D58a
D54
D58
D52
D56
D53

图34

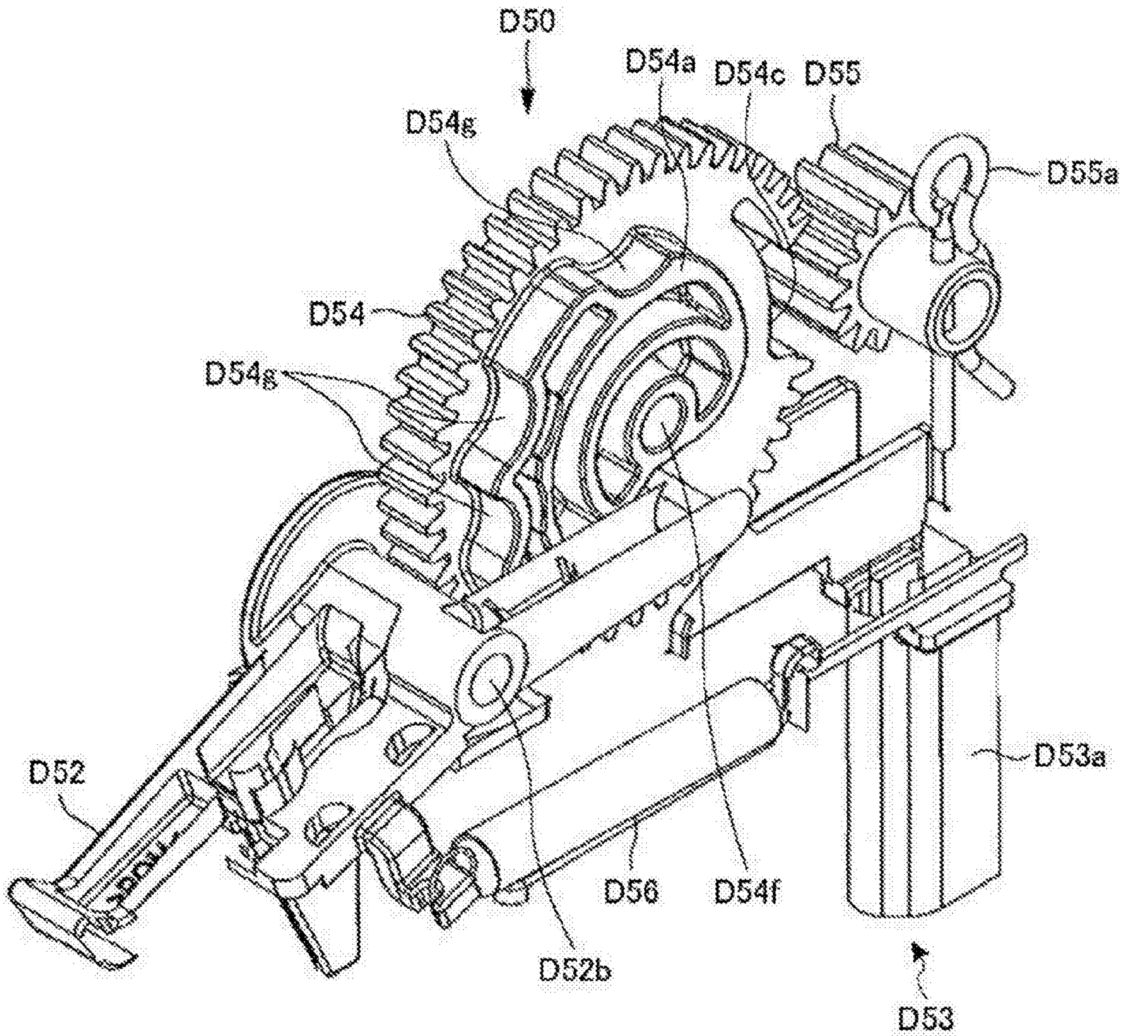


图35

Petitioner Exhibit 1002-2121

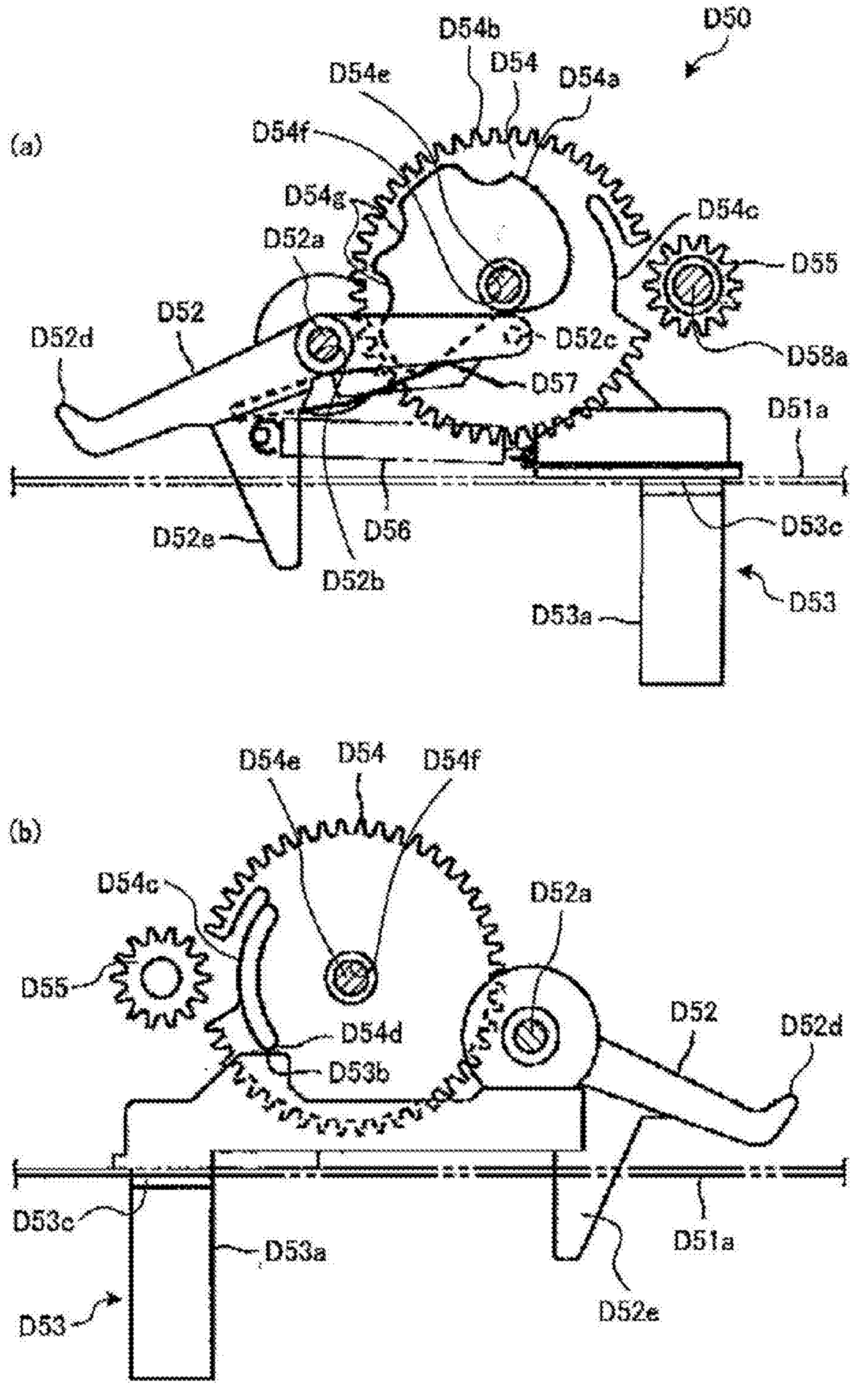


图36

Petitioner Exhibit 1002-2122

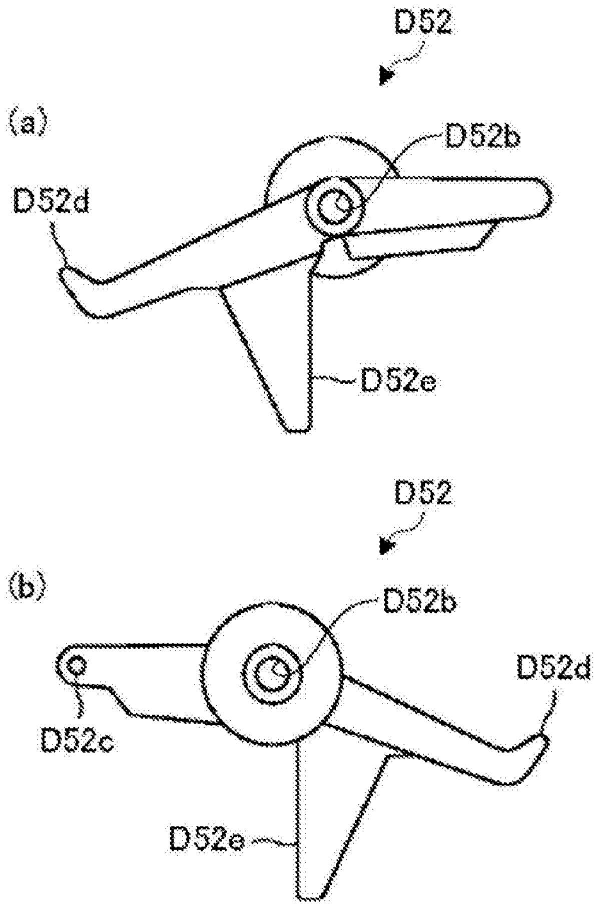


图37

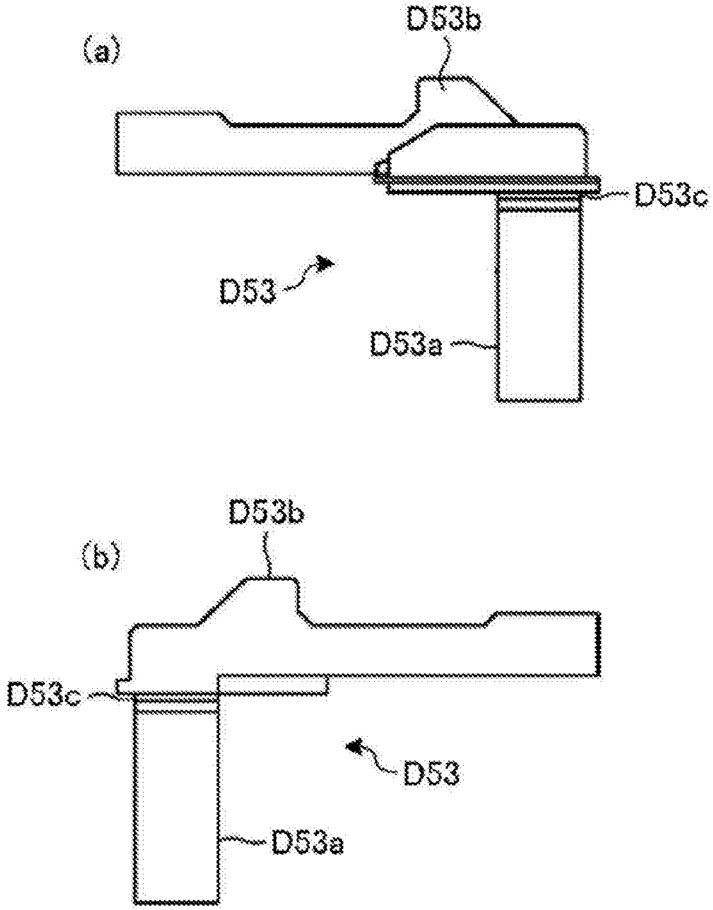
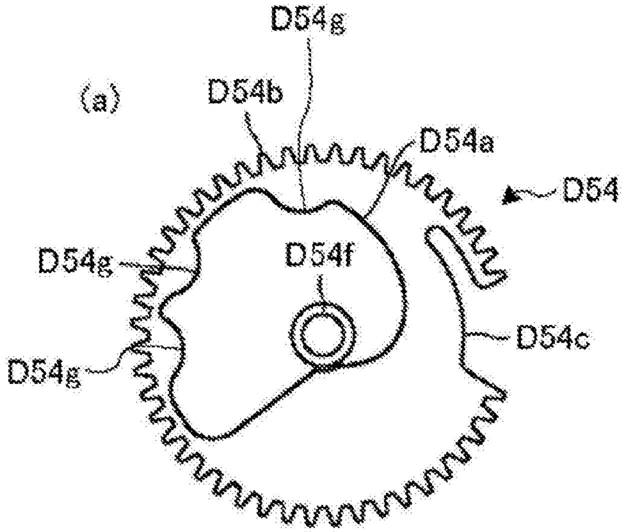


图38

Petitioner Exhibit 1002-2124



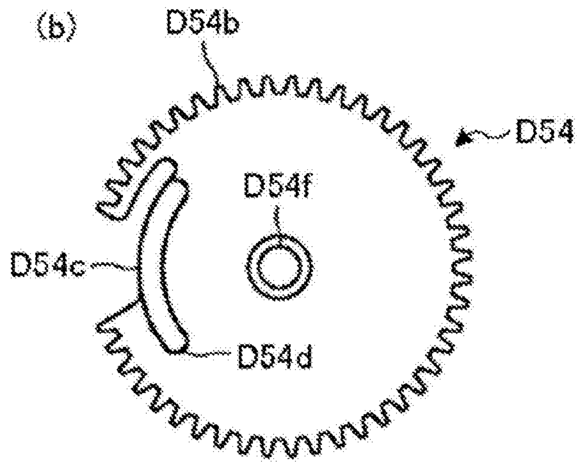


图39

Petitioner Exhibit 1002-2125

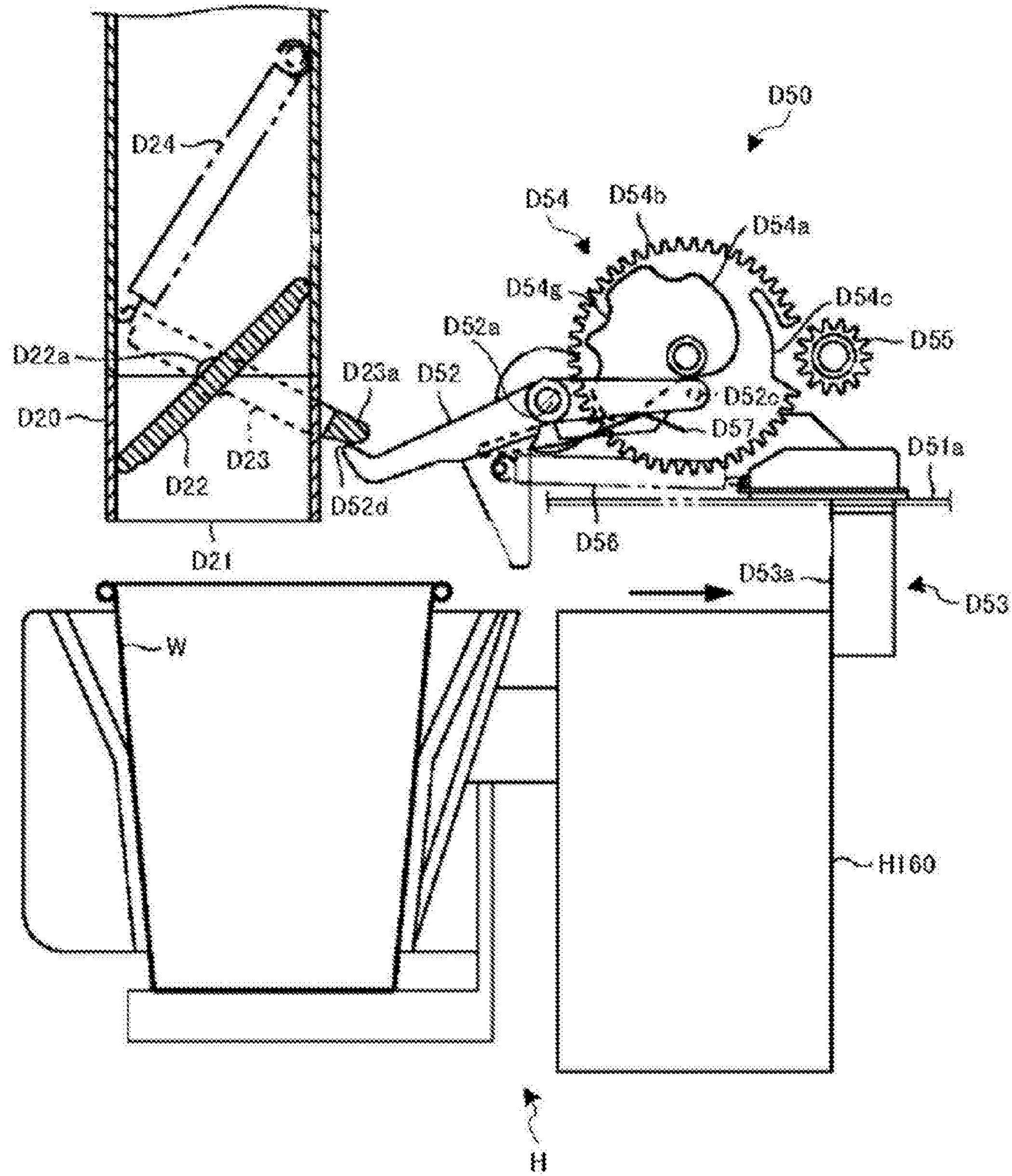


图40

Petitioner Exhibit 1002-2126

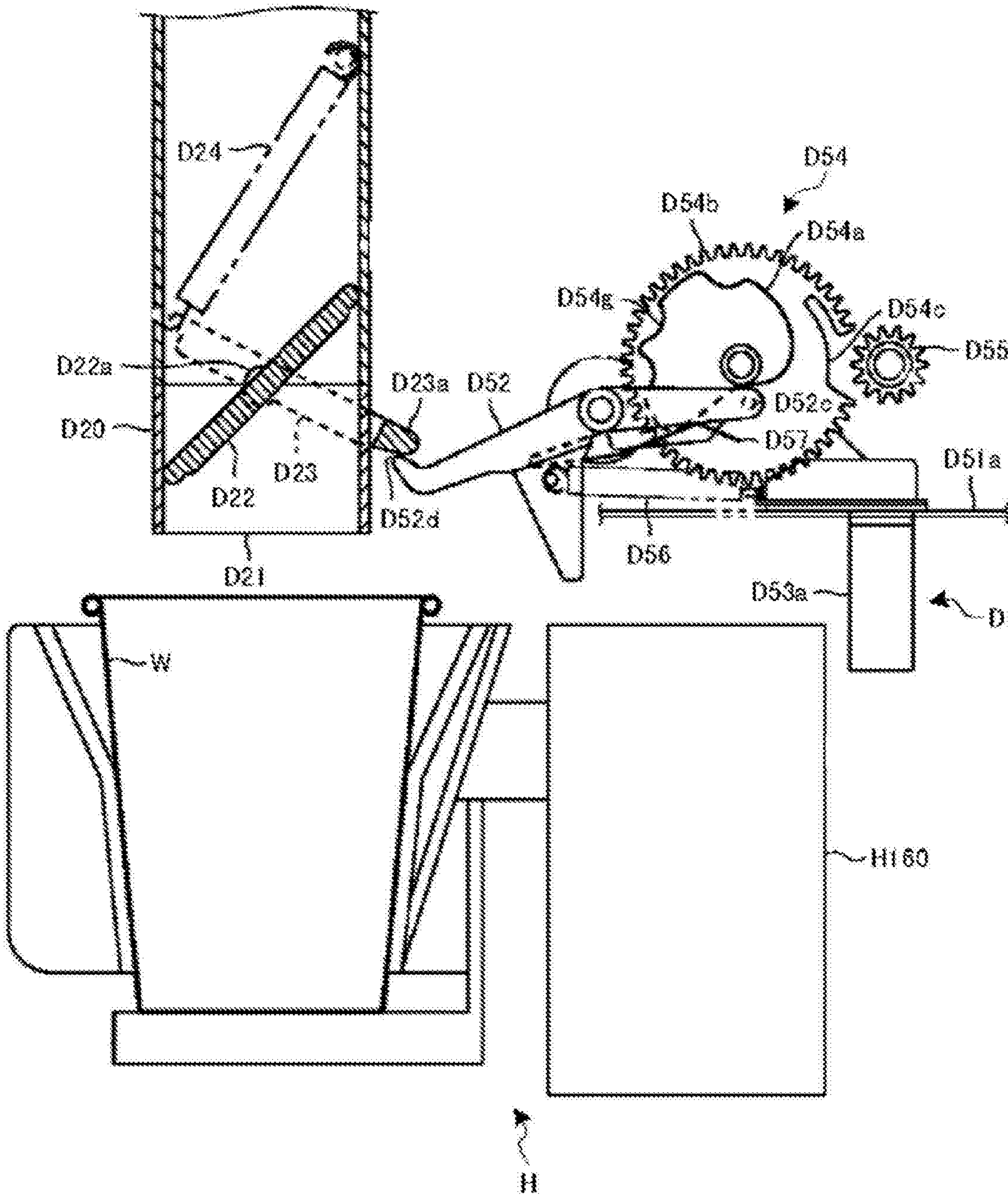


图41

Petitioner Exhibit 1002-2127

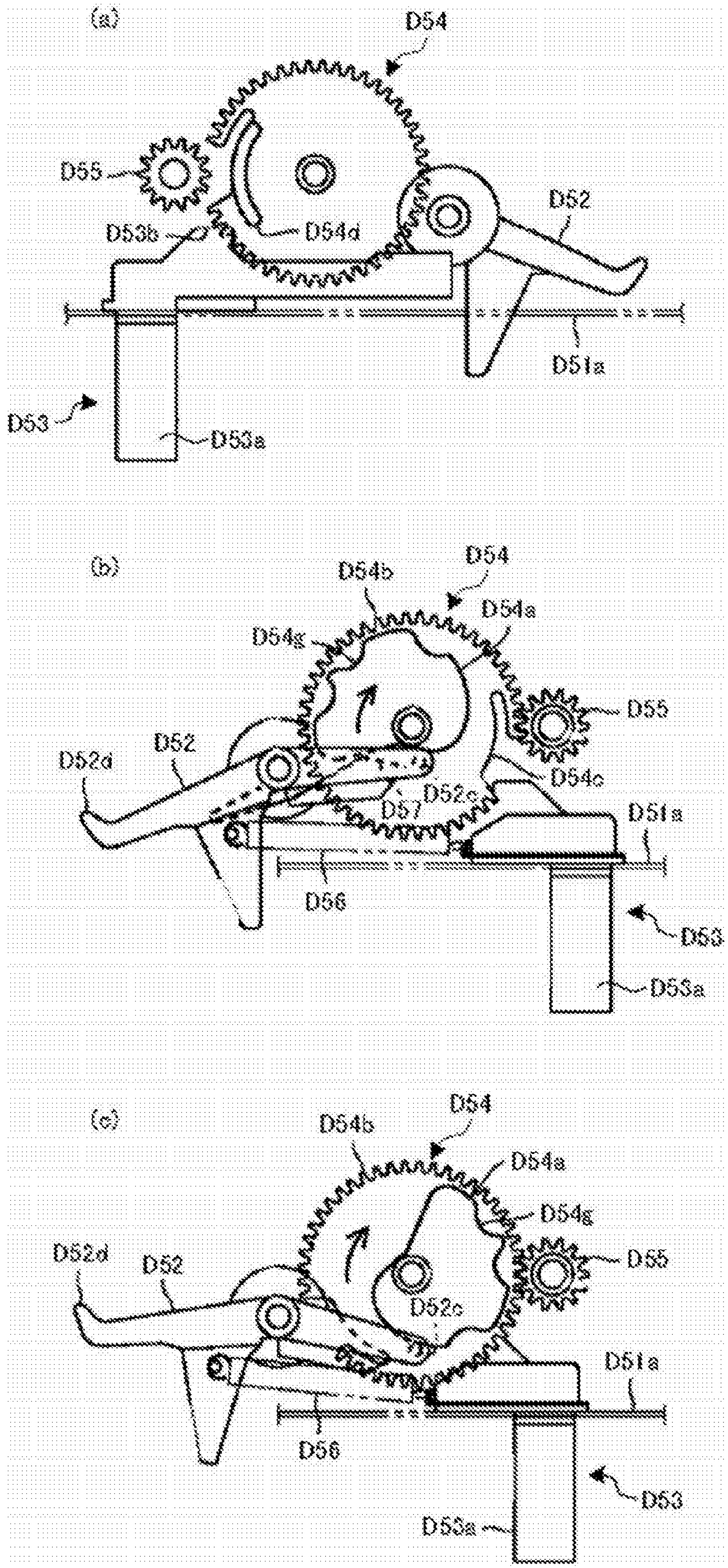


图42

Petitioner Exhibit 1002-2128

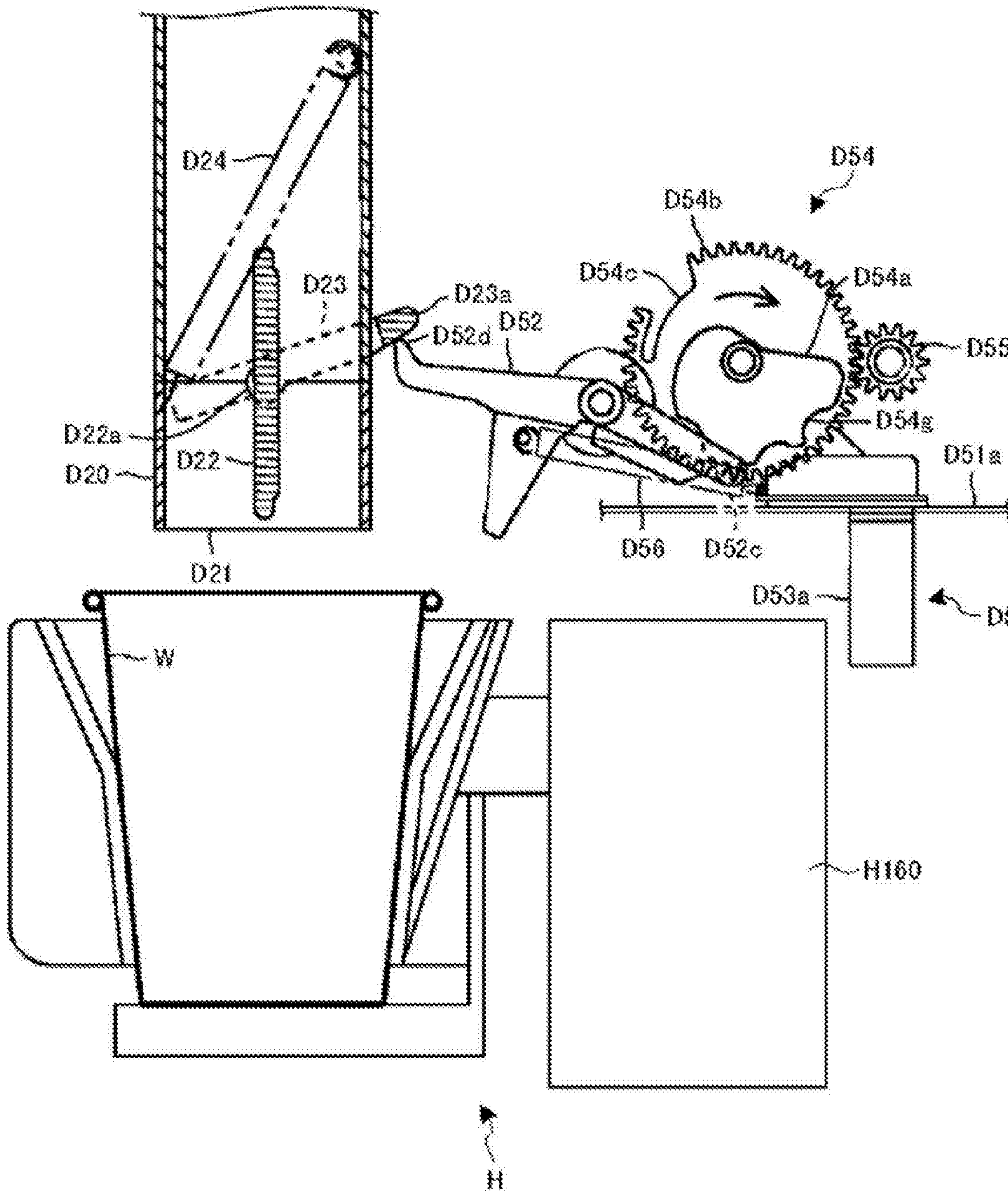


图43

Petitioner Exhibit 1002-2129

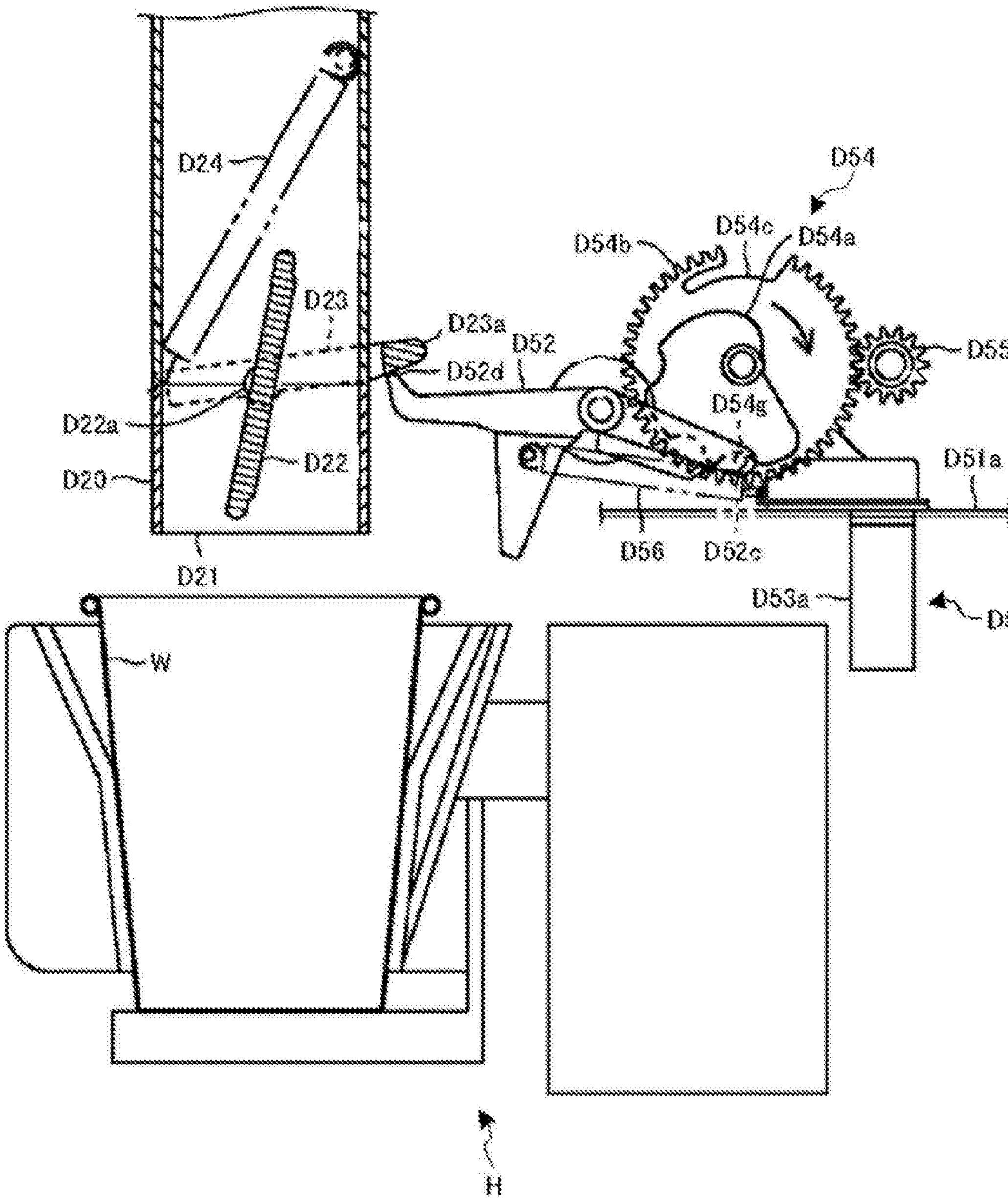


图44

Petitioner Exhibit 1002-2130

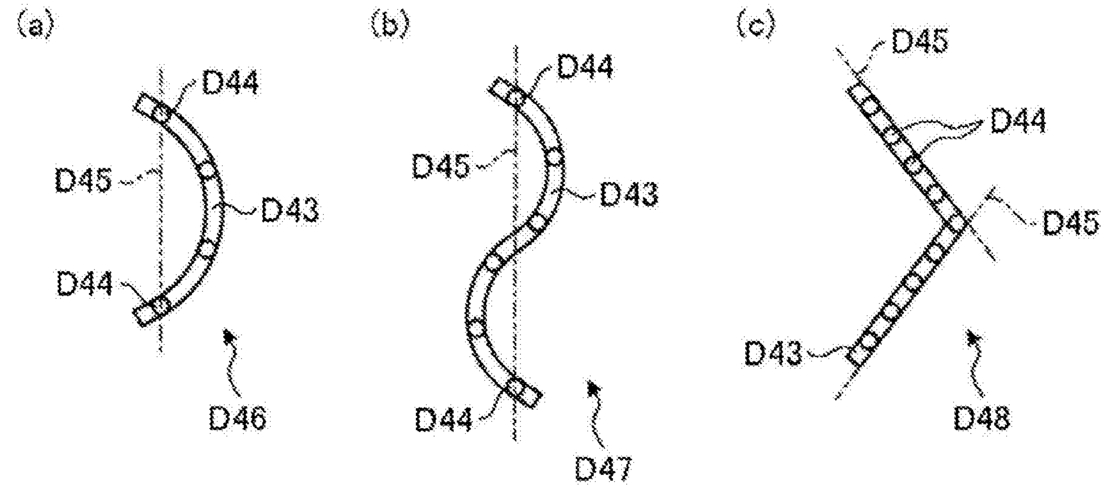


图45

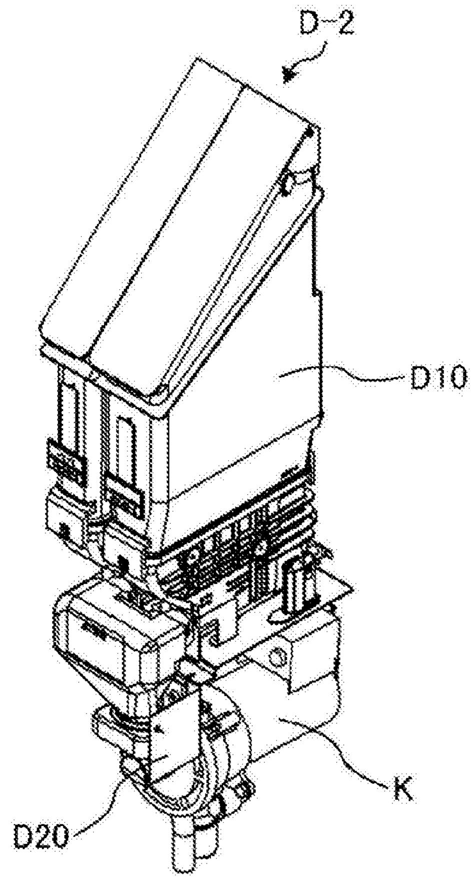


图46

Petitioner Exhibit 1002-2131

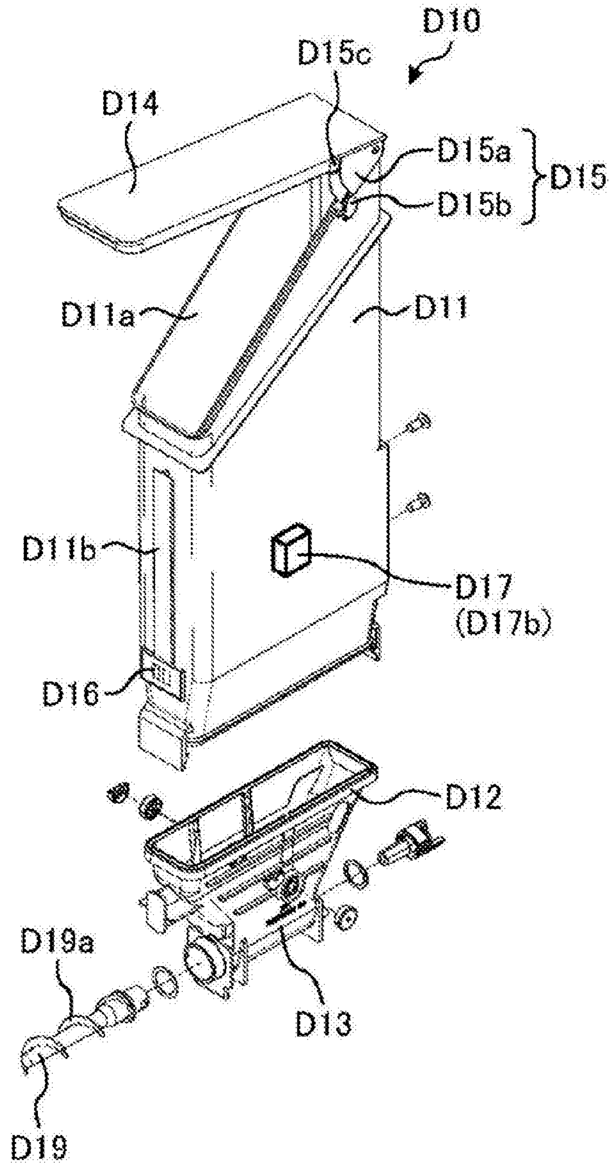


图47

Petitioner Exhibit 1002-2132

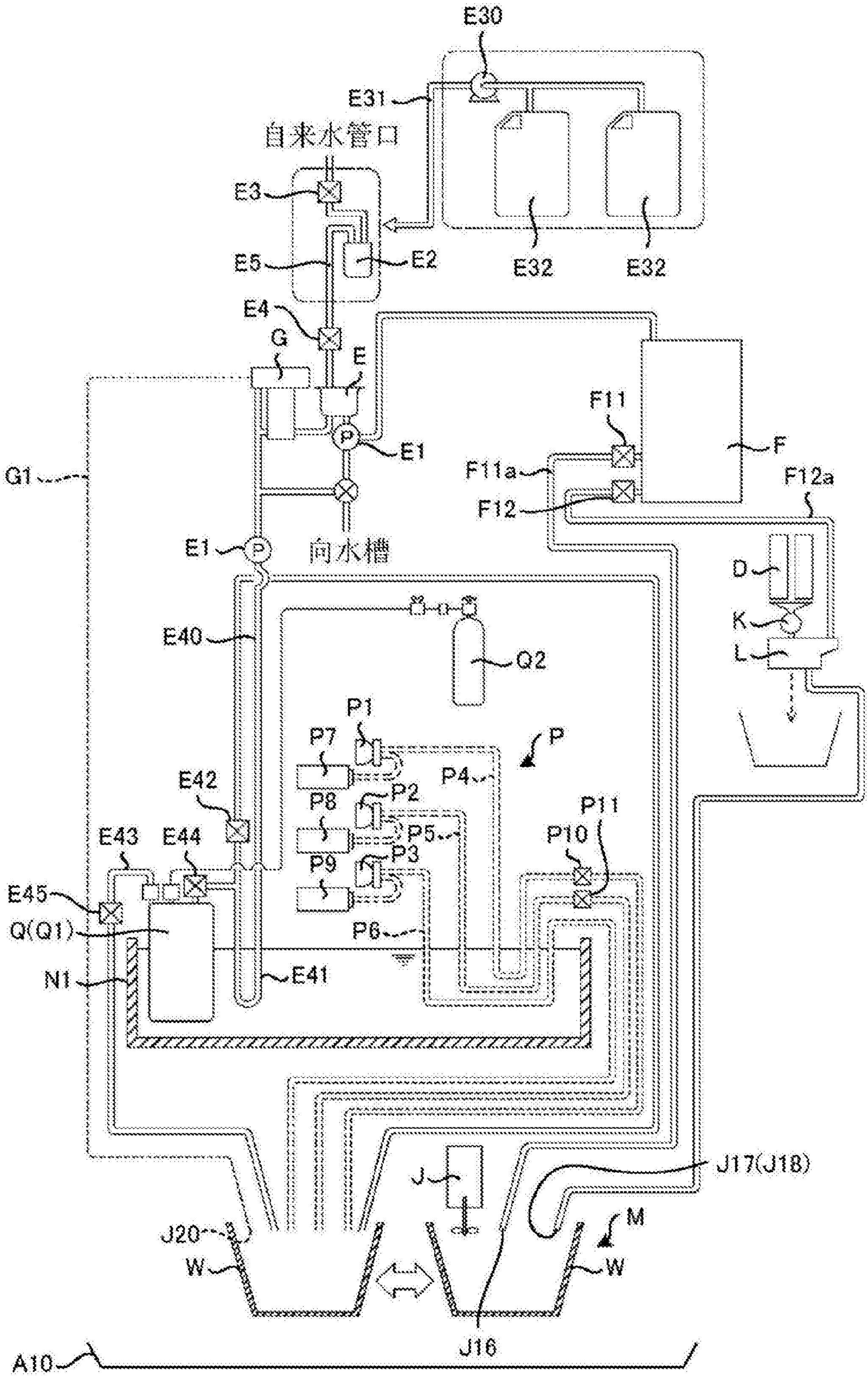


图48

Petitioner Exhibit 1002-2133

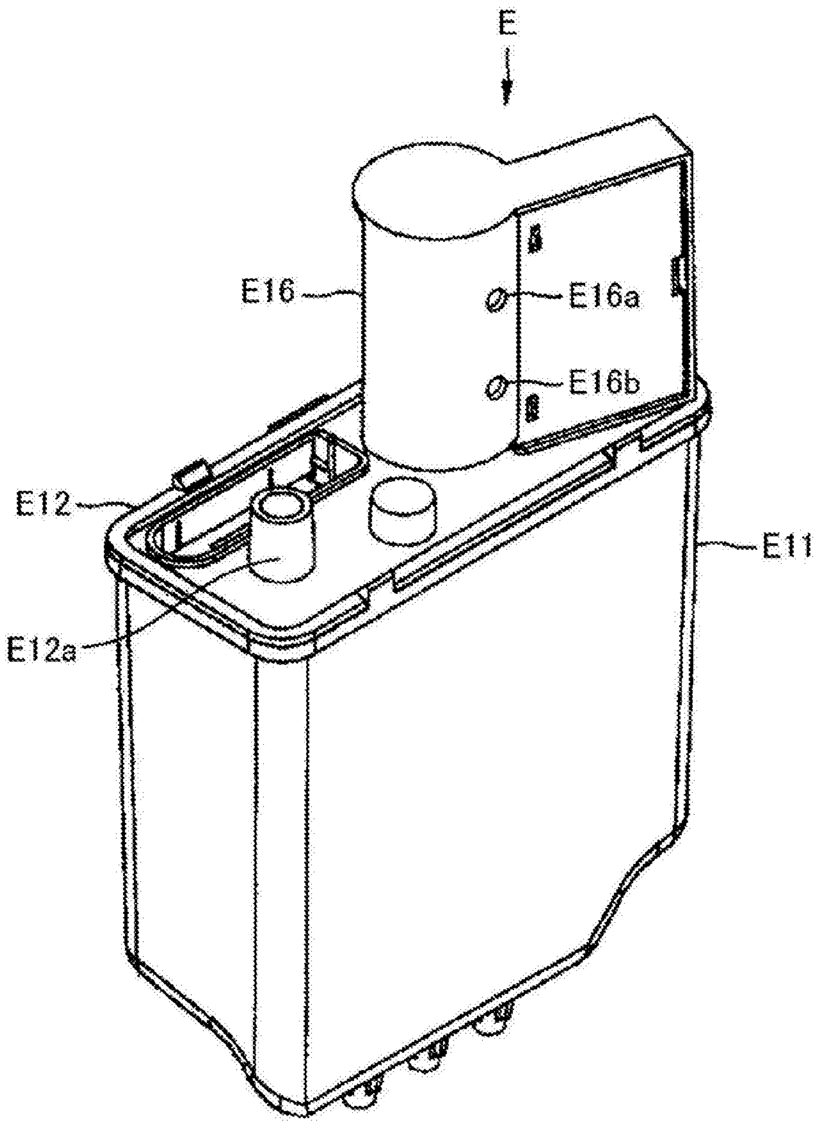


图49

Petitioner Exhibit 1002-2134

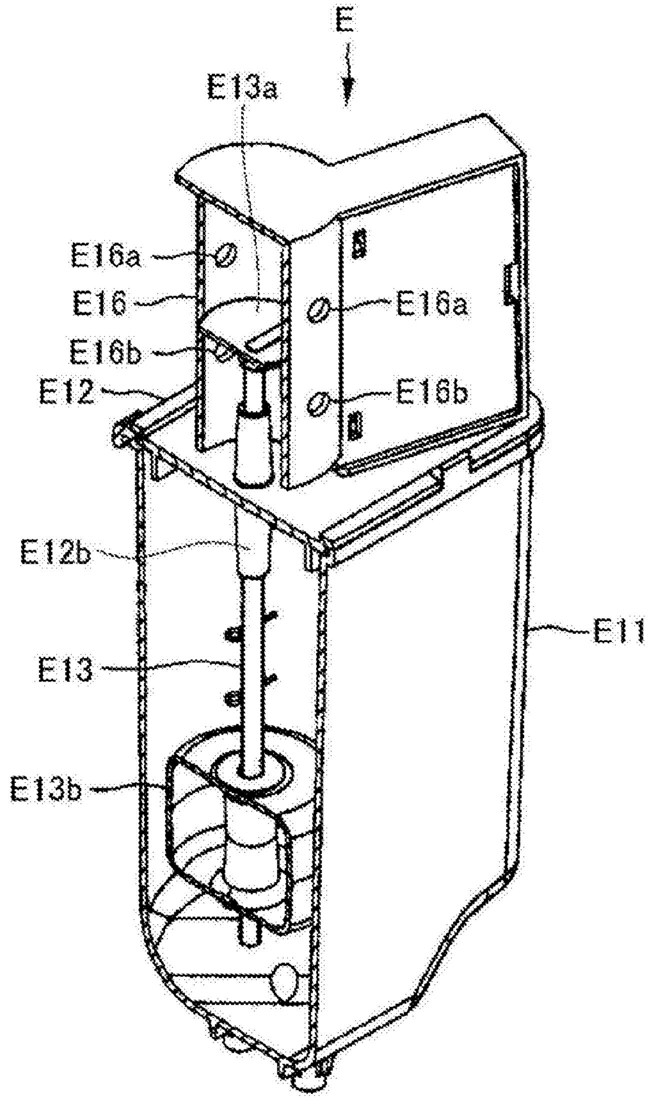


图50

Petitioner Exhibit 1002-2135

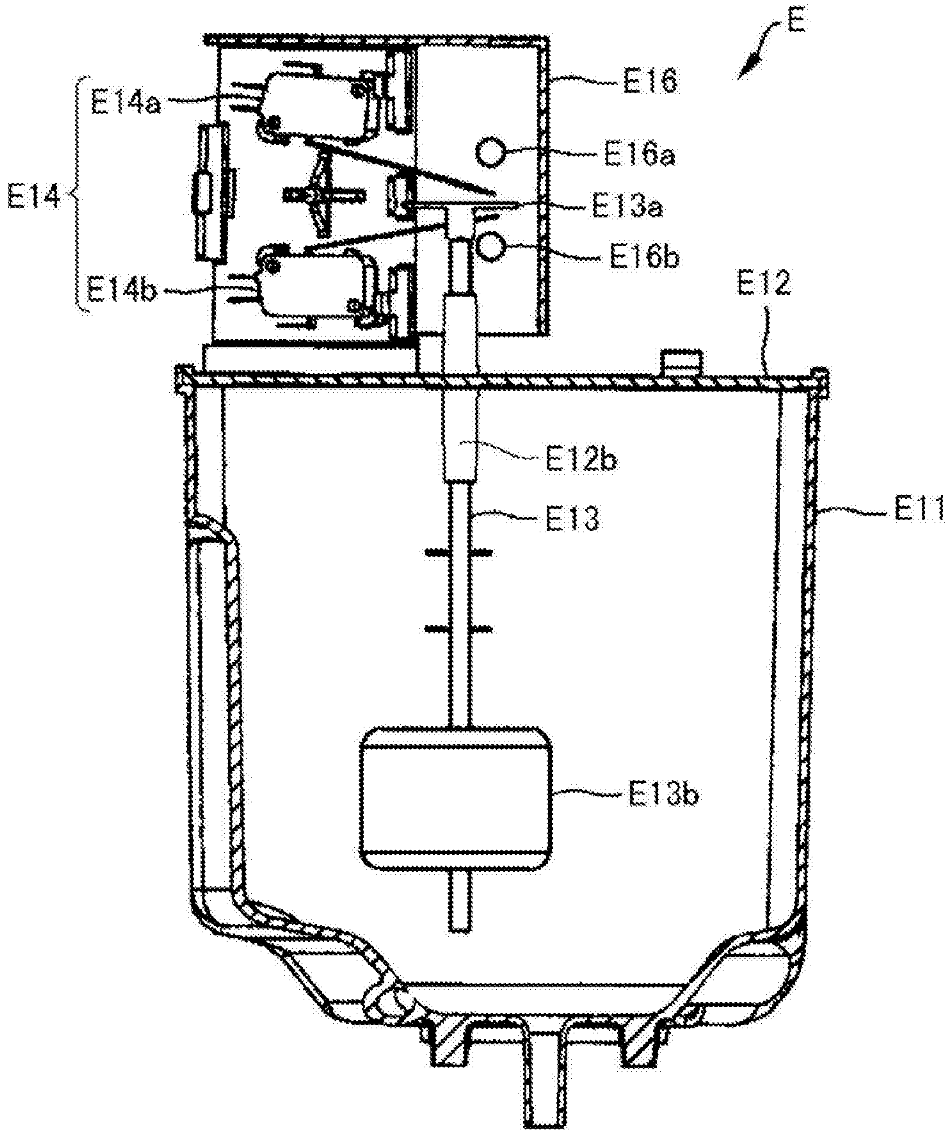


图51

Petitioner Exhibit 1002-2136

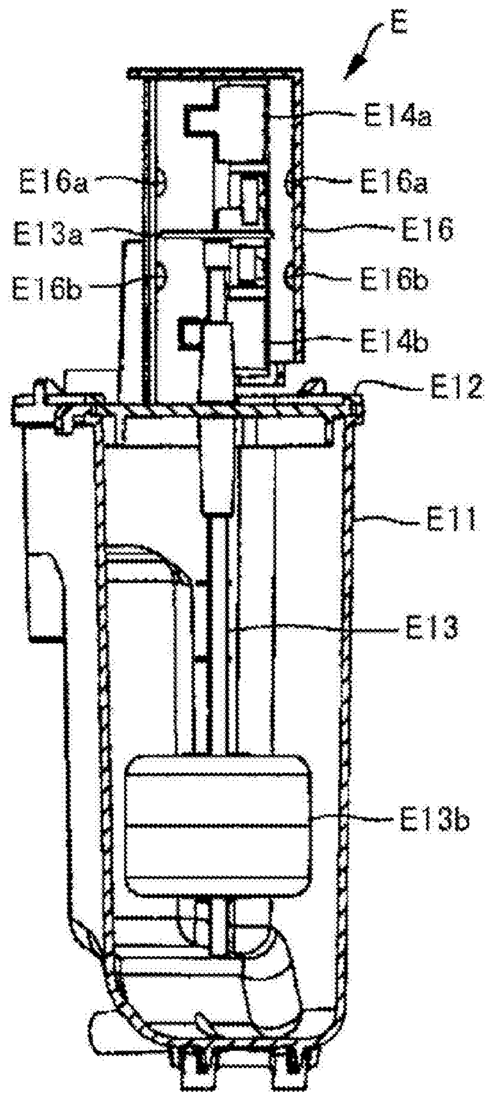


图52

Petitioner Exhibit 1002-2137

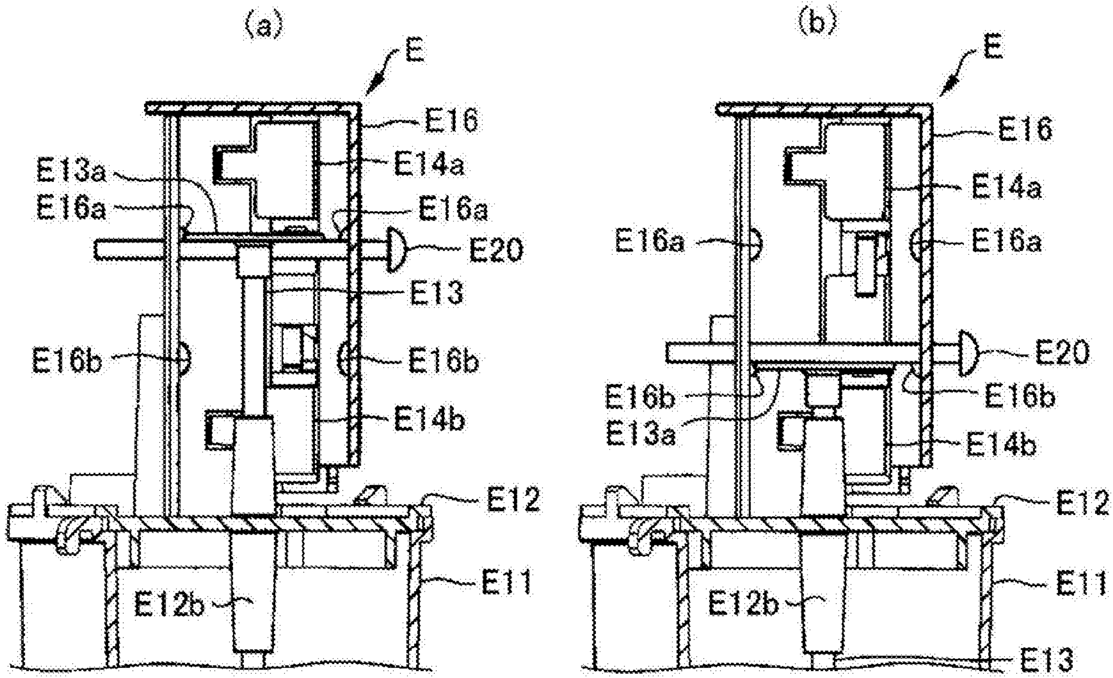


图53

Petitioner Exhibit 1002-2138

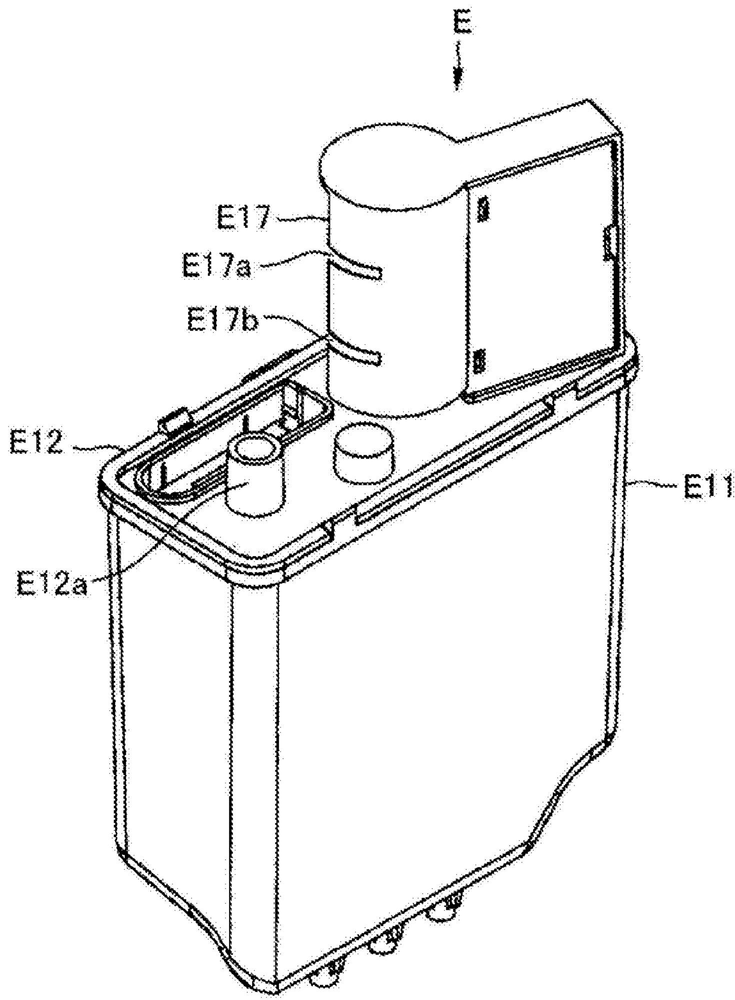


图54

Petitioner Exhibit 1002-2139

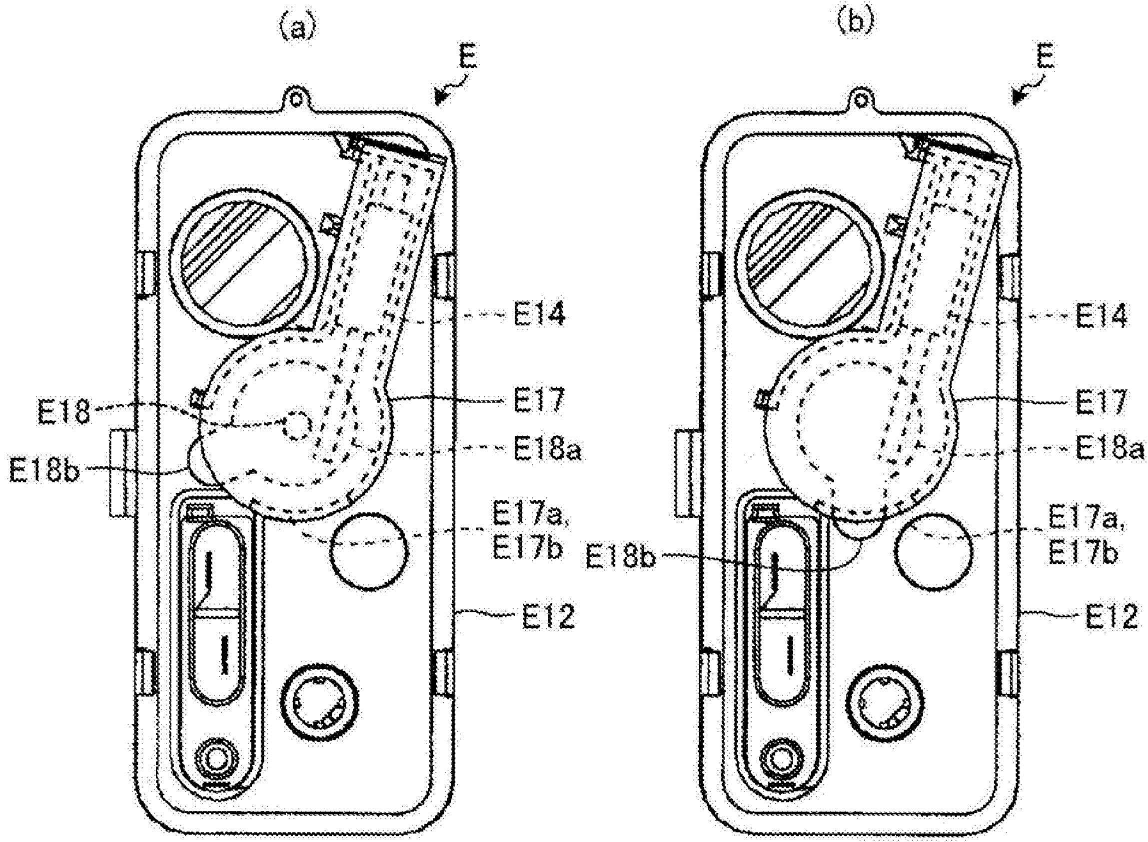


图55

Petitioner Exhibit 1002-2140

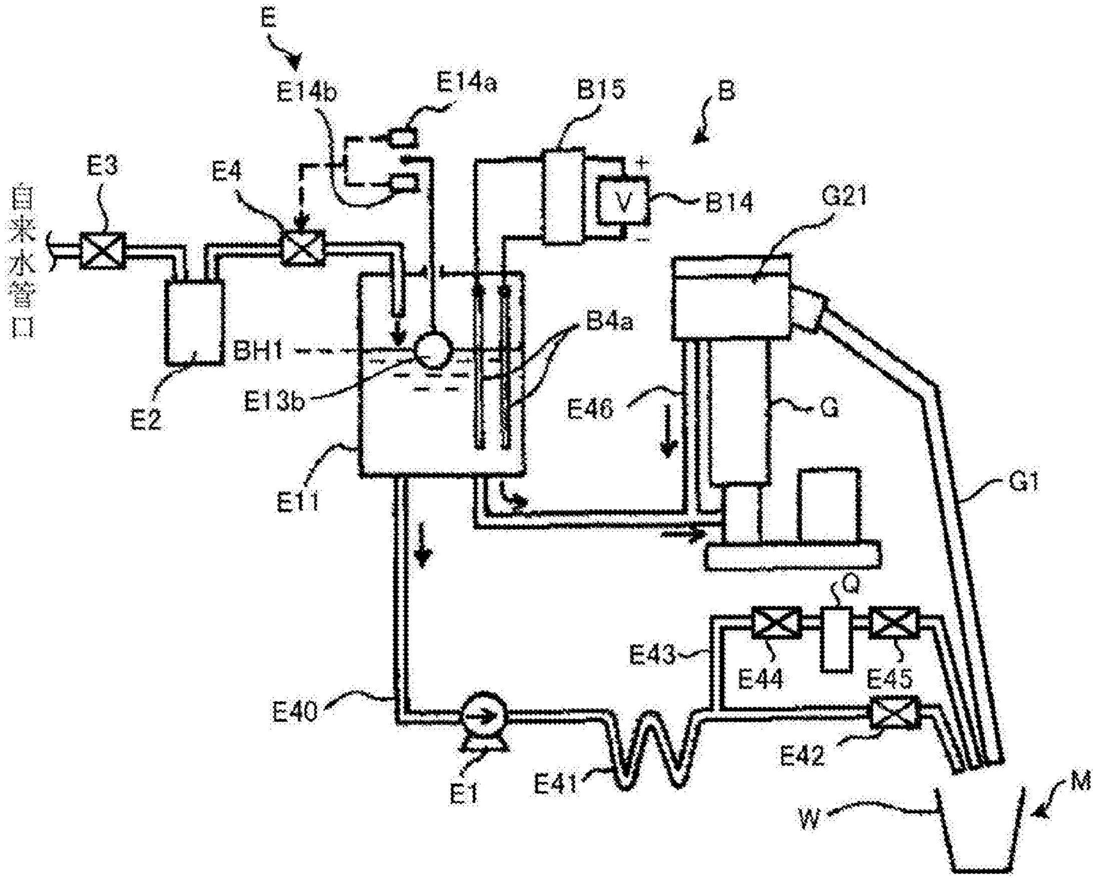


图56

Petitioner Exhibit 1002-2141

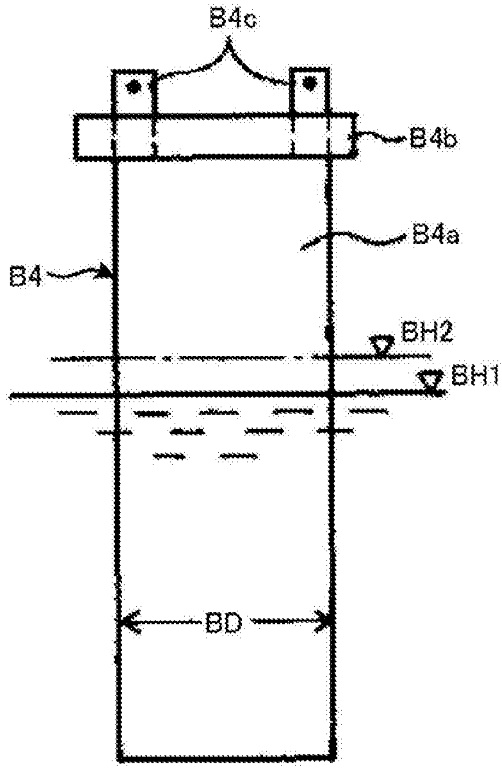


图57

Petitioner Exhibit 1002-2142

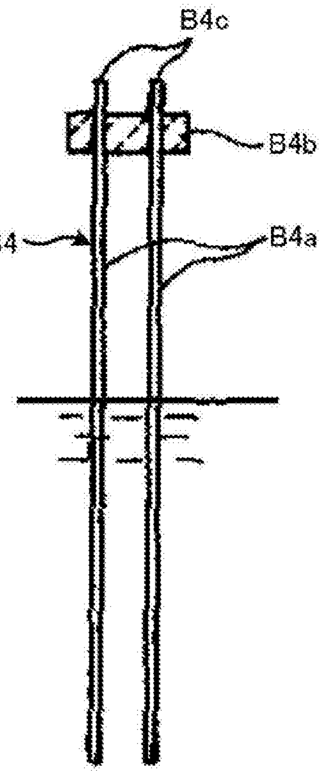


图58

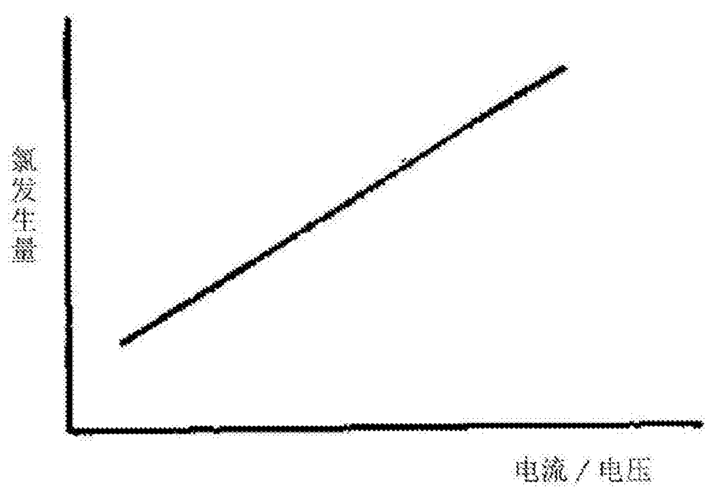


图59

Petitioner Exhibit 1002-2143

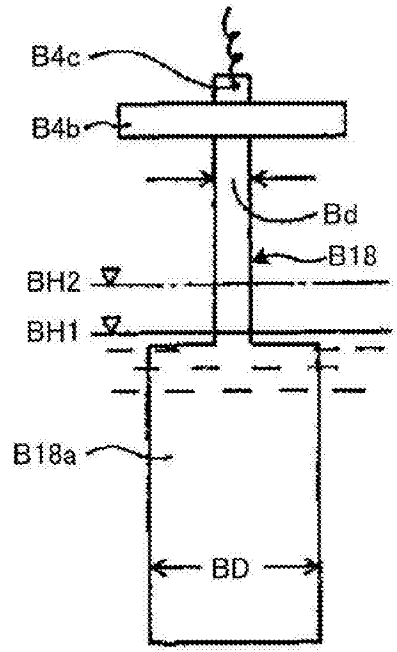


图60

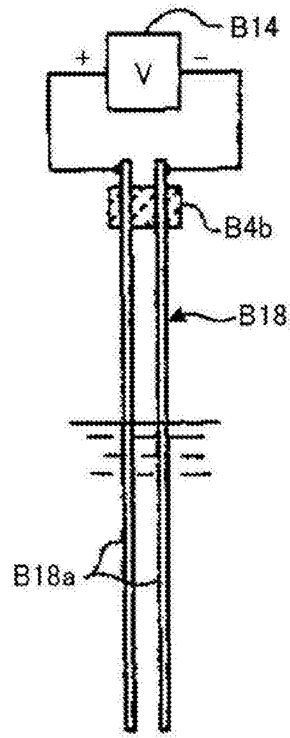


图61

Petitioner Exhibit 1002-2144

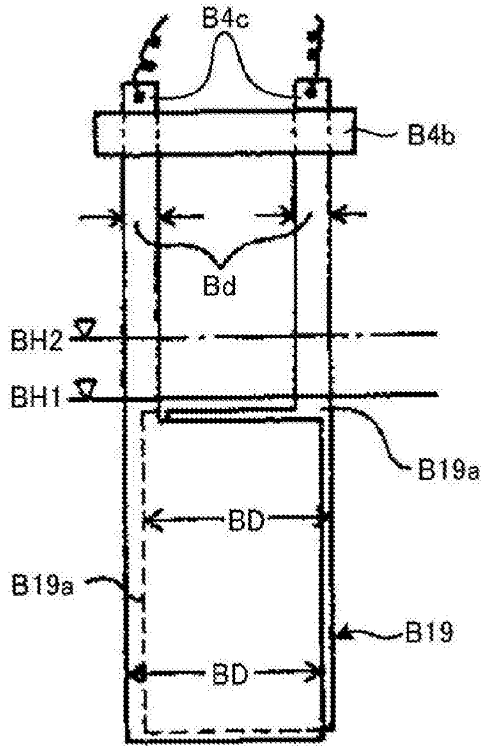

B4c
B4b
Bd
BH2
BH1
B19a
BD
B19a
B19
BD

图62

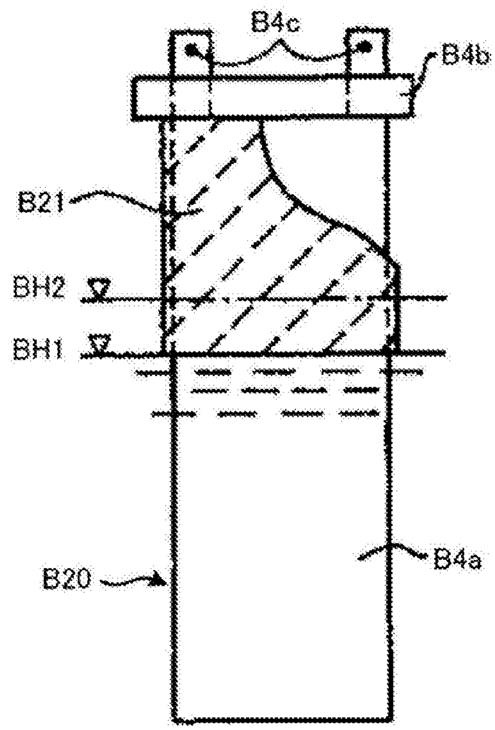

B4c
B4b
B21
BH2
BH1
B20
B4a

图63

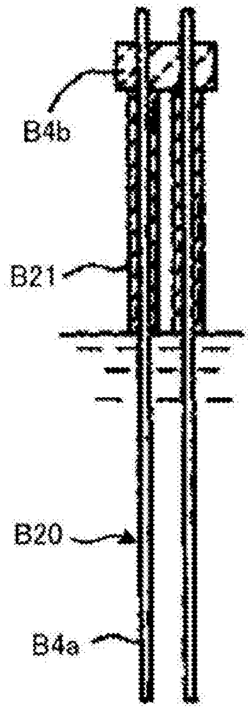


图64

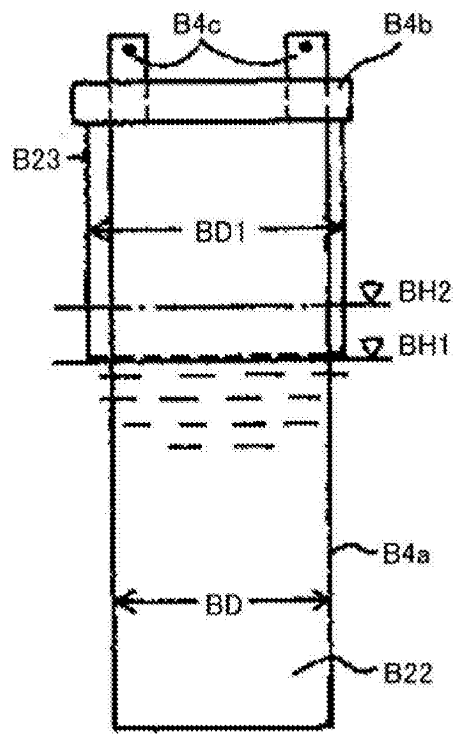


图65

Petitioner Exhibit 1002-2146

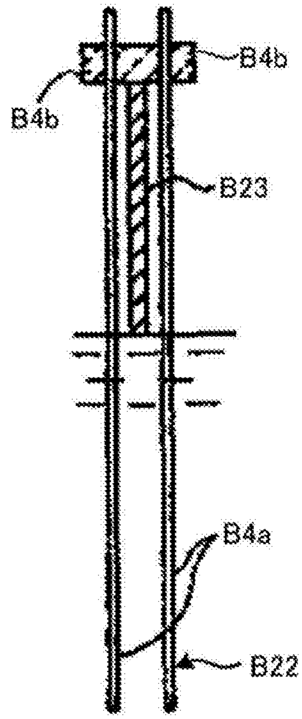


图66

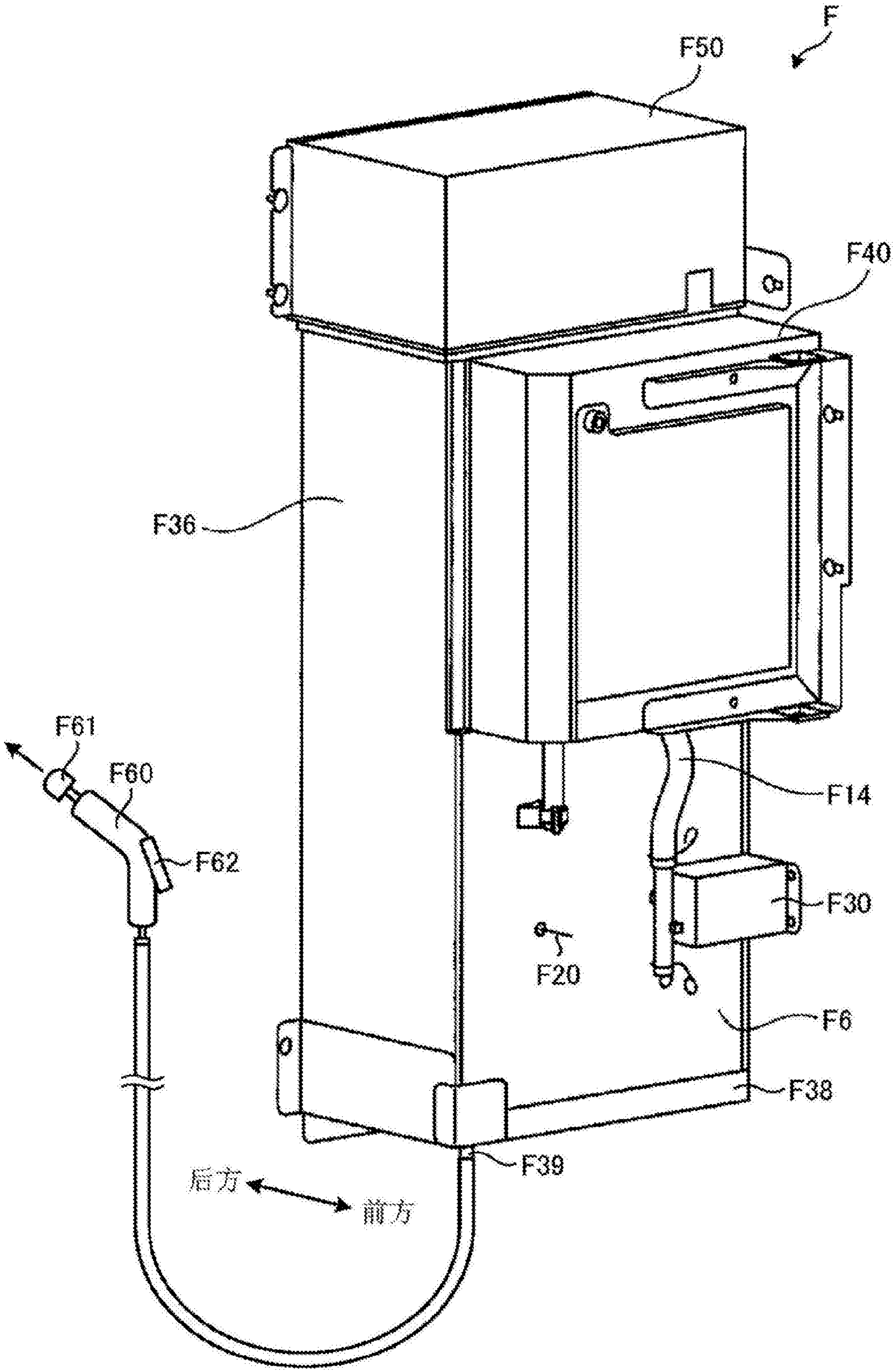


图67

Petitioner Exhibit 1002-2148

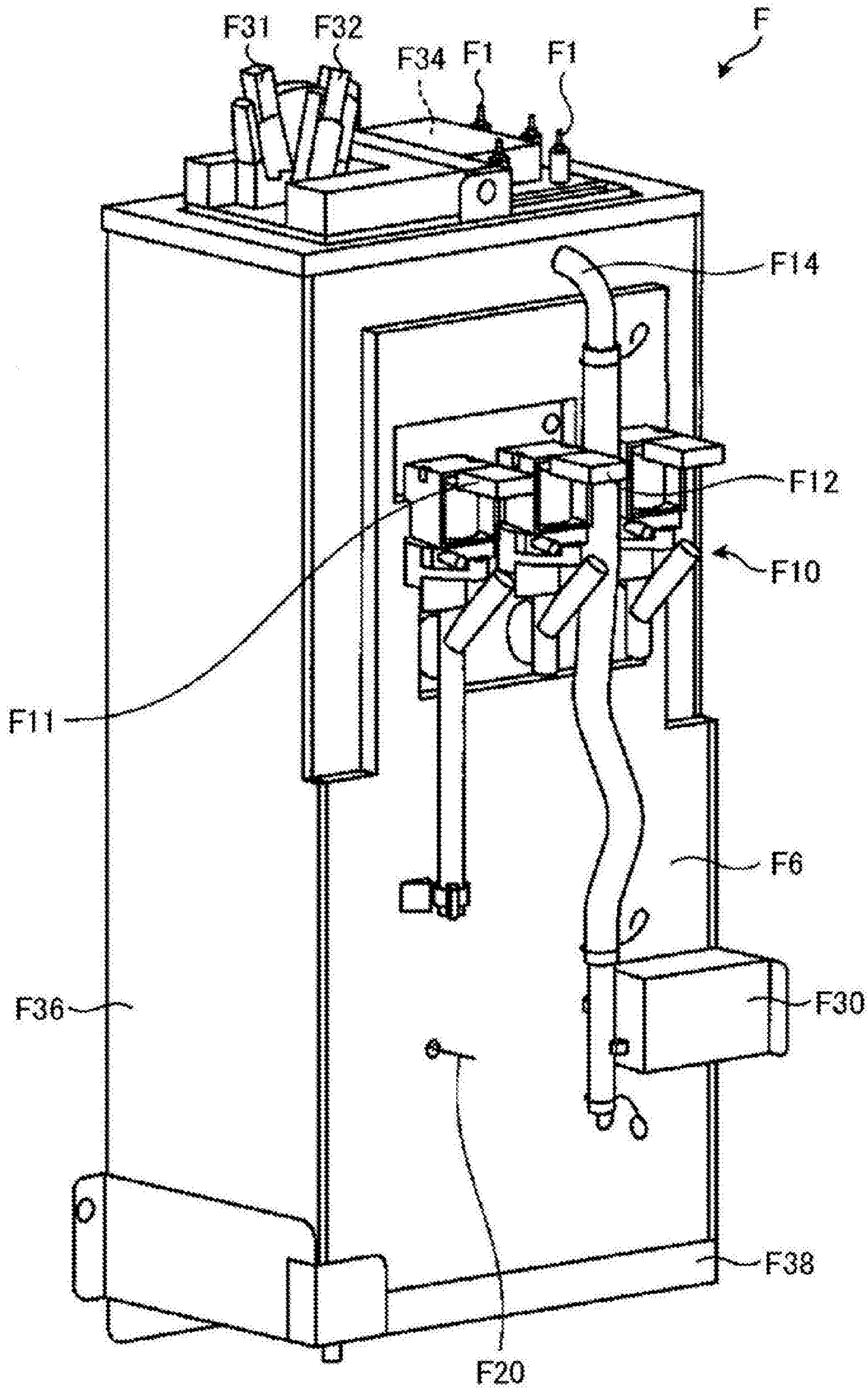


图68

Petitioner Exhibit 1002-2149

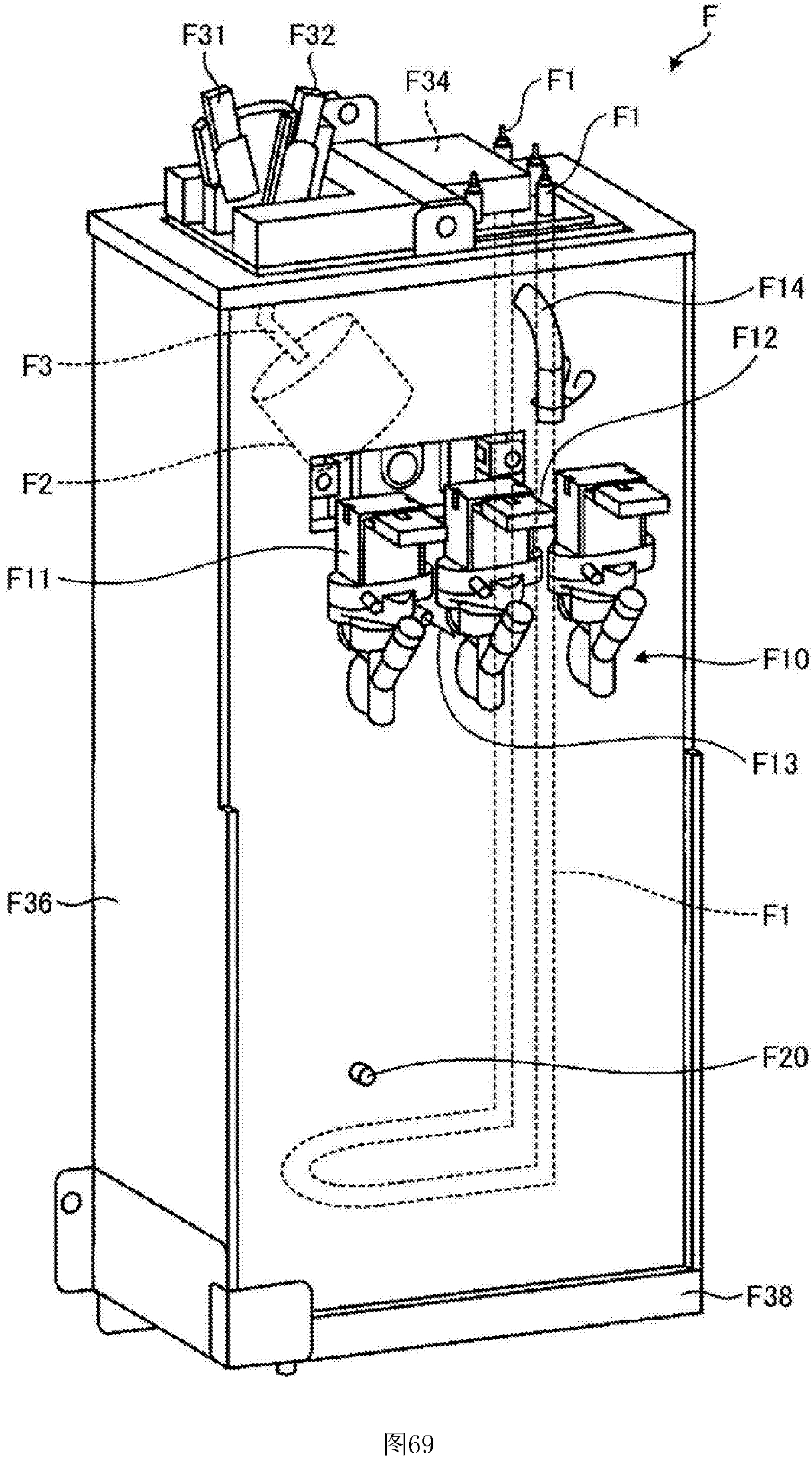


图69

Petitioner Exhibit 1002-2150

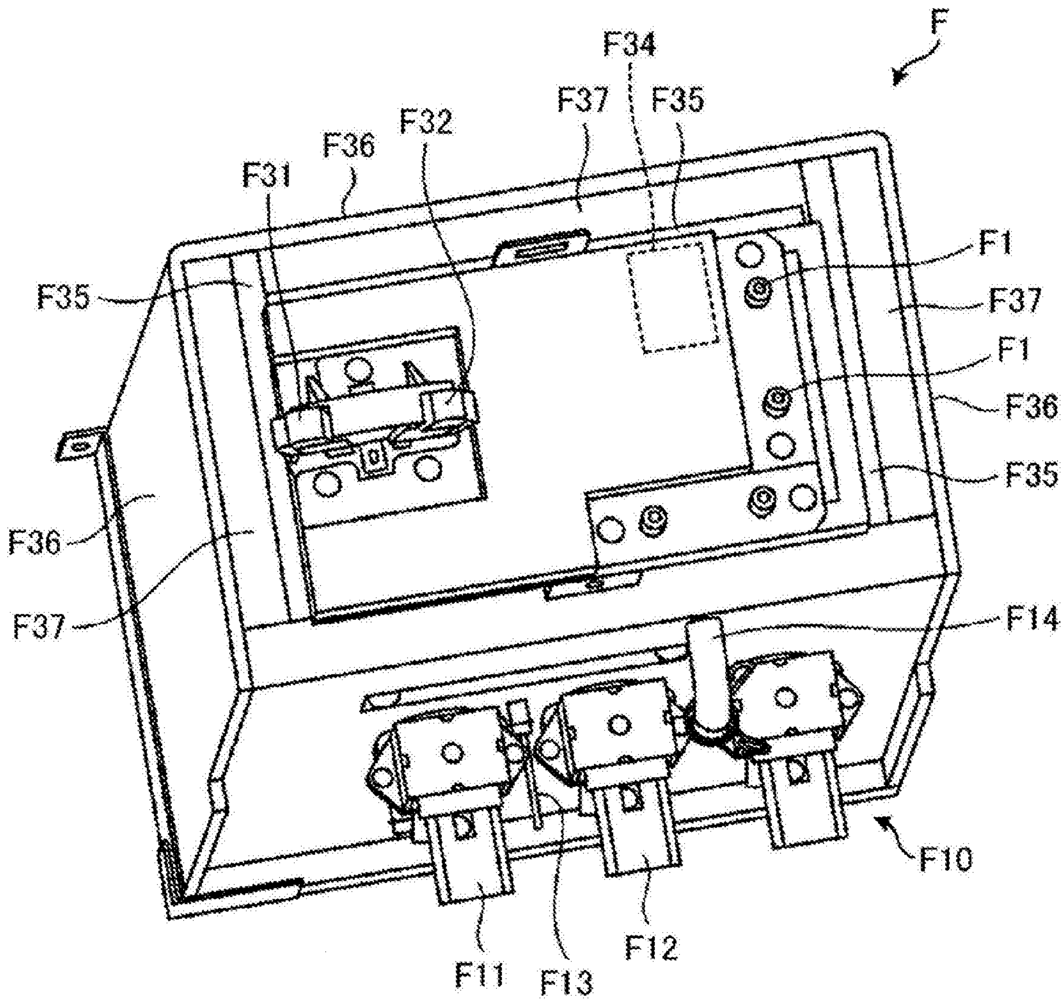


图70

Petitioner Exhibit 1002-2151

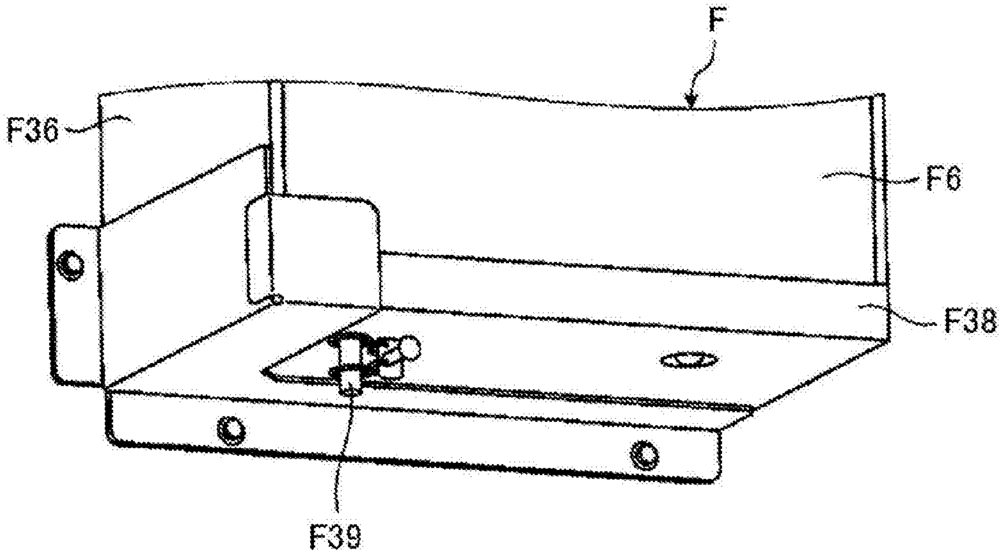


图71

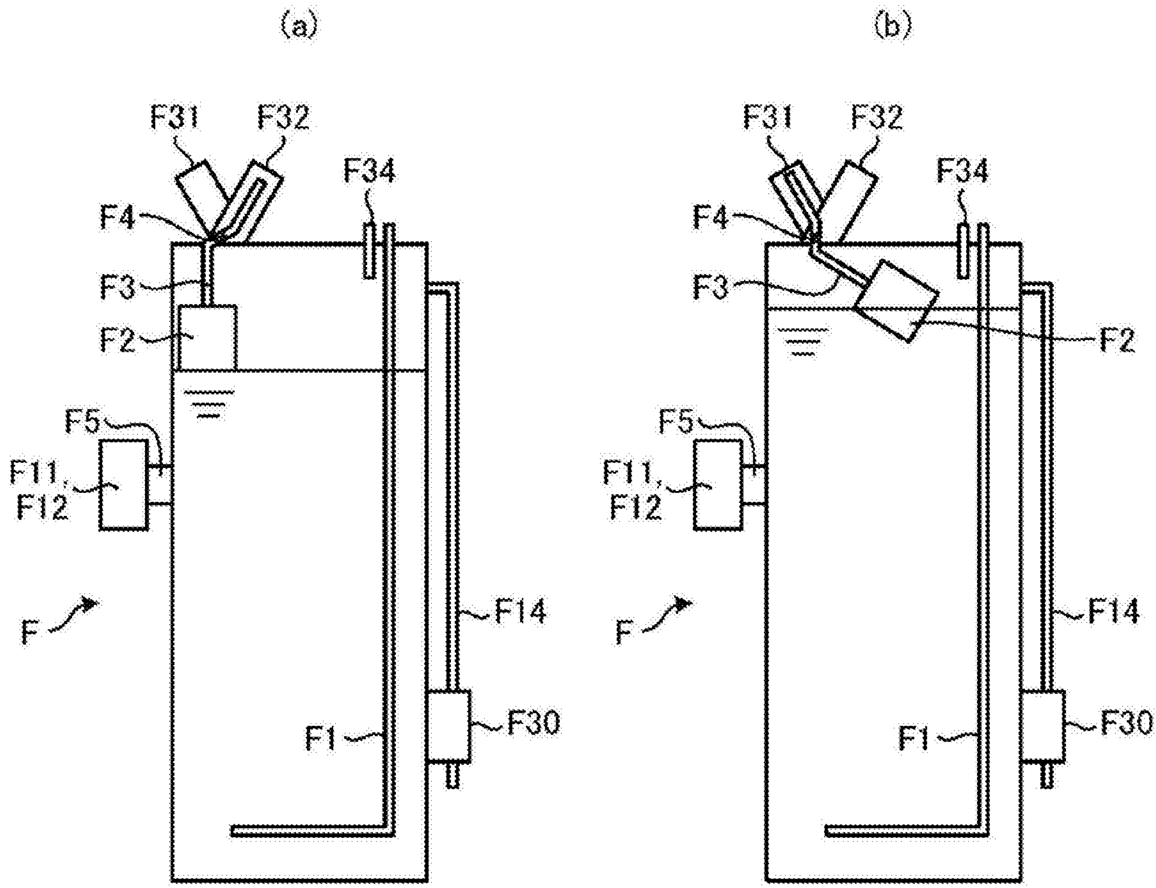


图72

Petitioner Exhibit 1002-2152

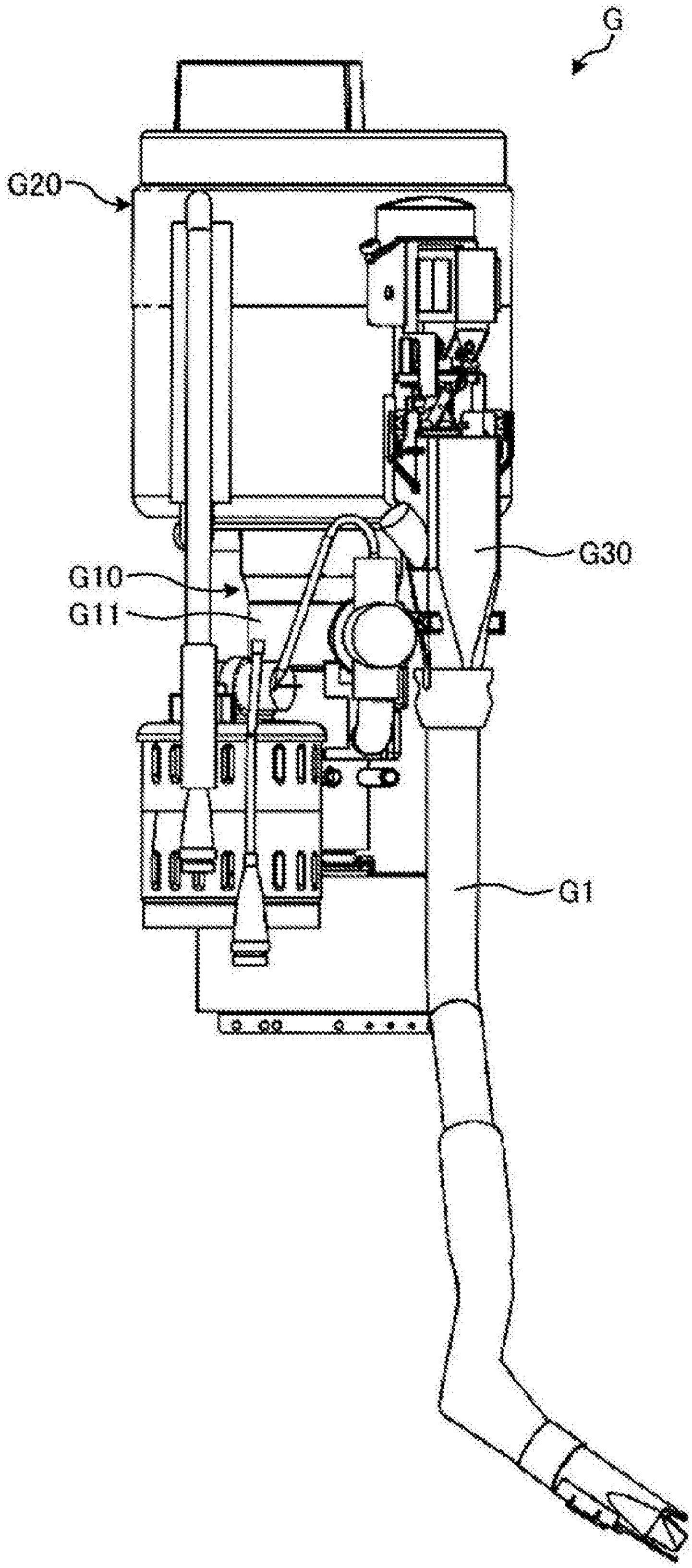


图73

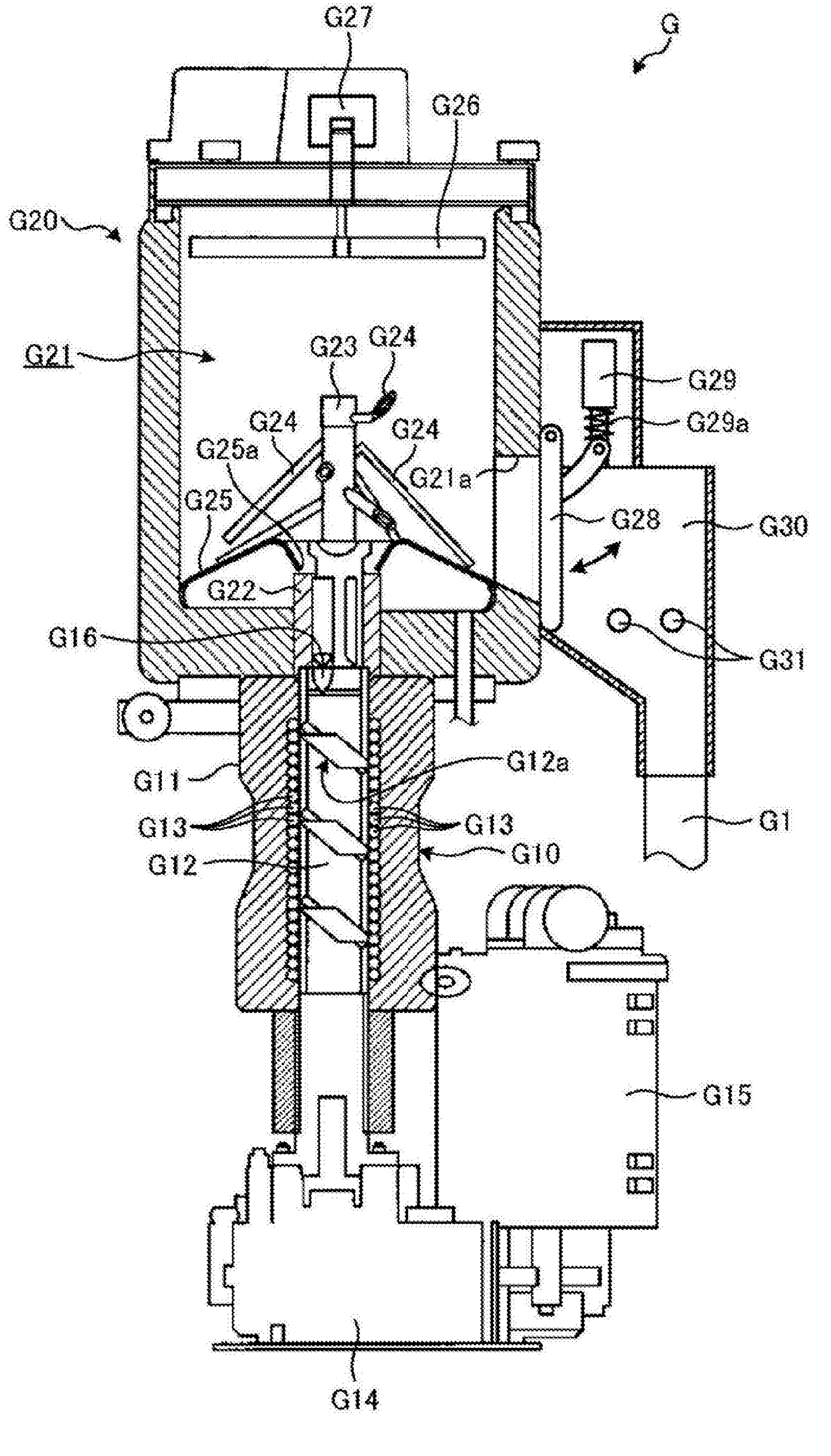


图74

Petitioner Exhibit 1002-2154

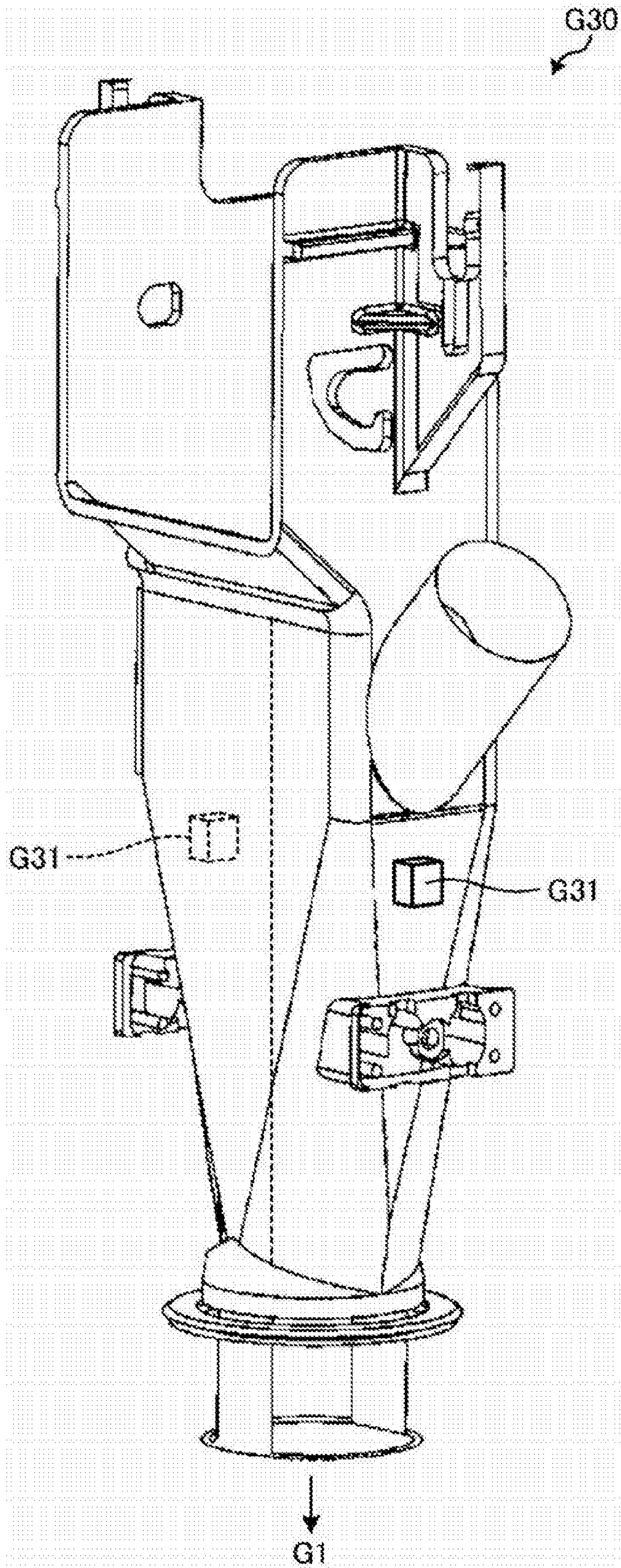


图75

Petitioner Exhibit 1002-2155

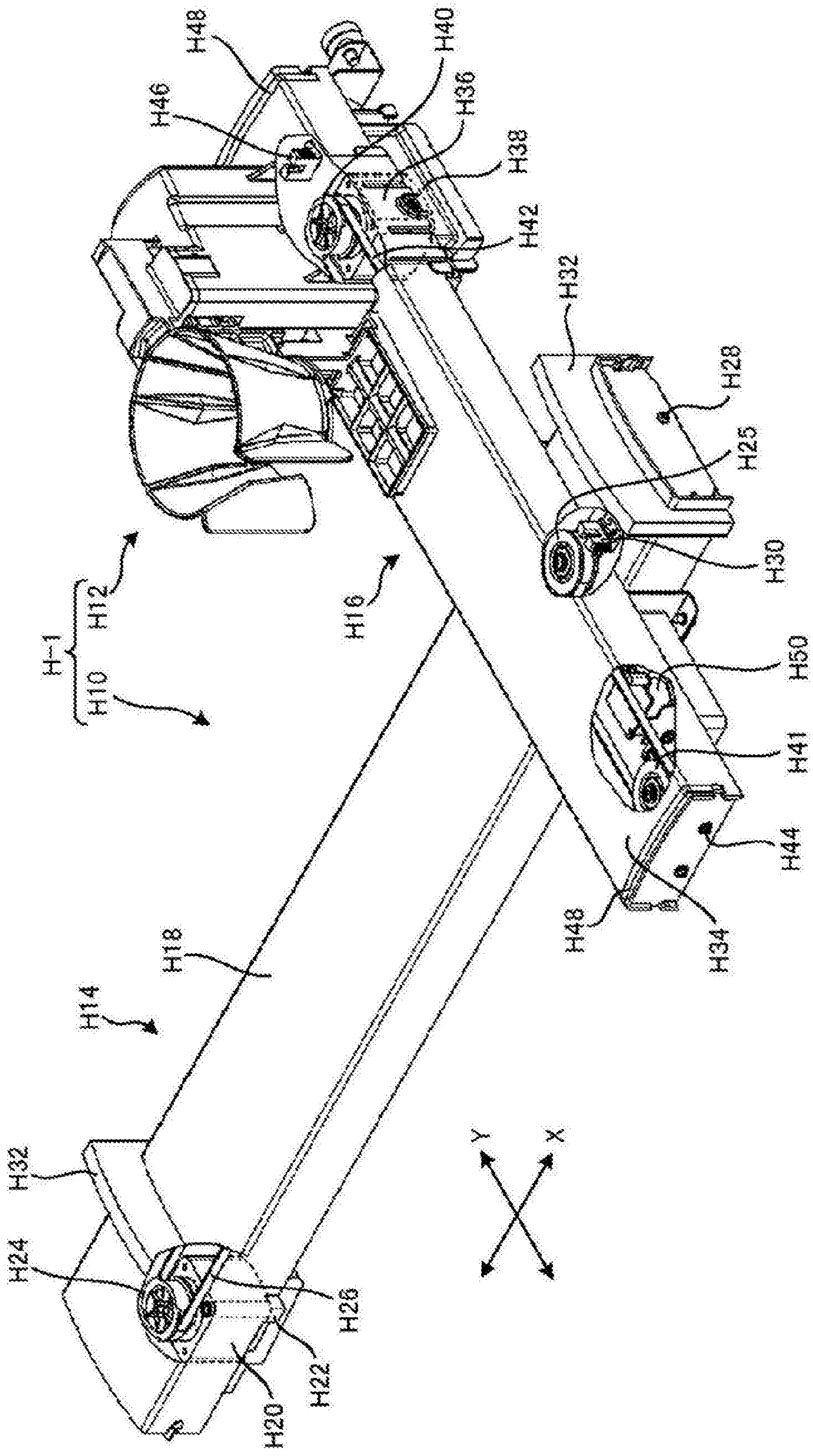


图76

Petitioner Exhibit 1002-2156

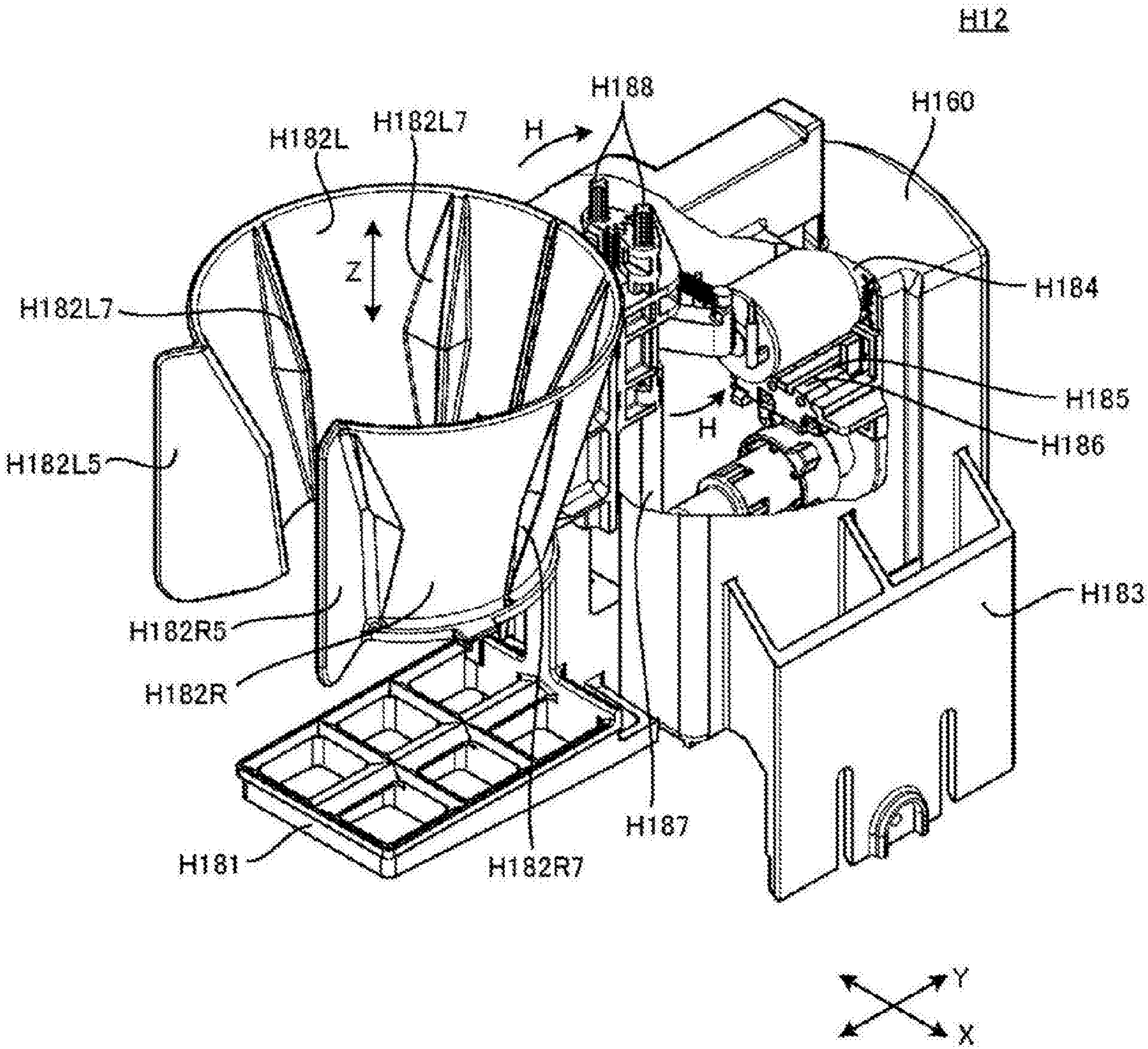


图77

Petitioner Exhibit 1002-2157

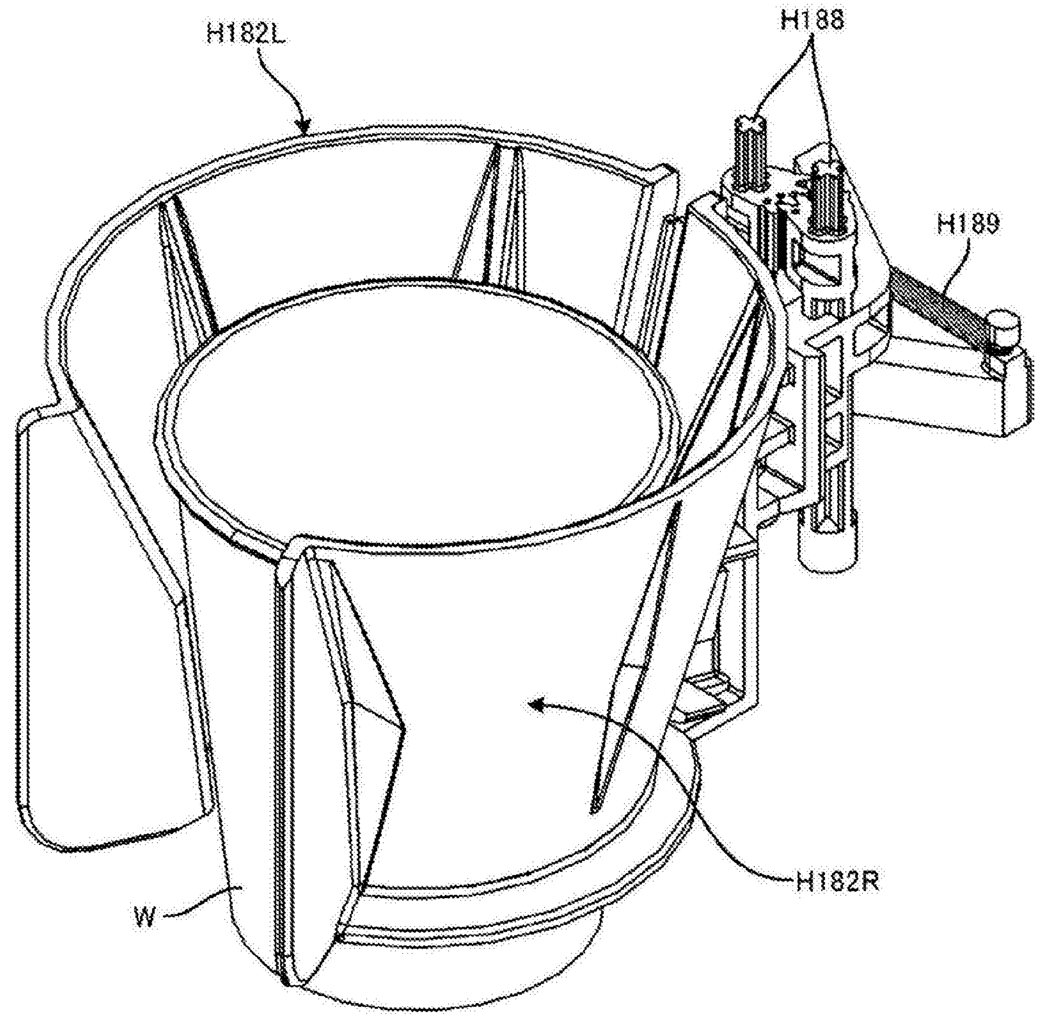
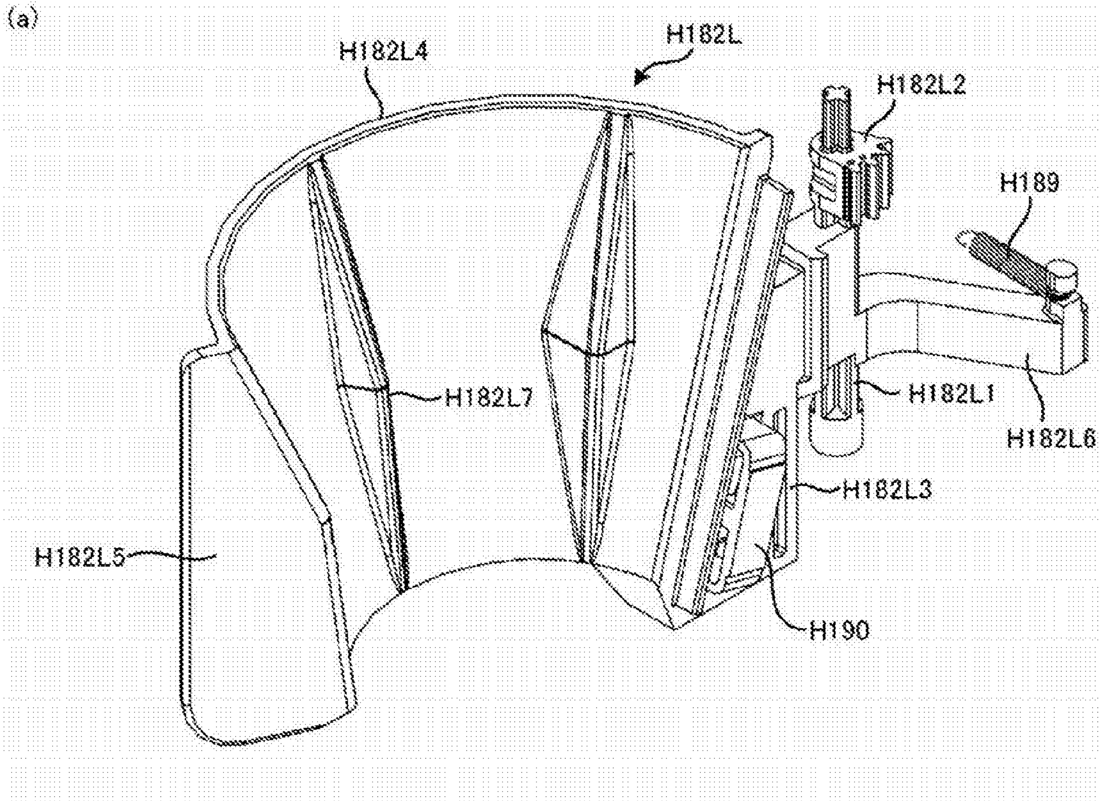


图78

Petitioner Exhibit 1002-2158

(a)



(b)

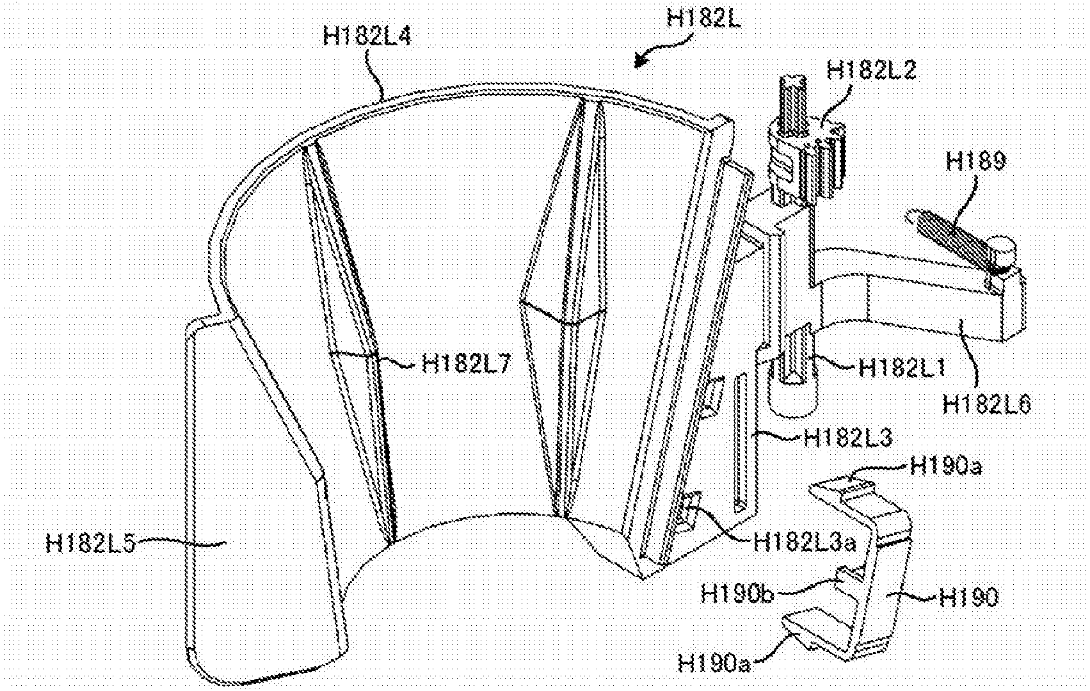
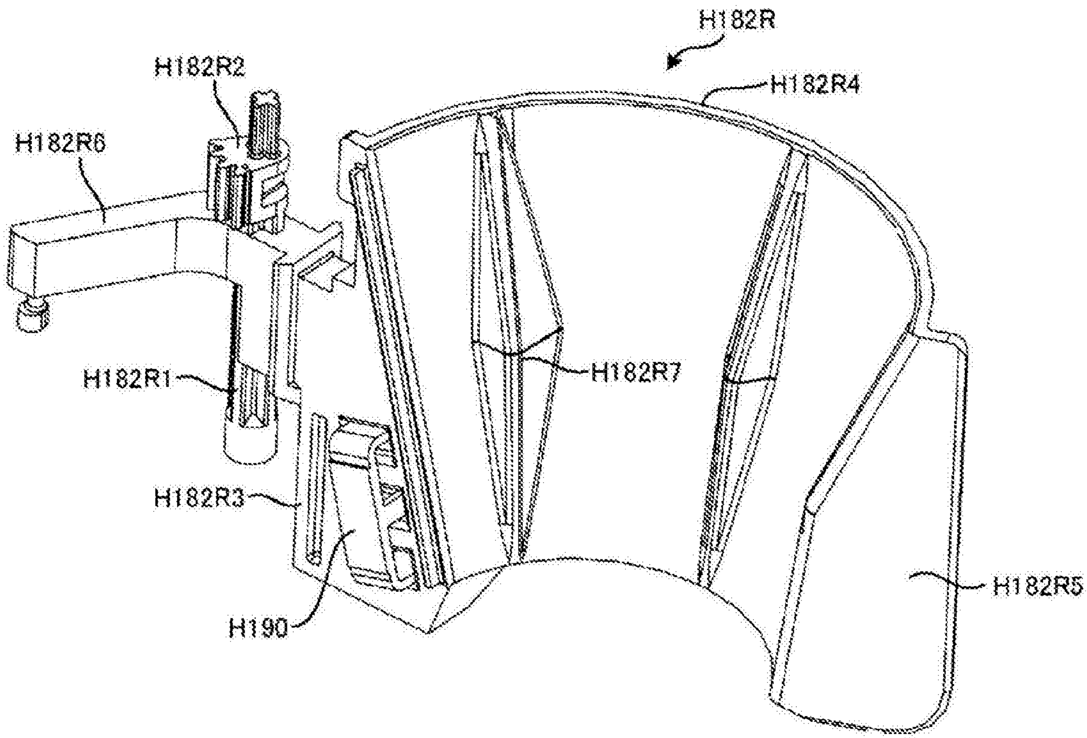


图79

Petitioner Exhibit 1002-2159

(a)



(b)

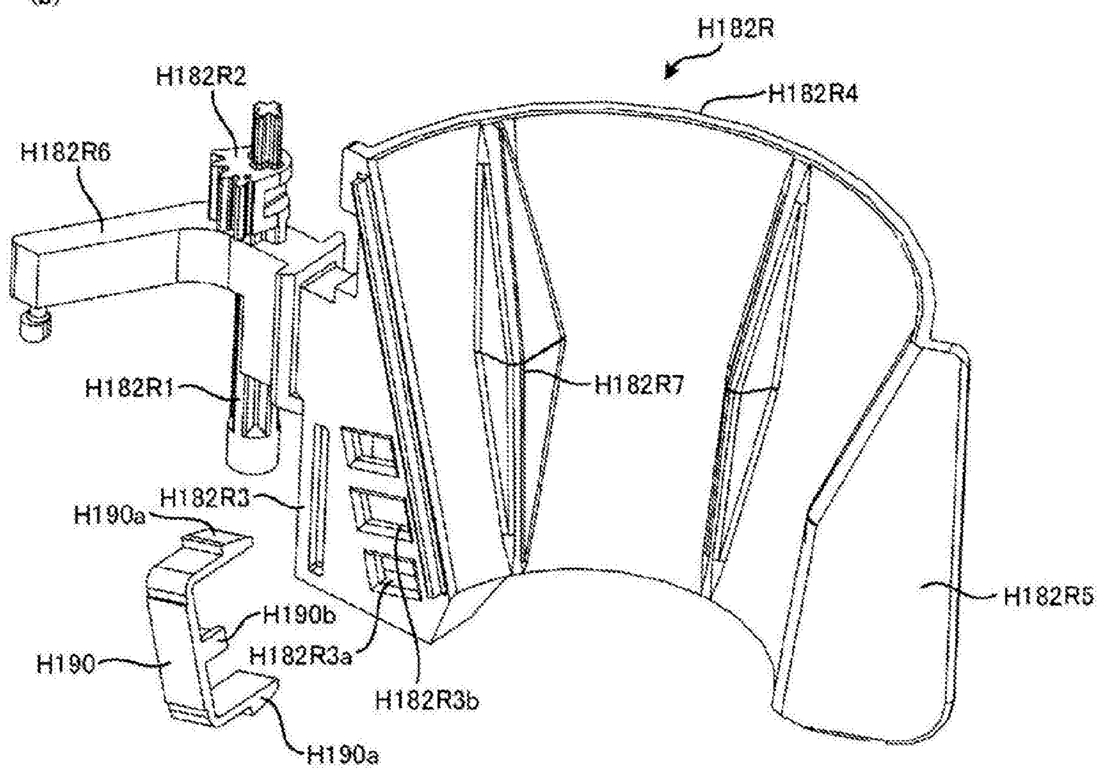


图80

Petitioner Exhibit 1002-2160

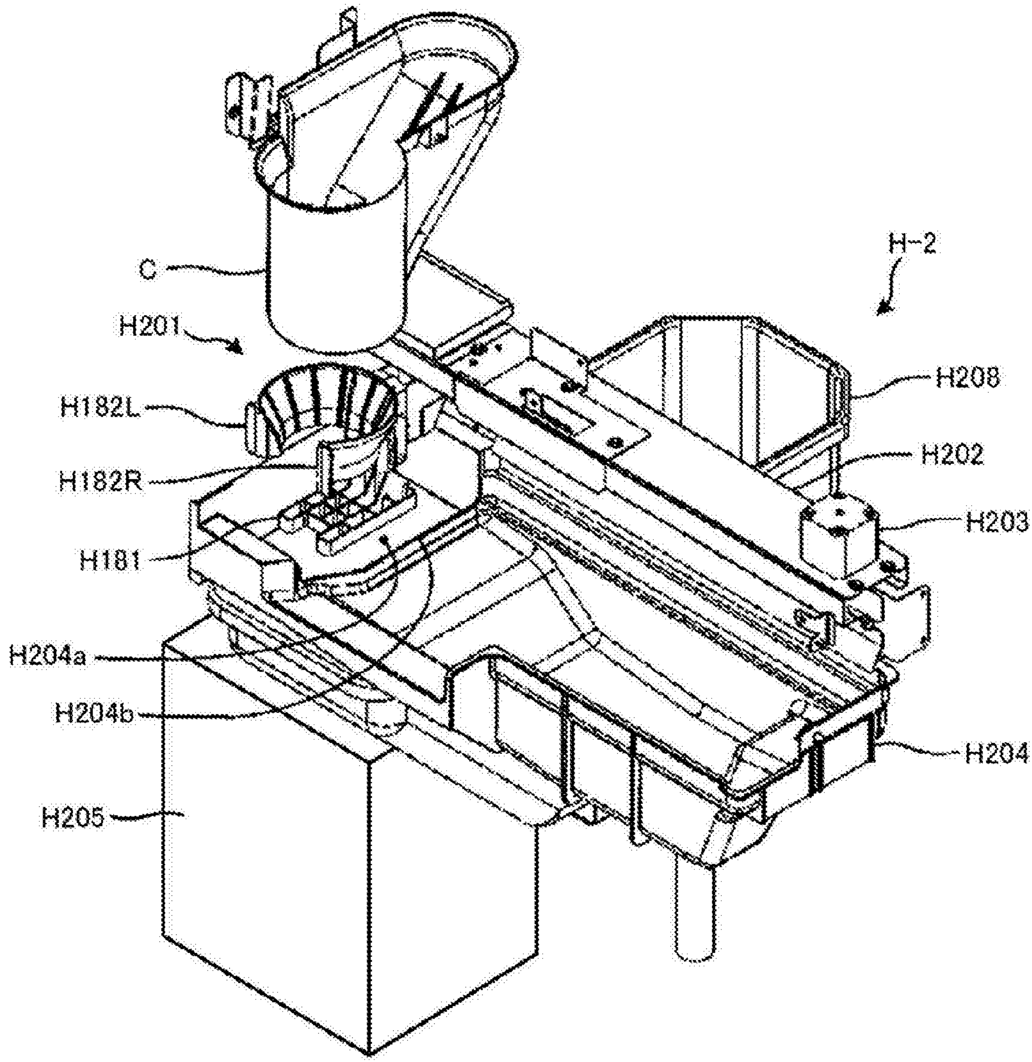


图81

Petitioner Exhibit 1002-2161

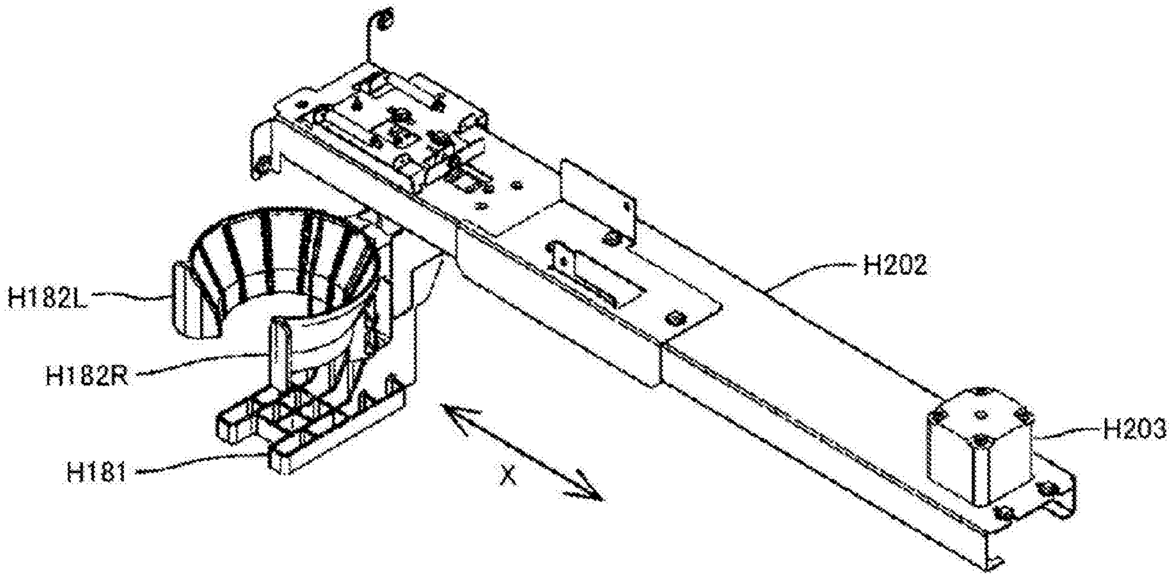


图82

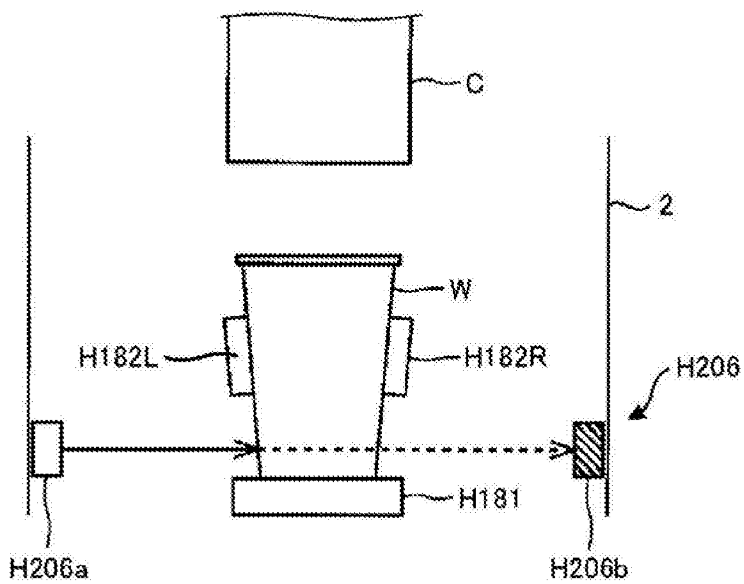


图83

Petitioner Exhibit 1002-2162

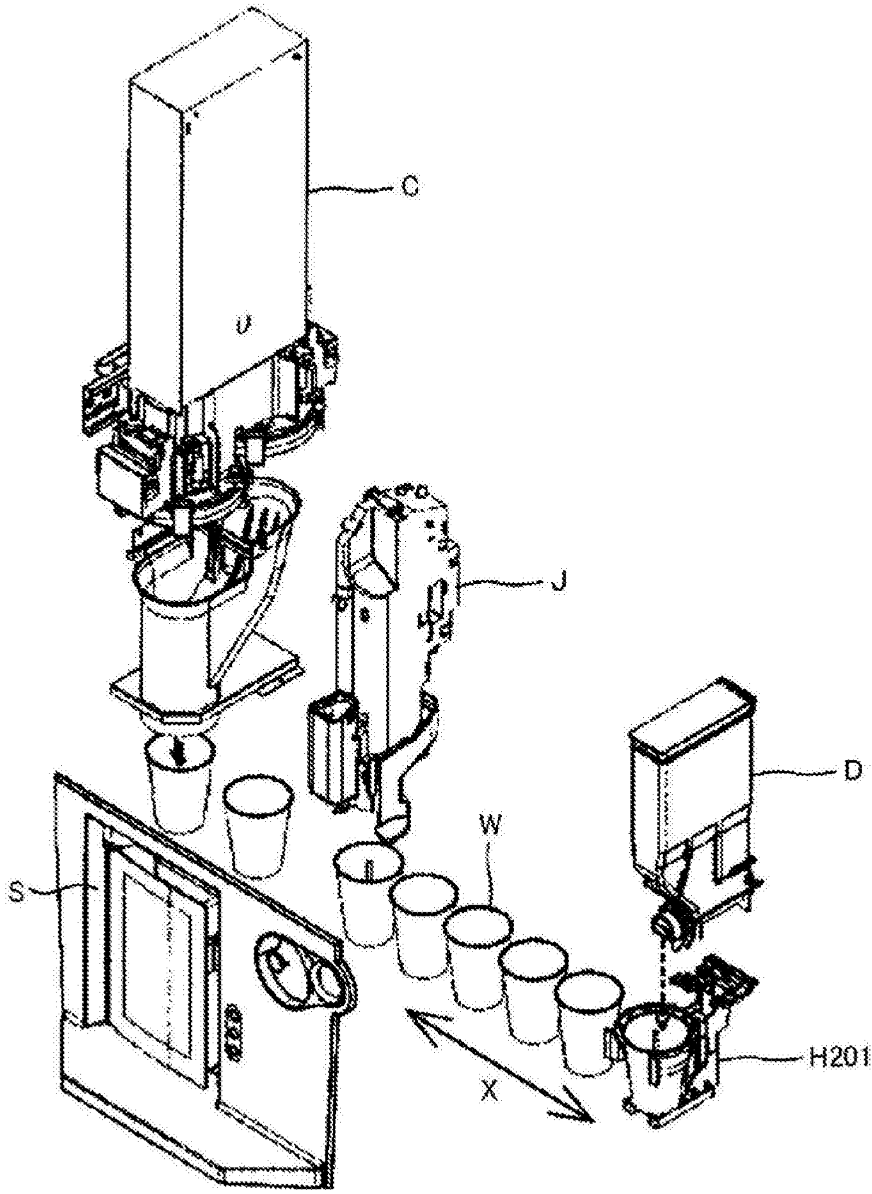


图84

Petitioner Exhibit 1002-2163

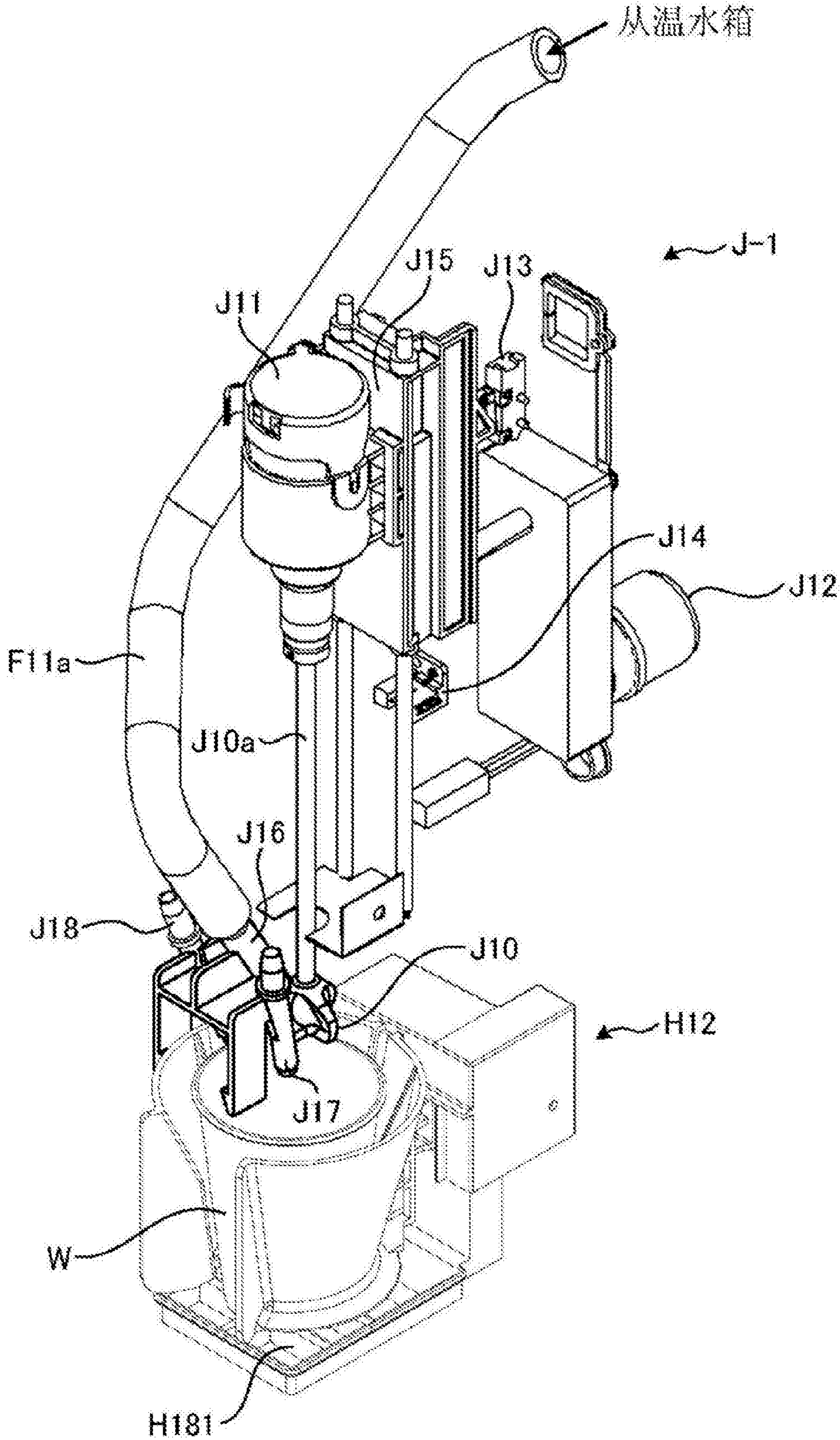


图85

Petitioner Exhibit 1002-2164

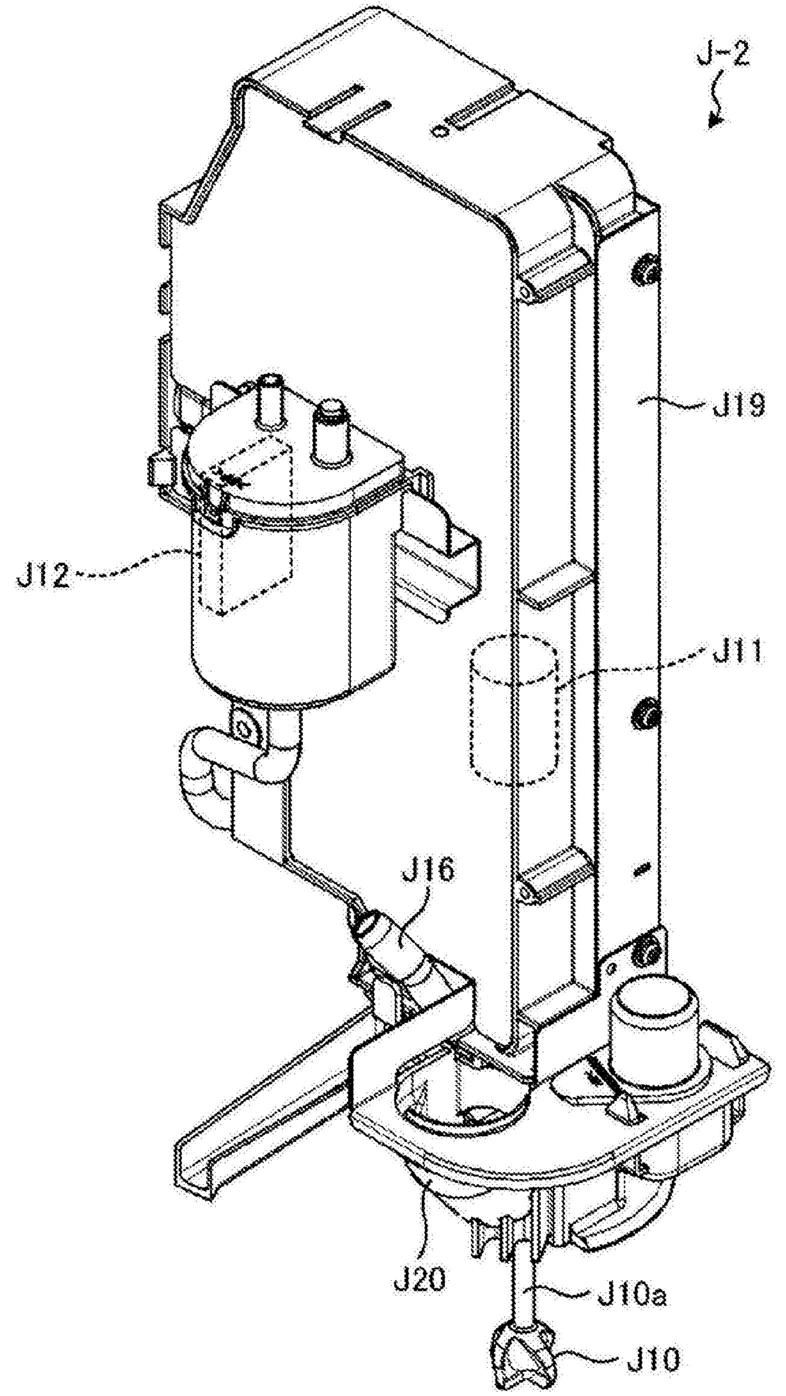


图86

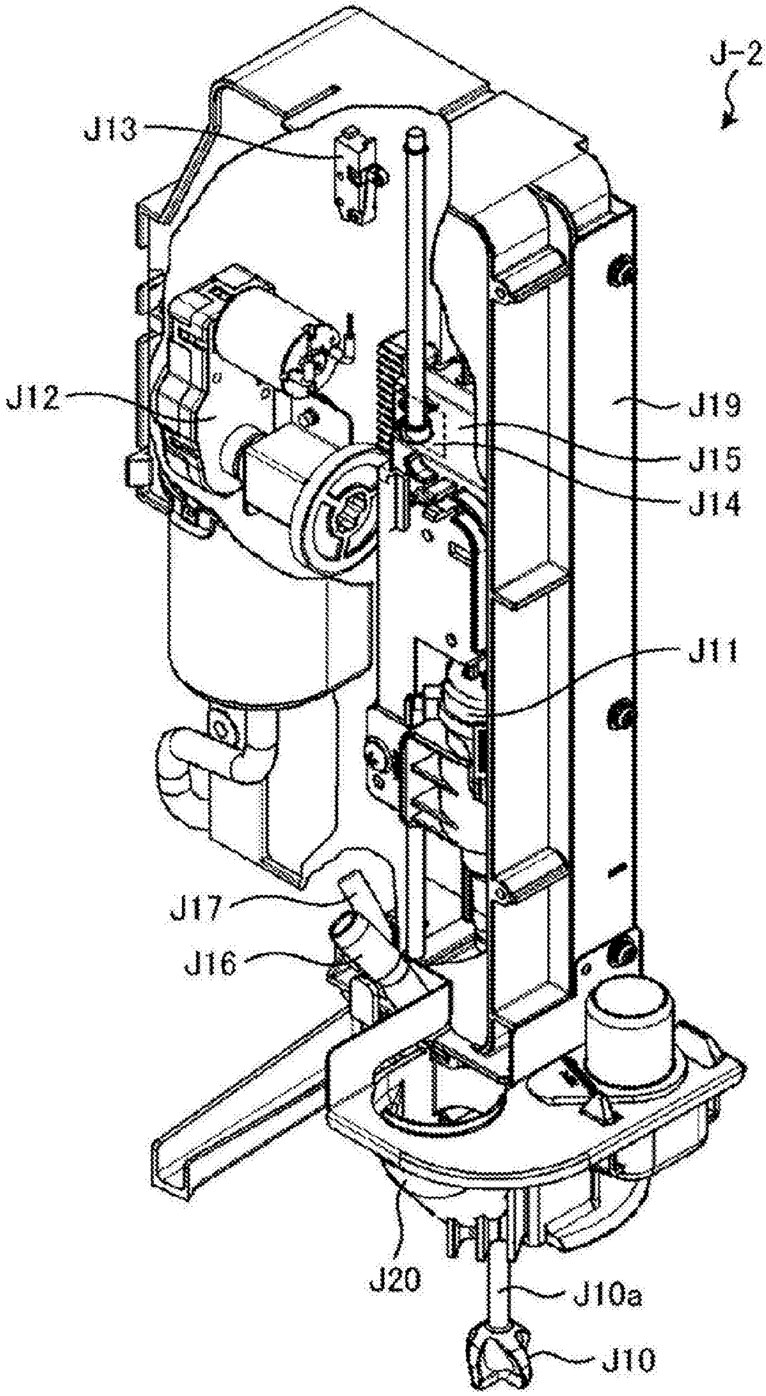


图87

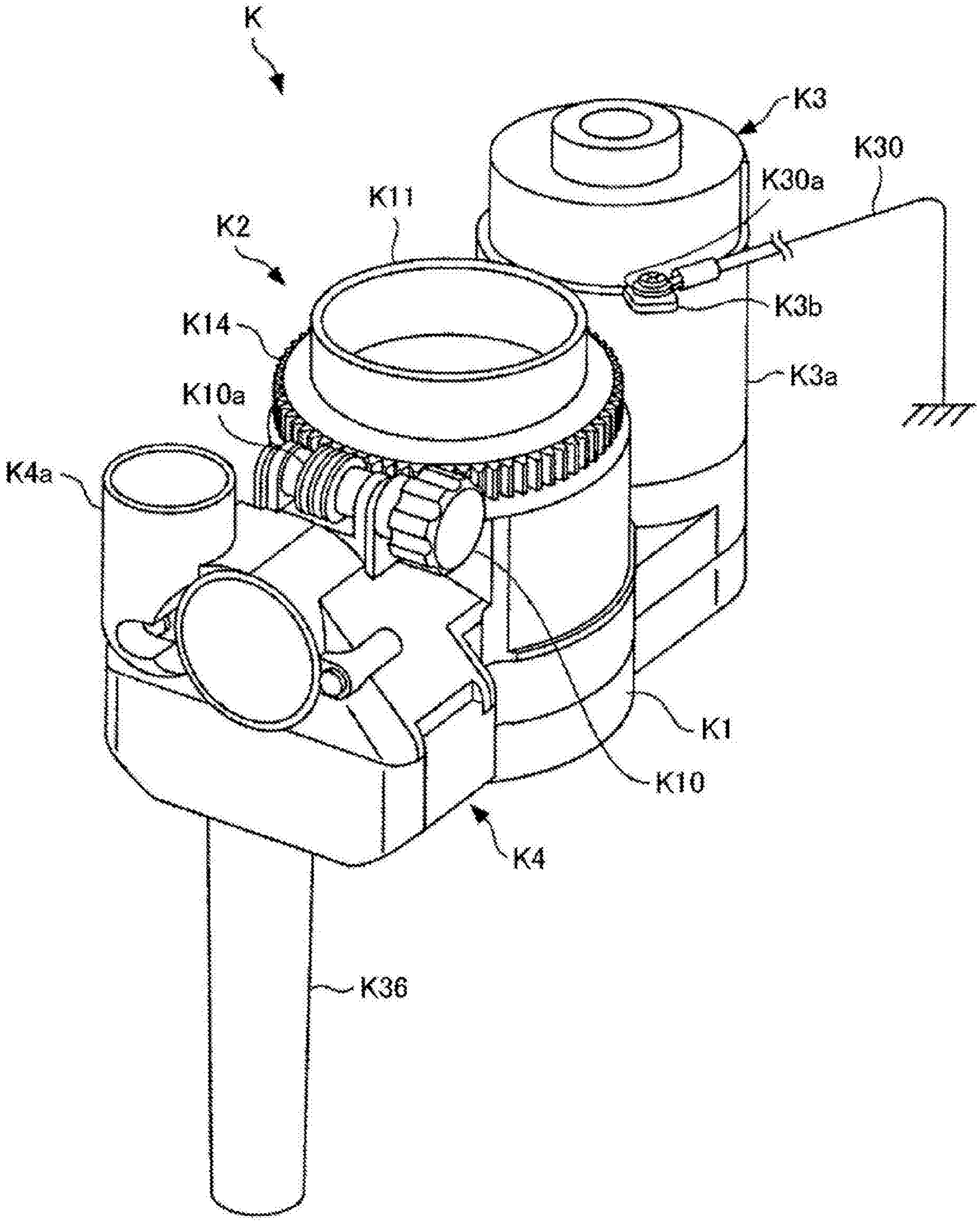


图88

Petitioner Exhibit 1002-2167

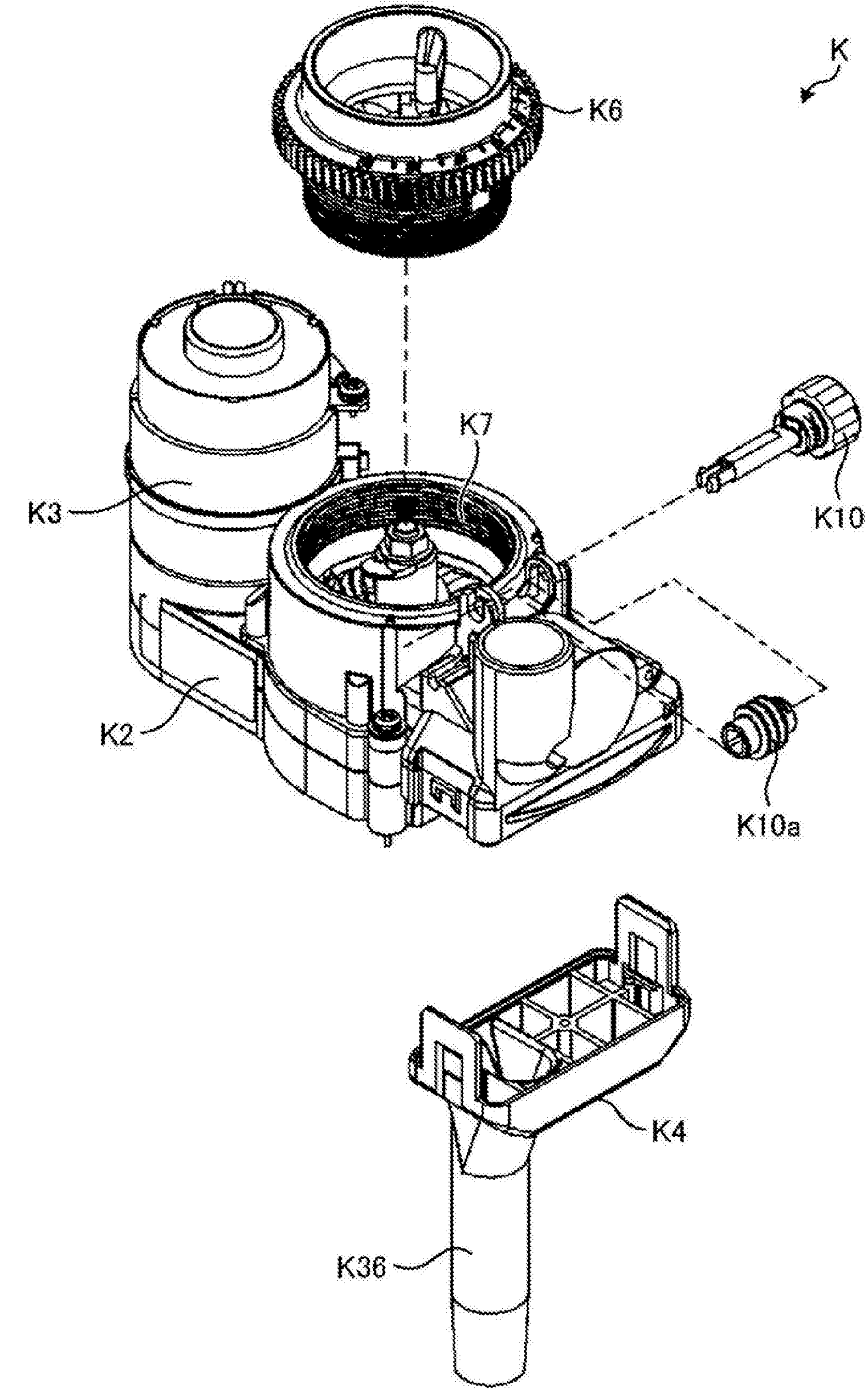


图89

Petitioner Exhibit 1002-2168

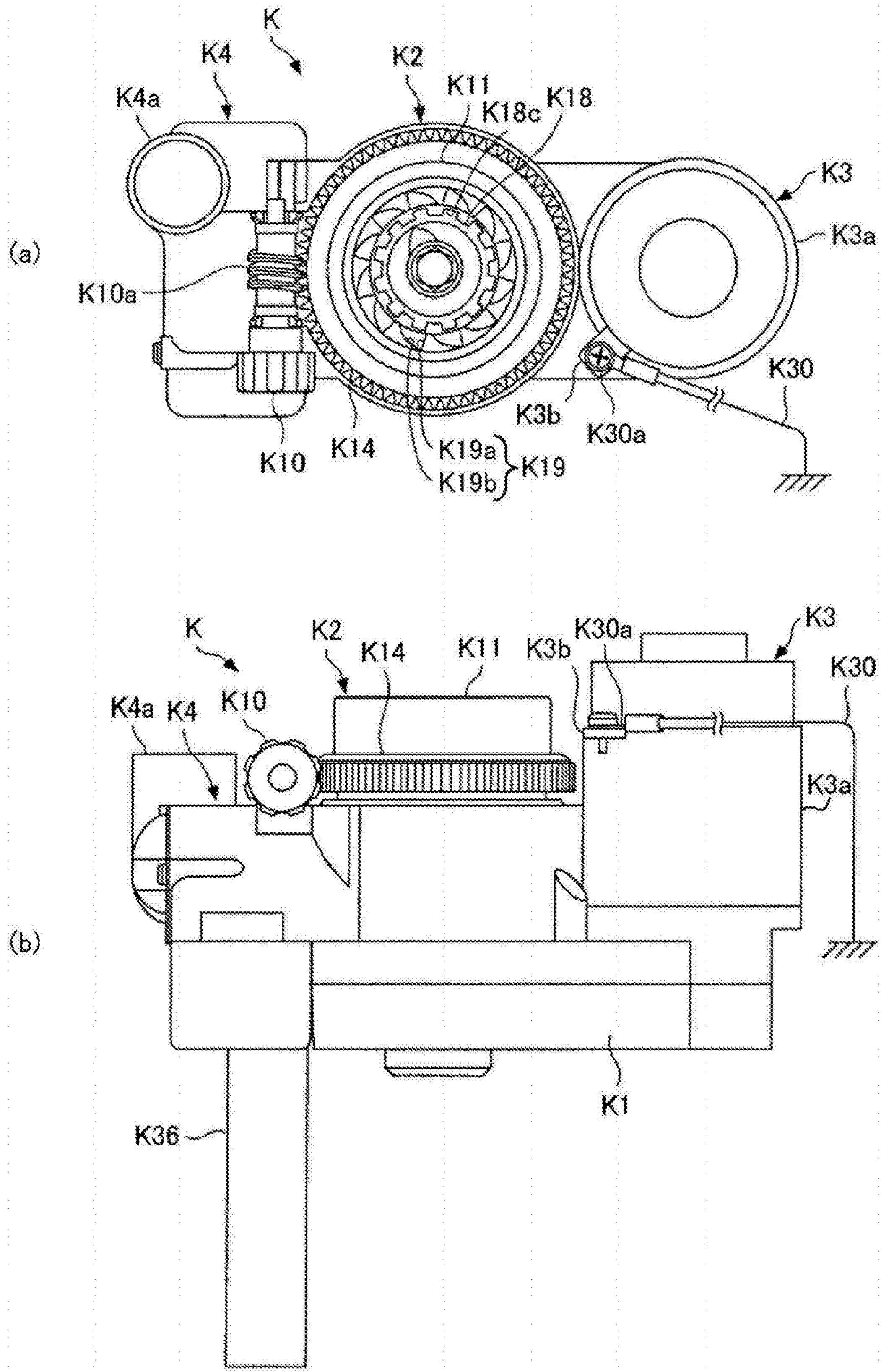


图90

Petitioner Exhibit 1002-2169

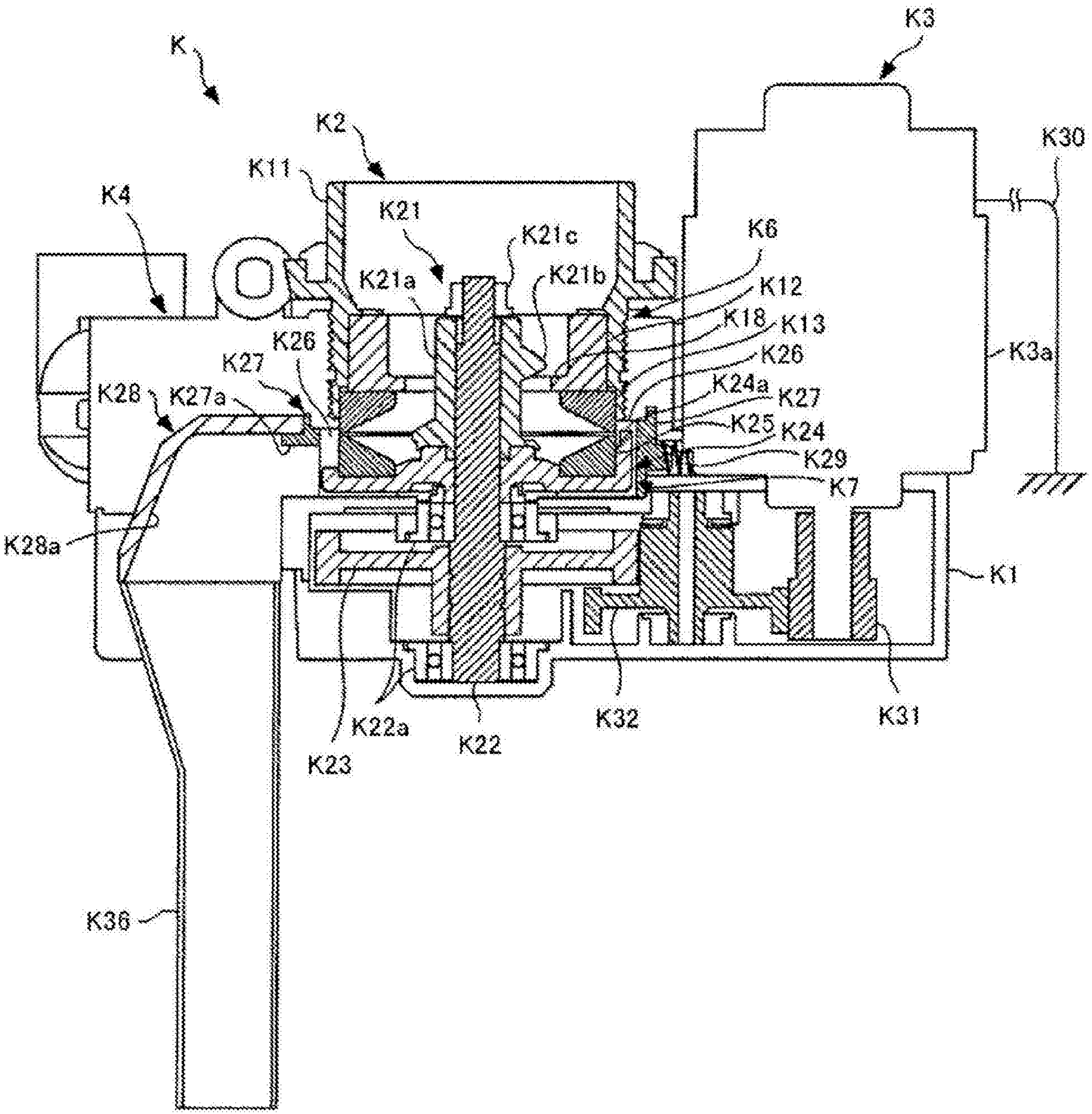


图91

Petitioner Exhibit 1002-2170

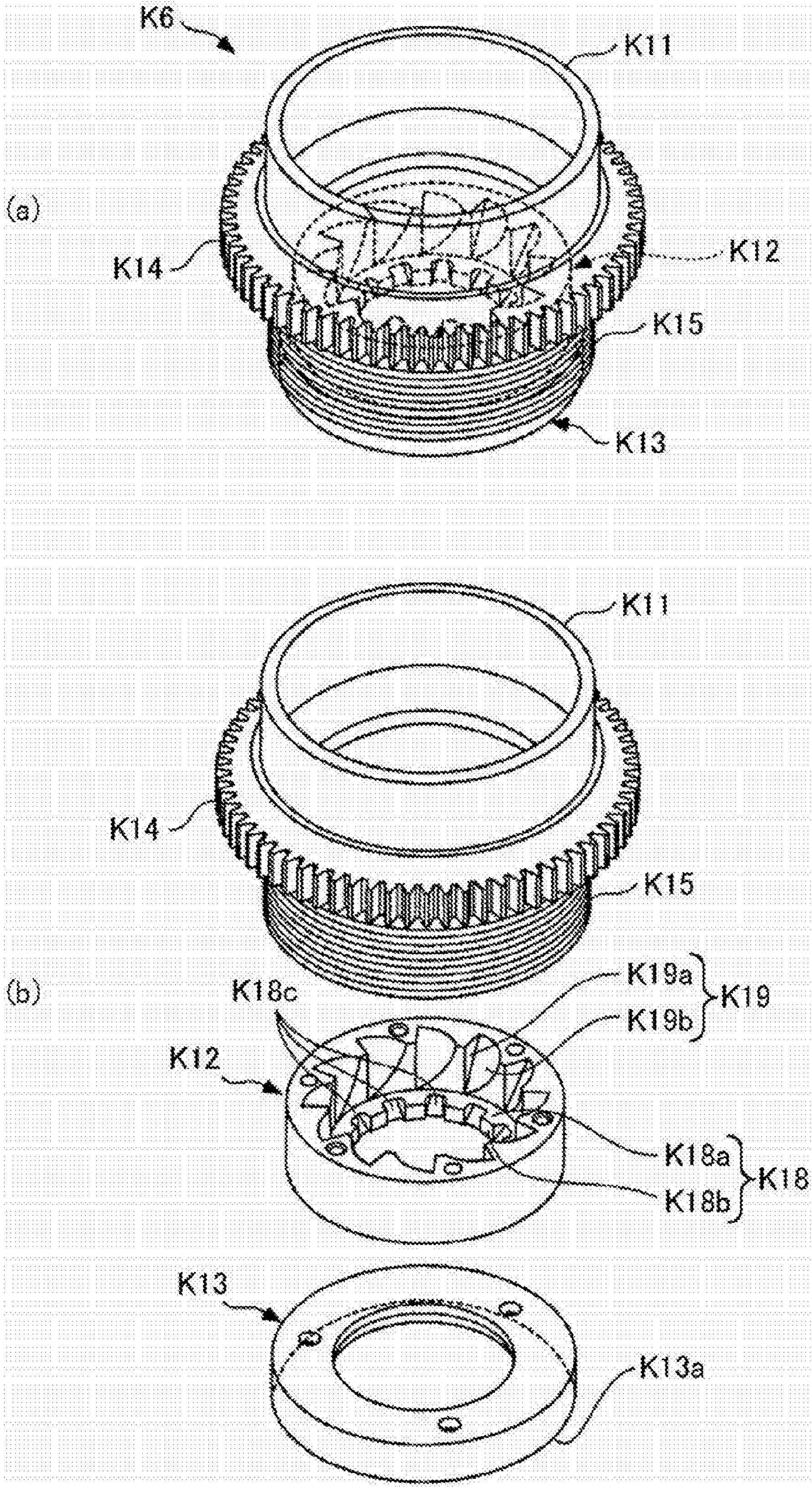

K6
K11
(a)
K12
K14
K15
K13
K11
K14
K15
(b)
K18c
K19a
K19
K19b
K12
K18a
K18
K18b
K13
K13a

图92

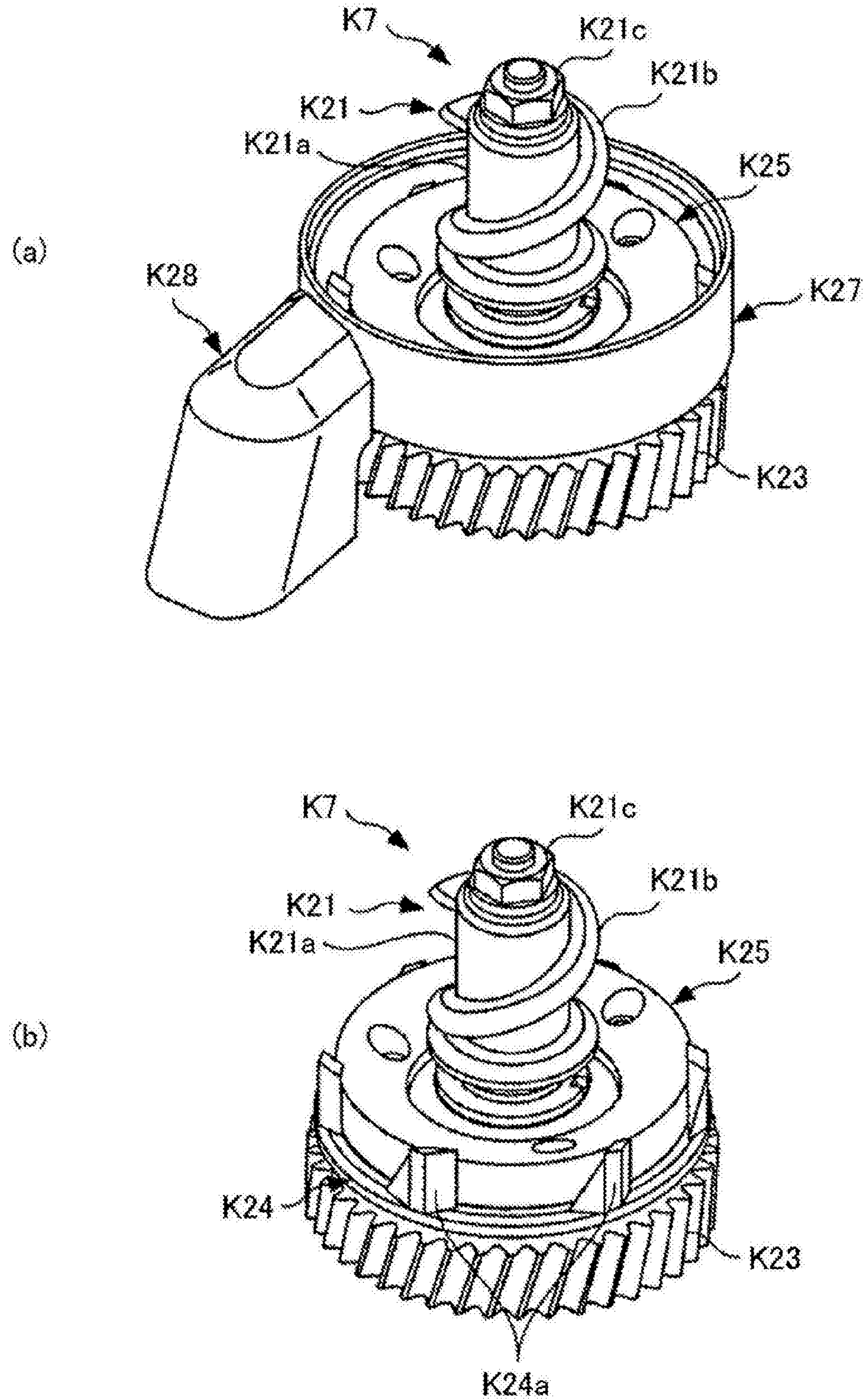


图93

Petitioner Exhibit 1002-2172

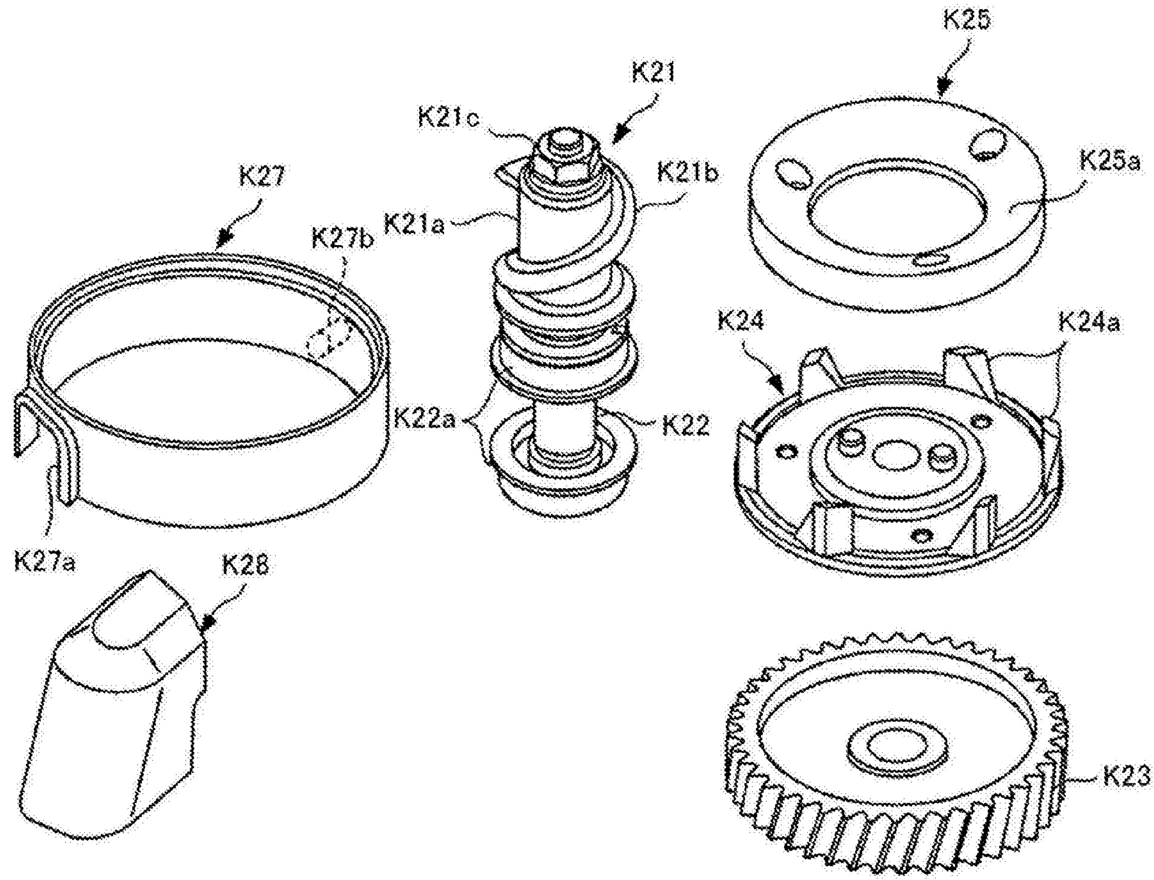


图94

Petitioner Exhibit 1002-2173

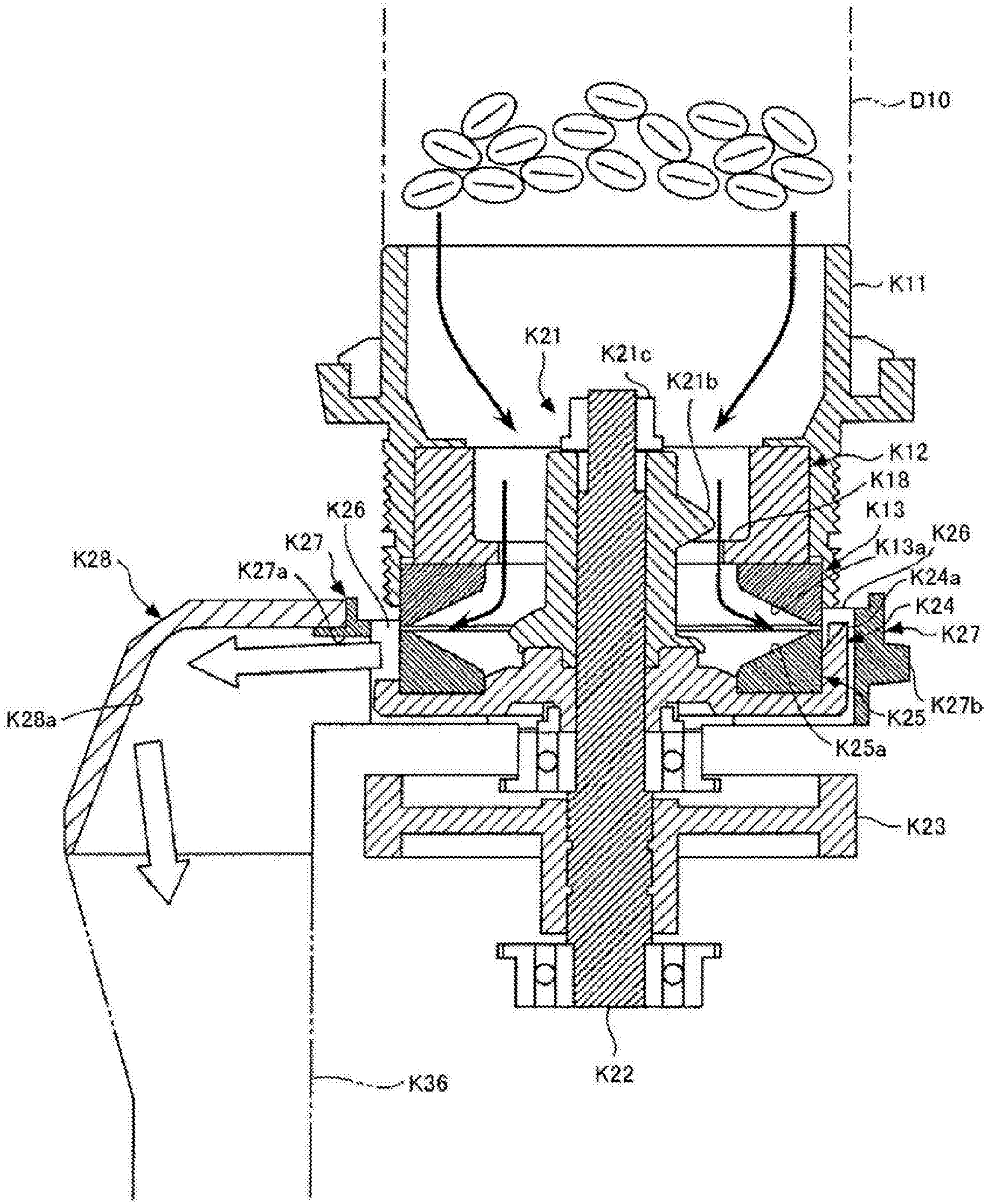


图95

Petitioner Exhibit 1002-2174

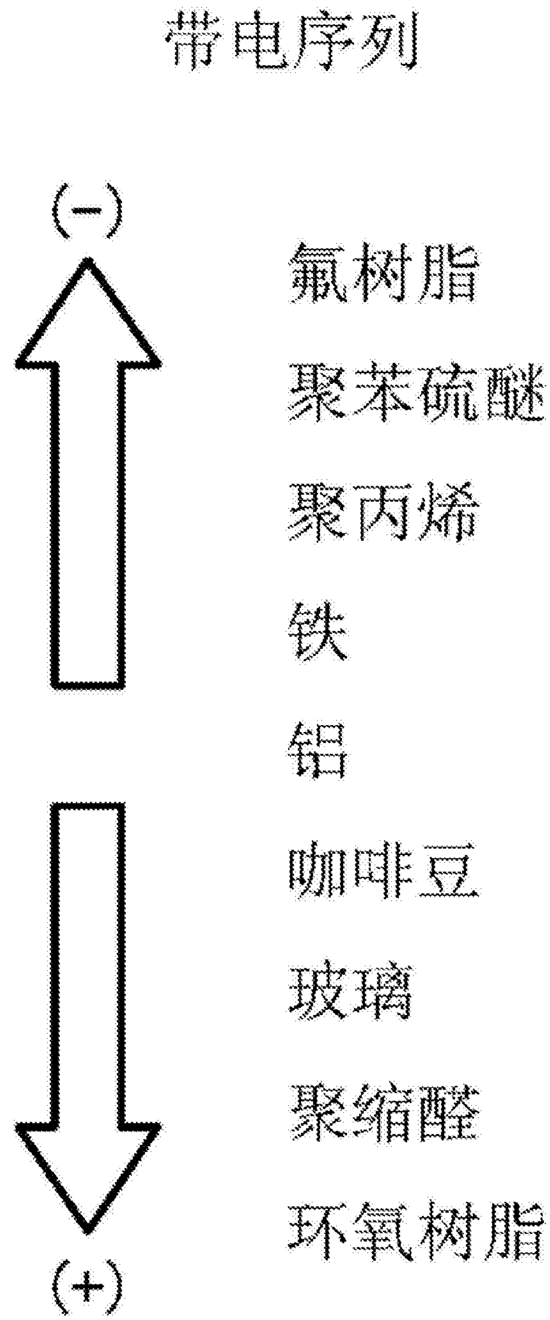


图96

Petitioner Exhibit 1002-2175

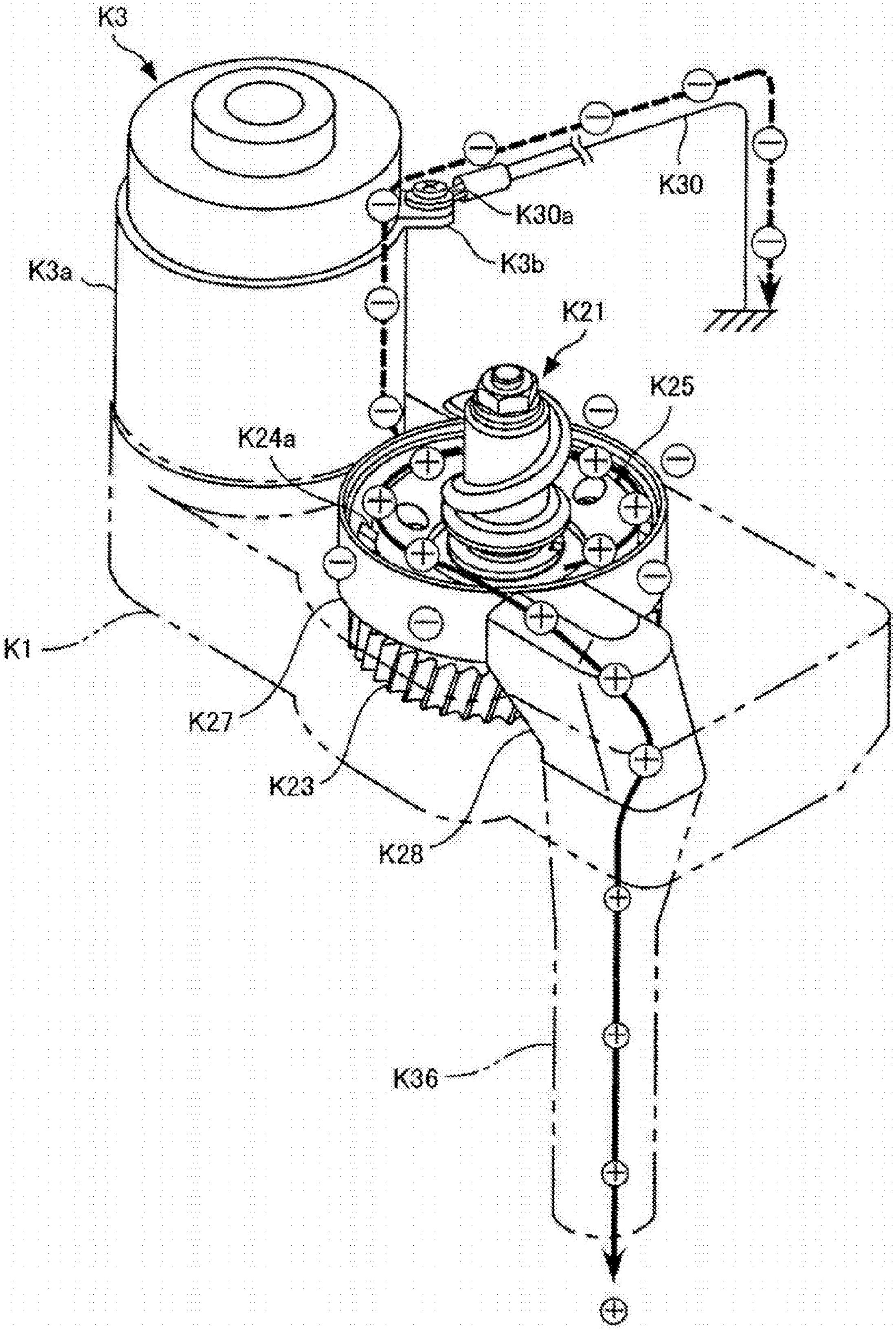


图97

Petitioner Exhibit 1002-2176

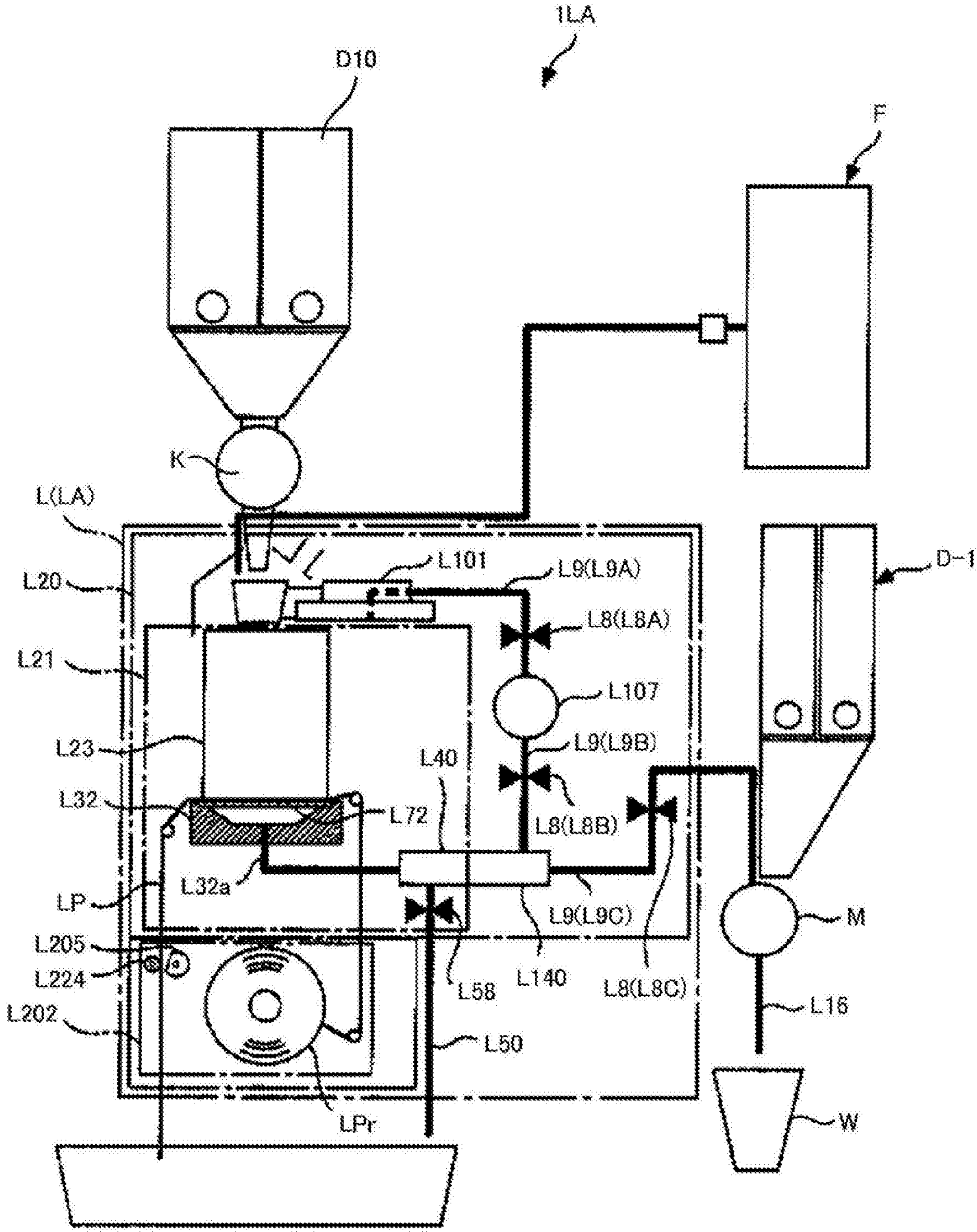


图98

Petitioner Exhibit 1002-2177

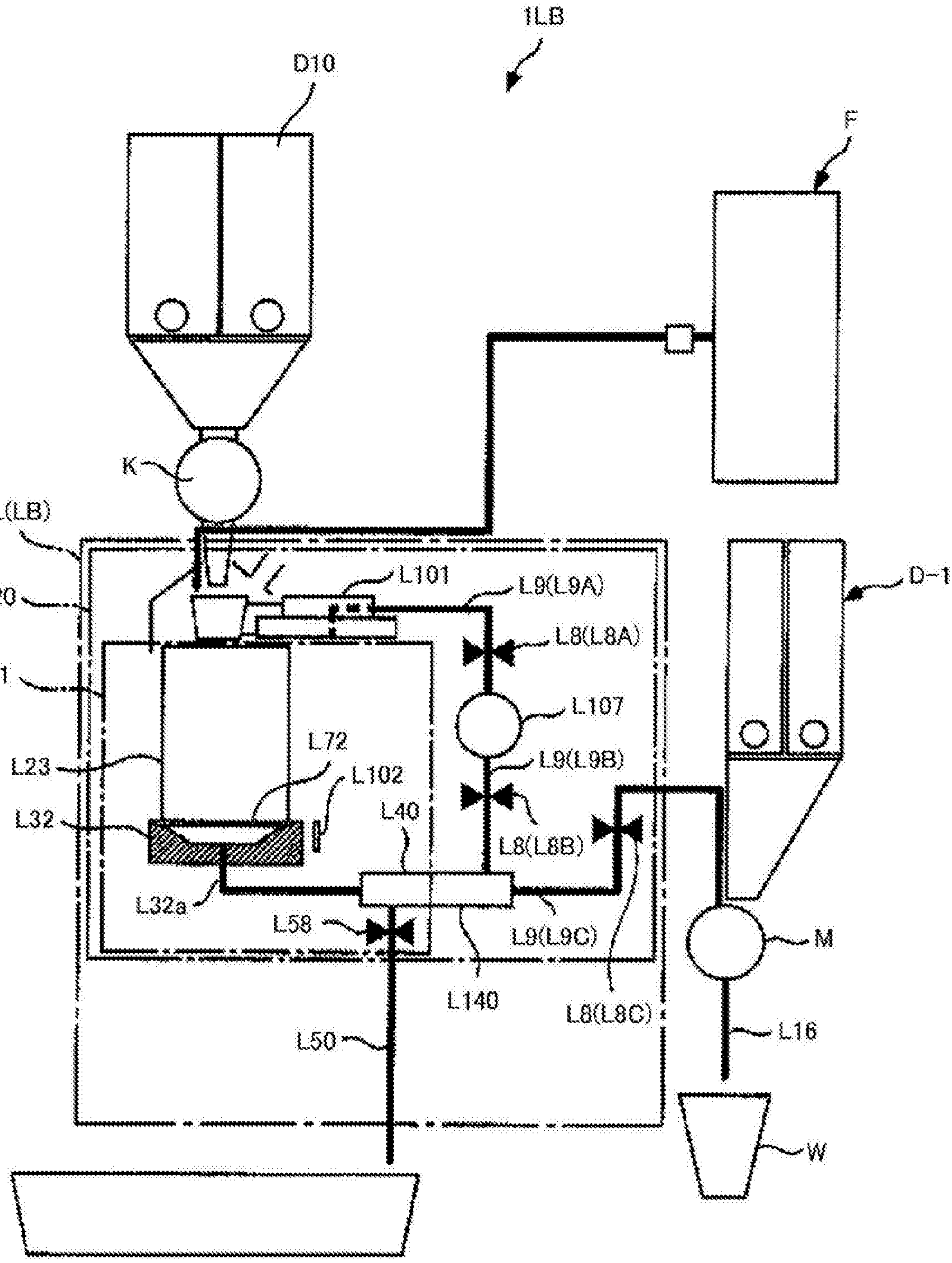


图99

Petitioner Exhibit 1002-2178

(a)

(b)

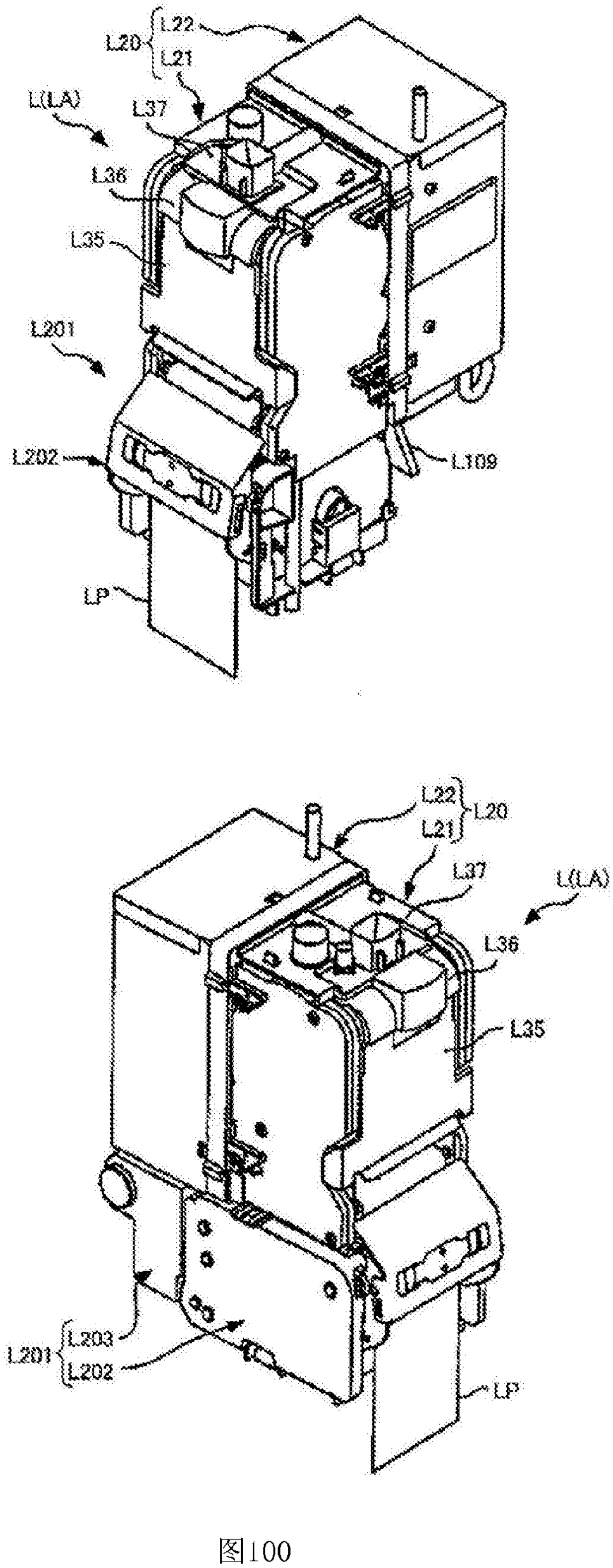
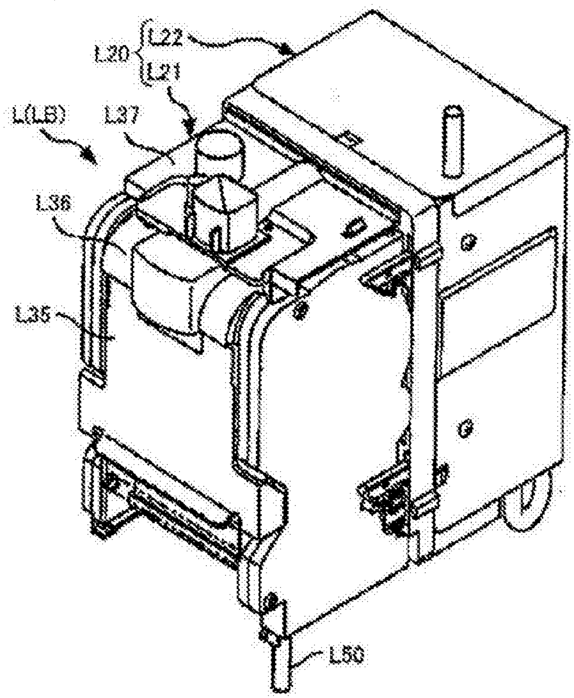


图100

Petitioner Exhibit 1002-2179

(a)



(b)

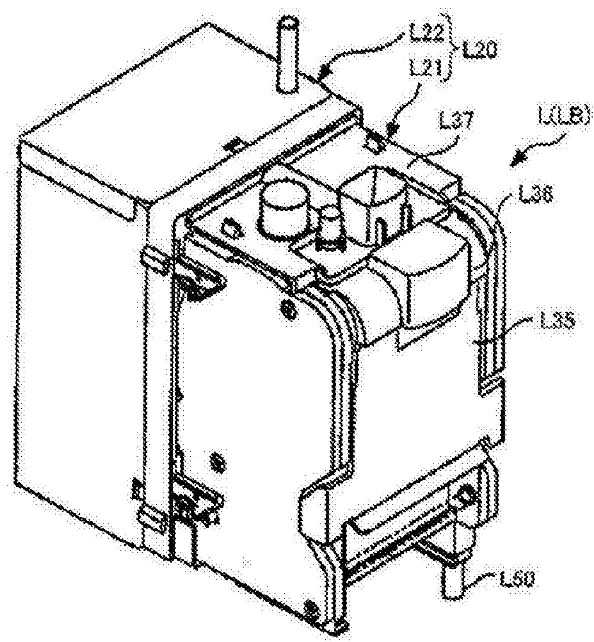


图101

Petitioner Exhibit 1002-2180

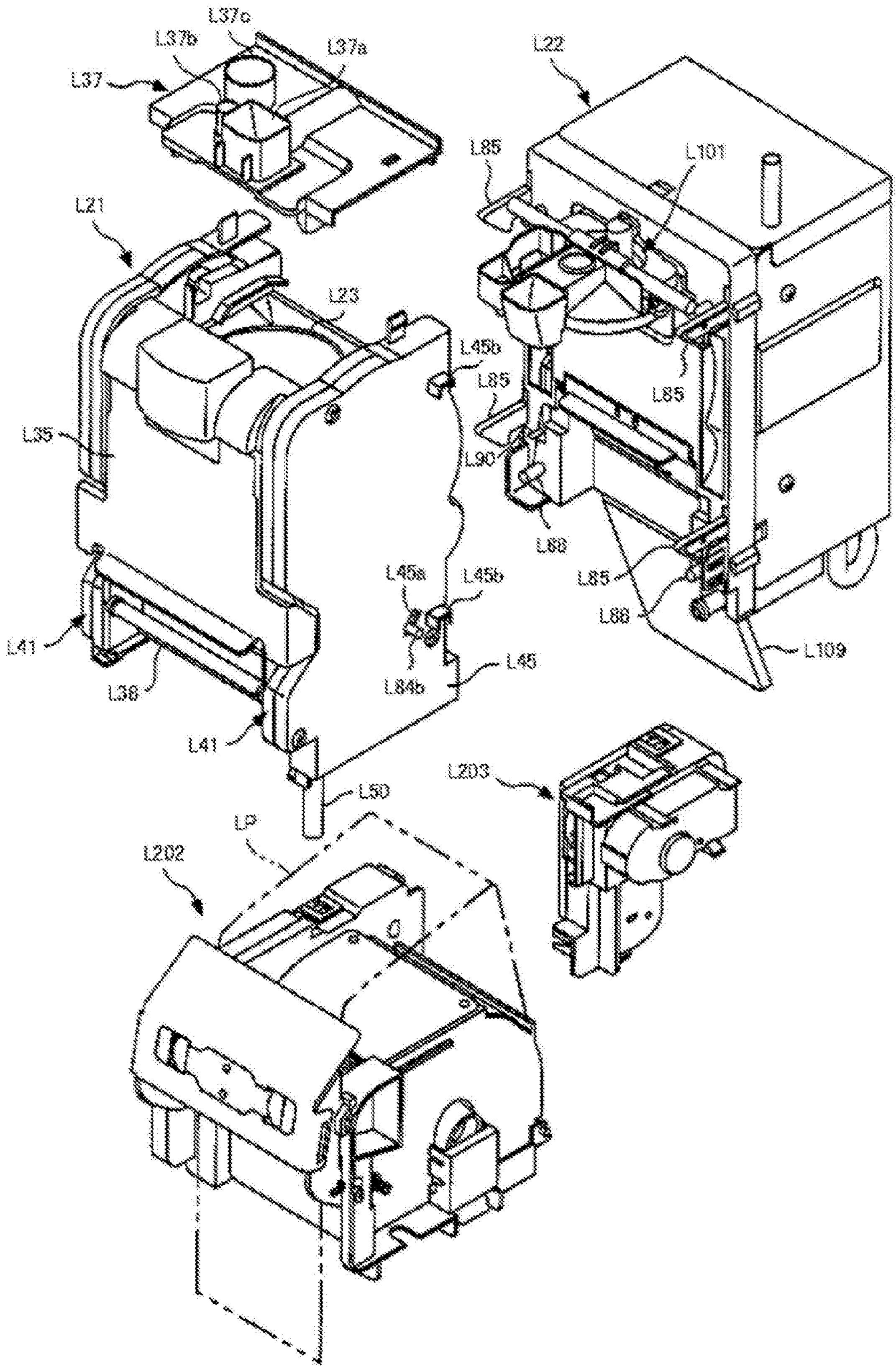


图102

Petitioner Exhibit 1002-2181

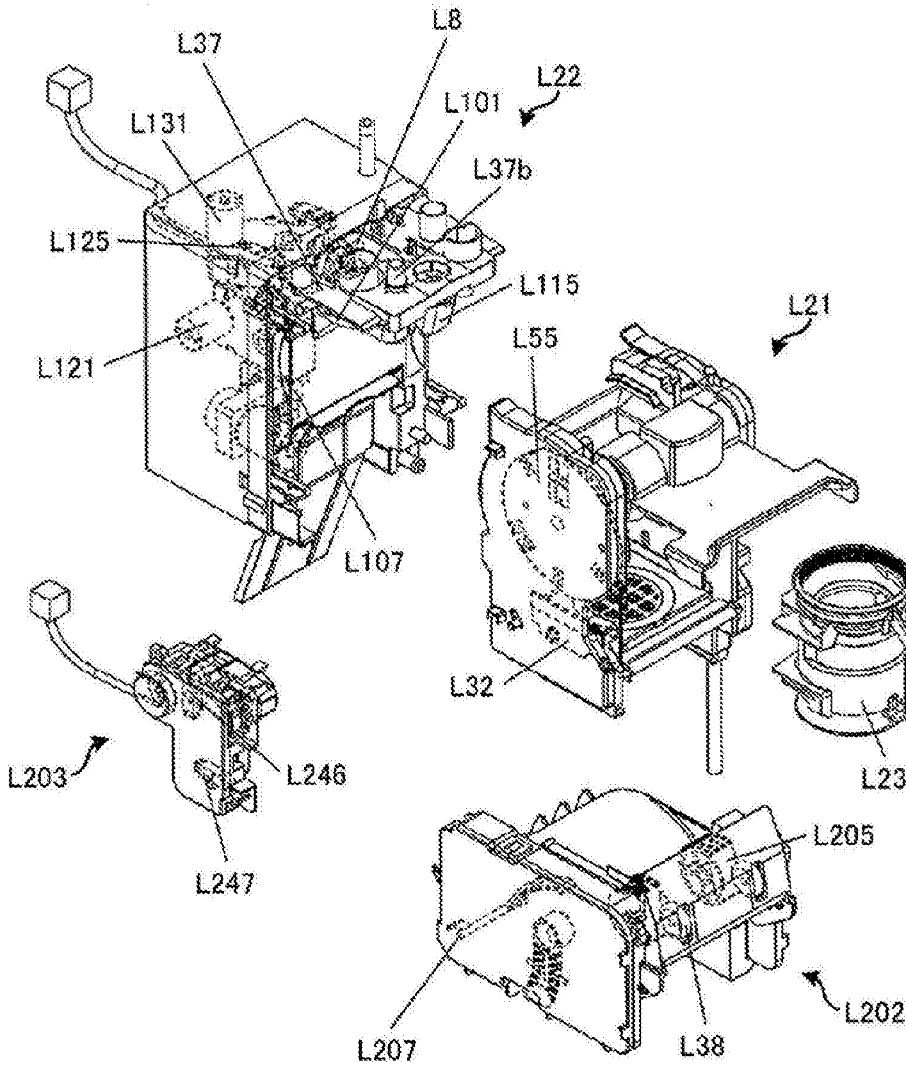


图103

Petitioner Exhibit 1002-2182

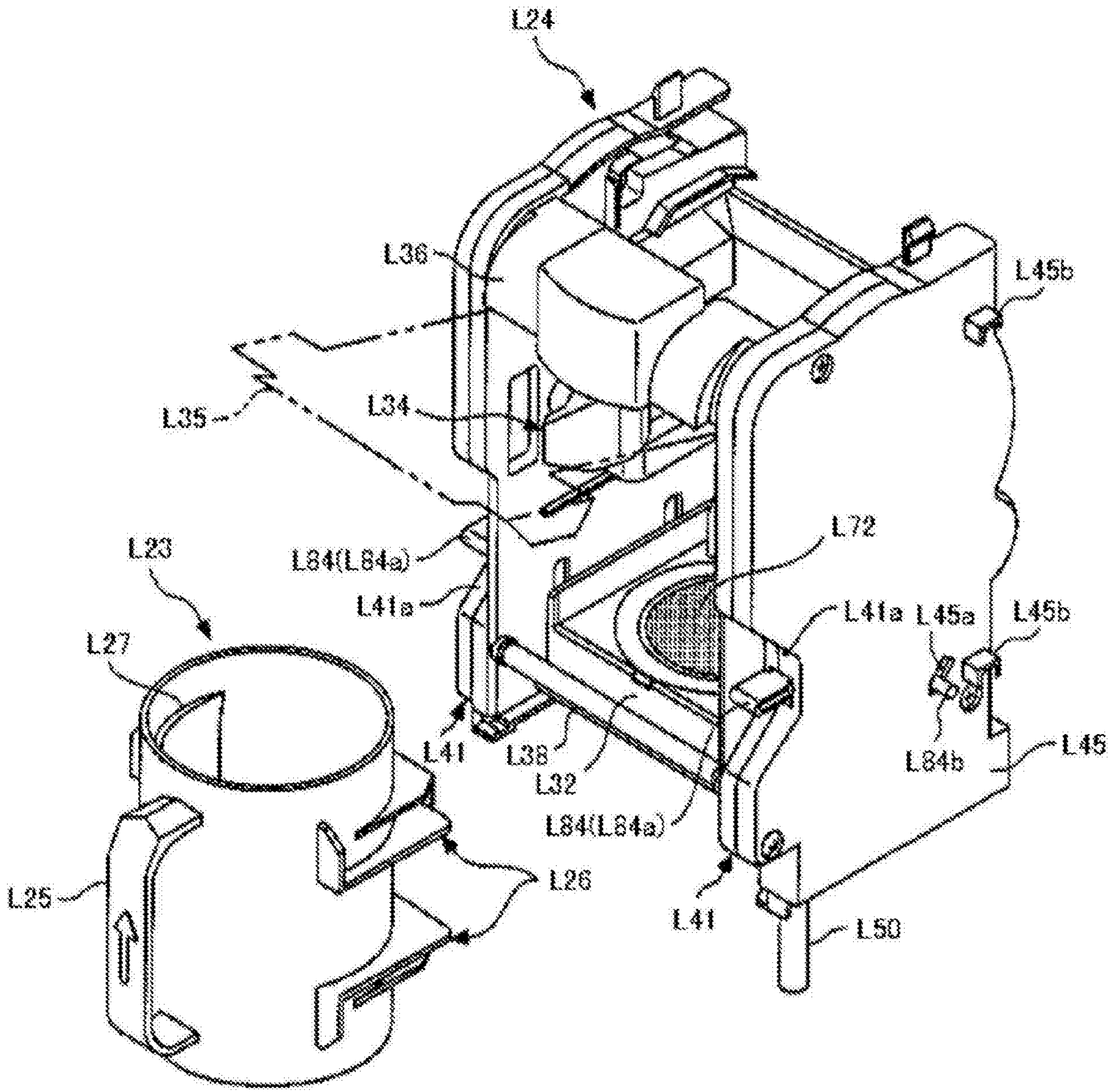


图104

Petitioner Exhibit 1002-2183

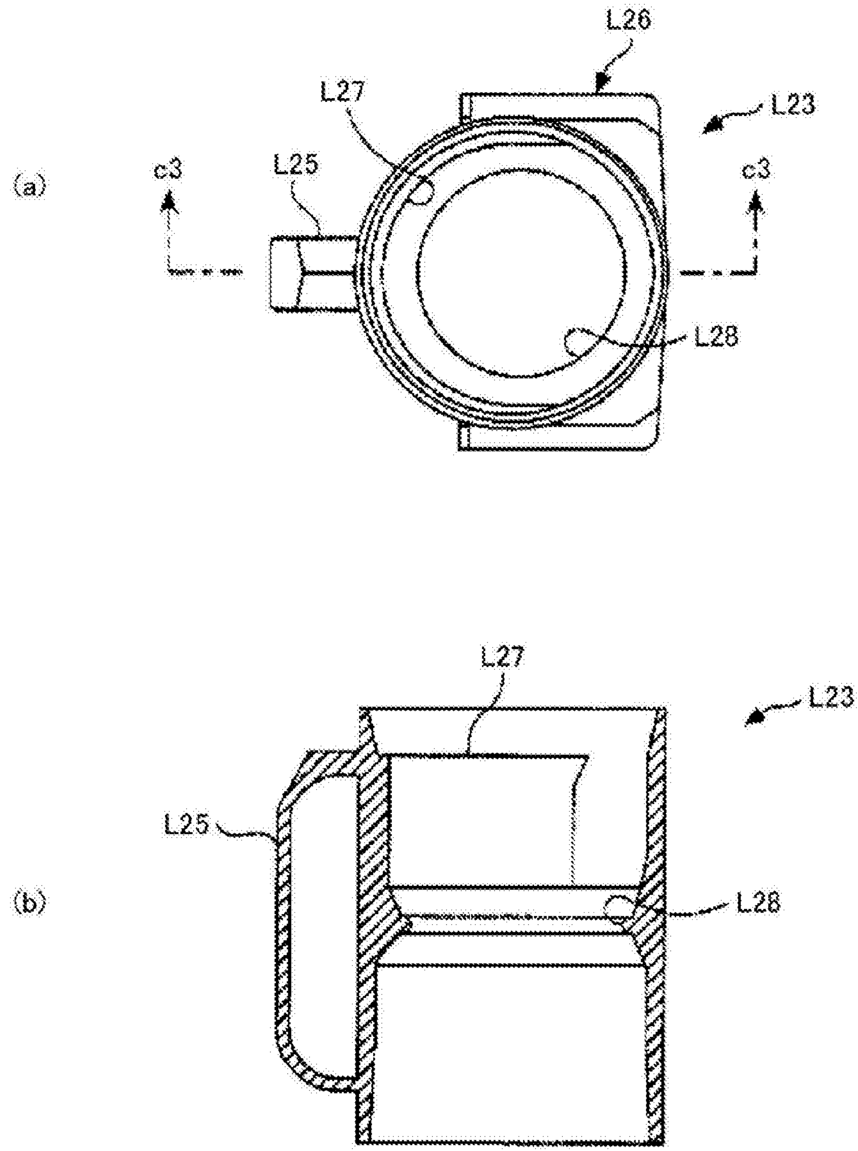
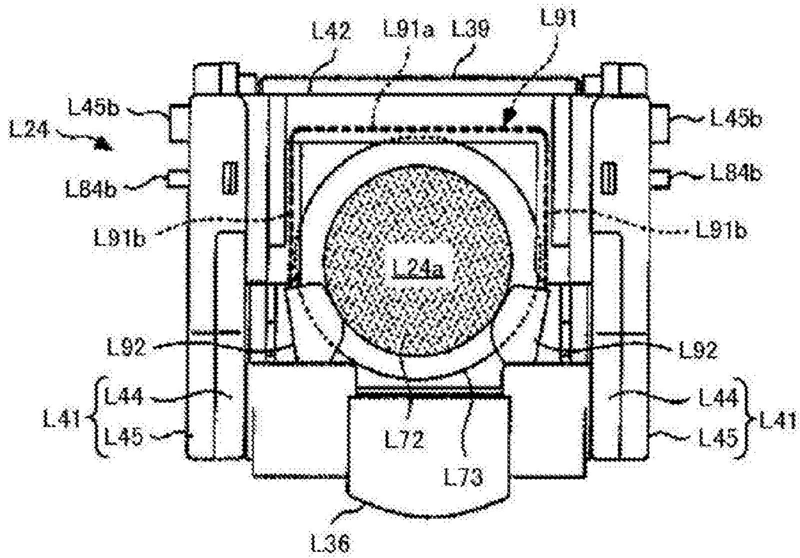


图105

Petitioner Exhibit 1002-2184

(a)



(b)

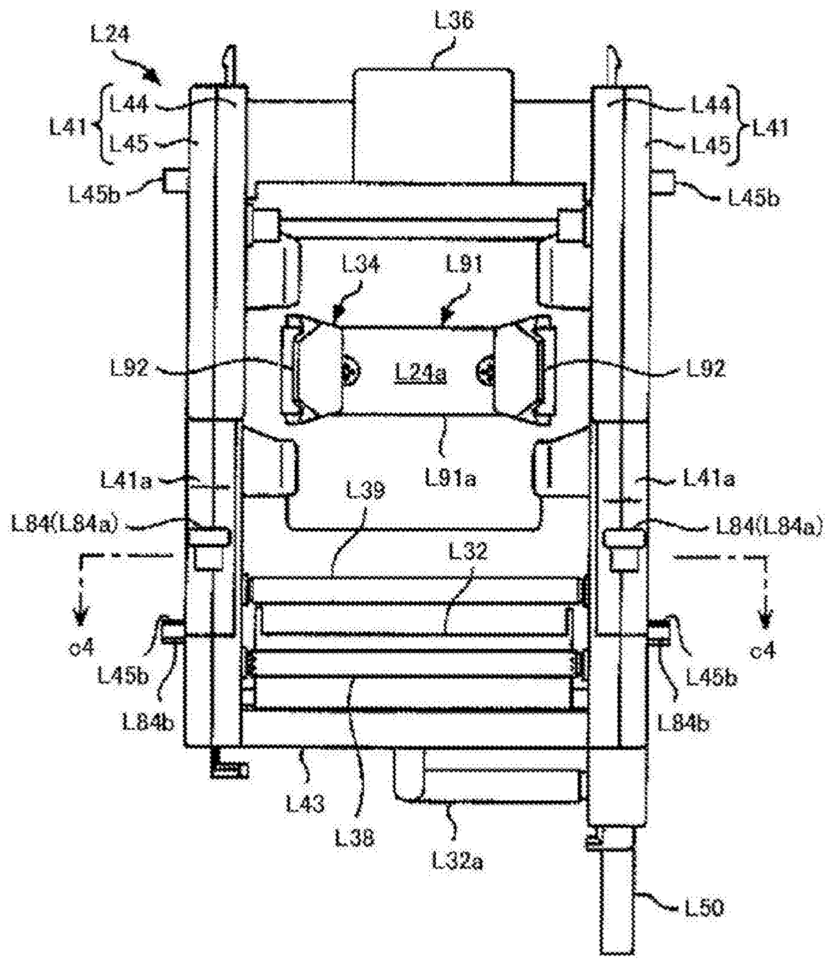
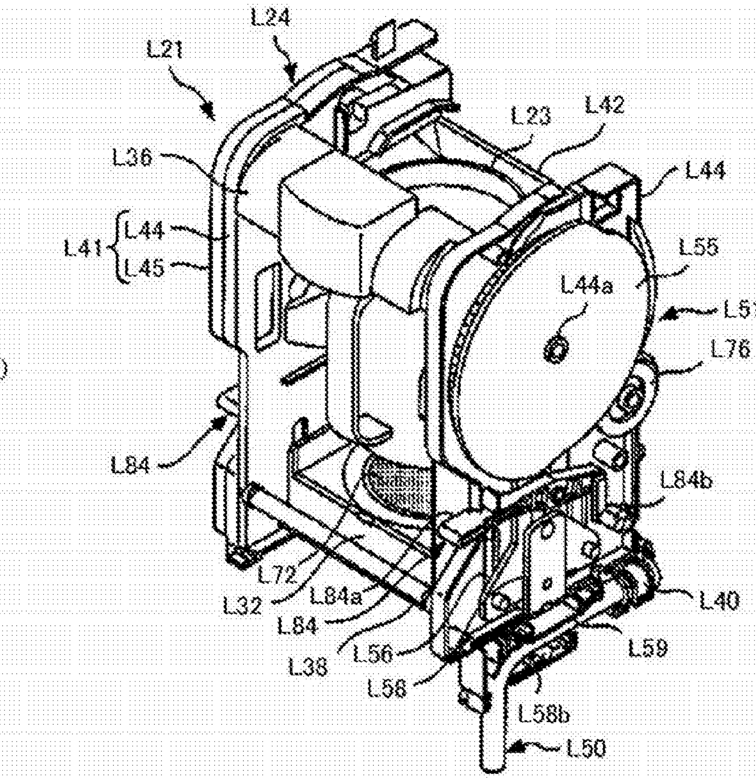


图106

Petitioner Exhibit 1002-2185

(a)



(b)

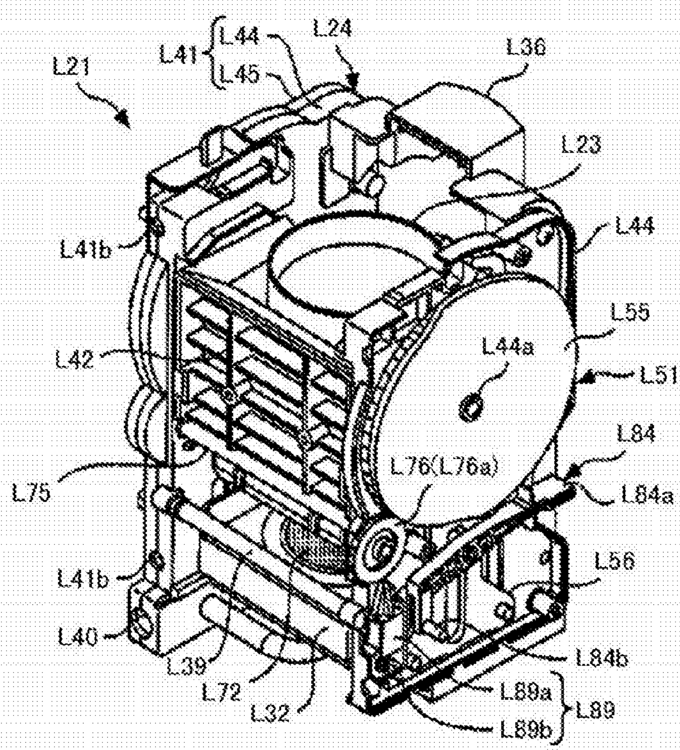


图107

Petitioner Exhibit 1002-2186

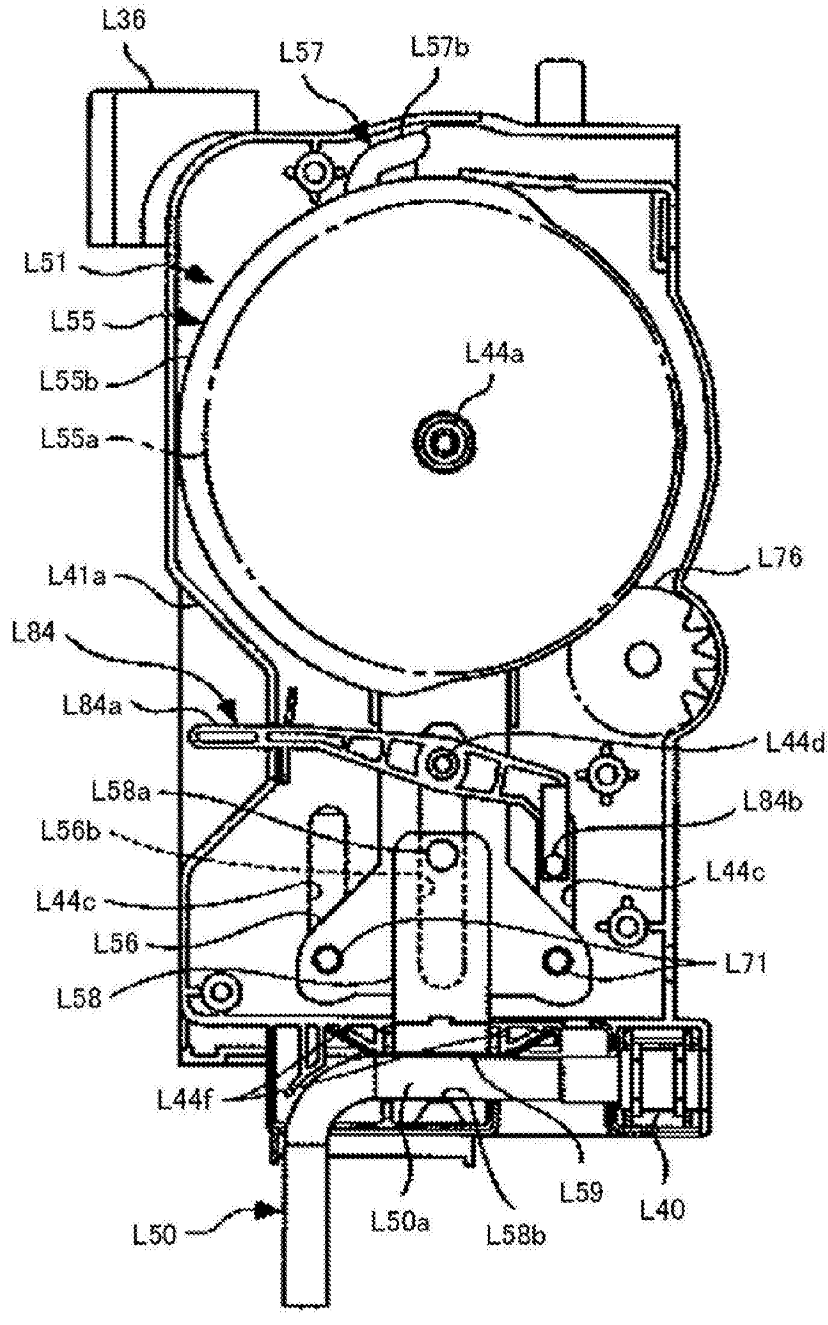


图108

Petitioner Exhibit 1002-2187

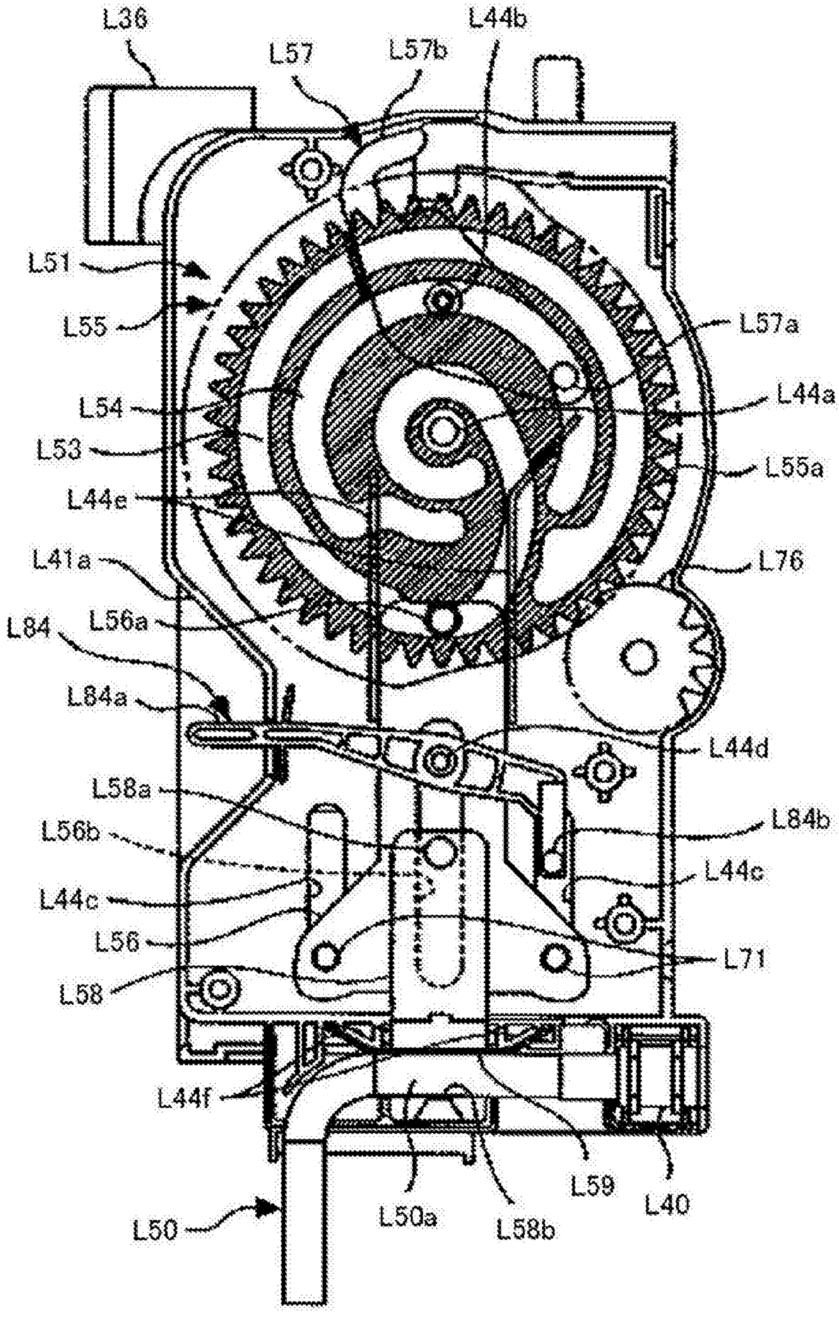


图109

Petitioner Exhibit 1002-2188

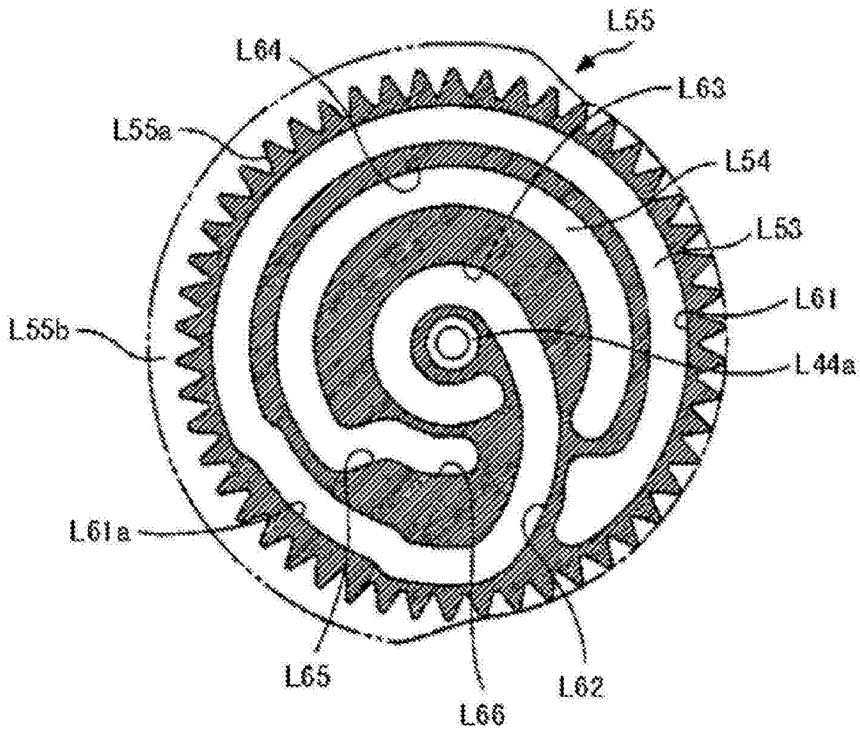


图110

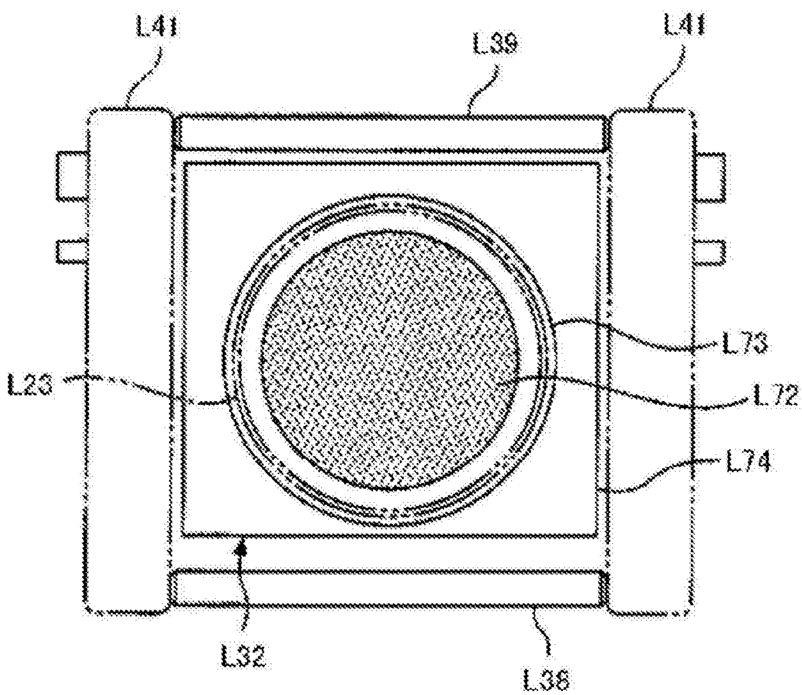


图111

Petitioner Exhibit 1002-2189

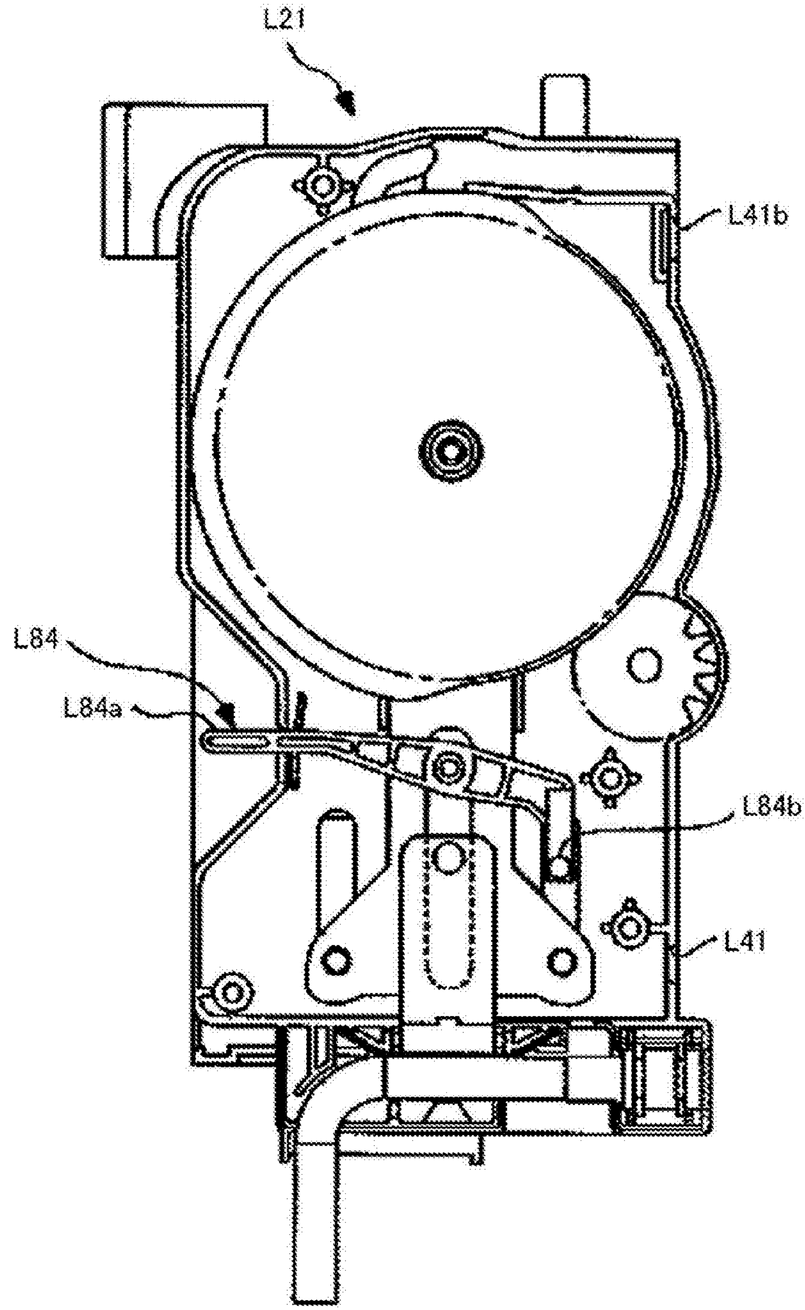


图112

Petitioner Exhibit 1002-2190

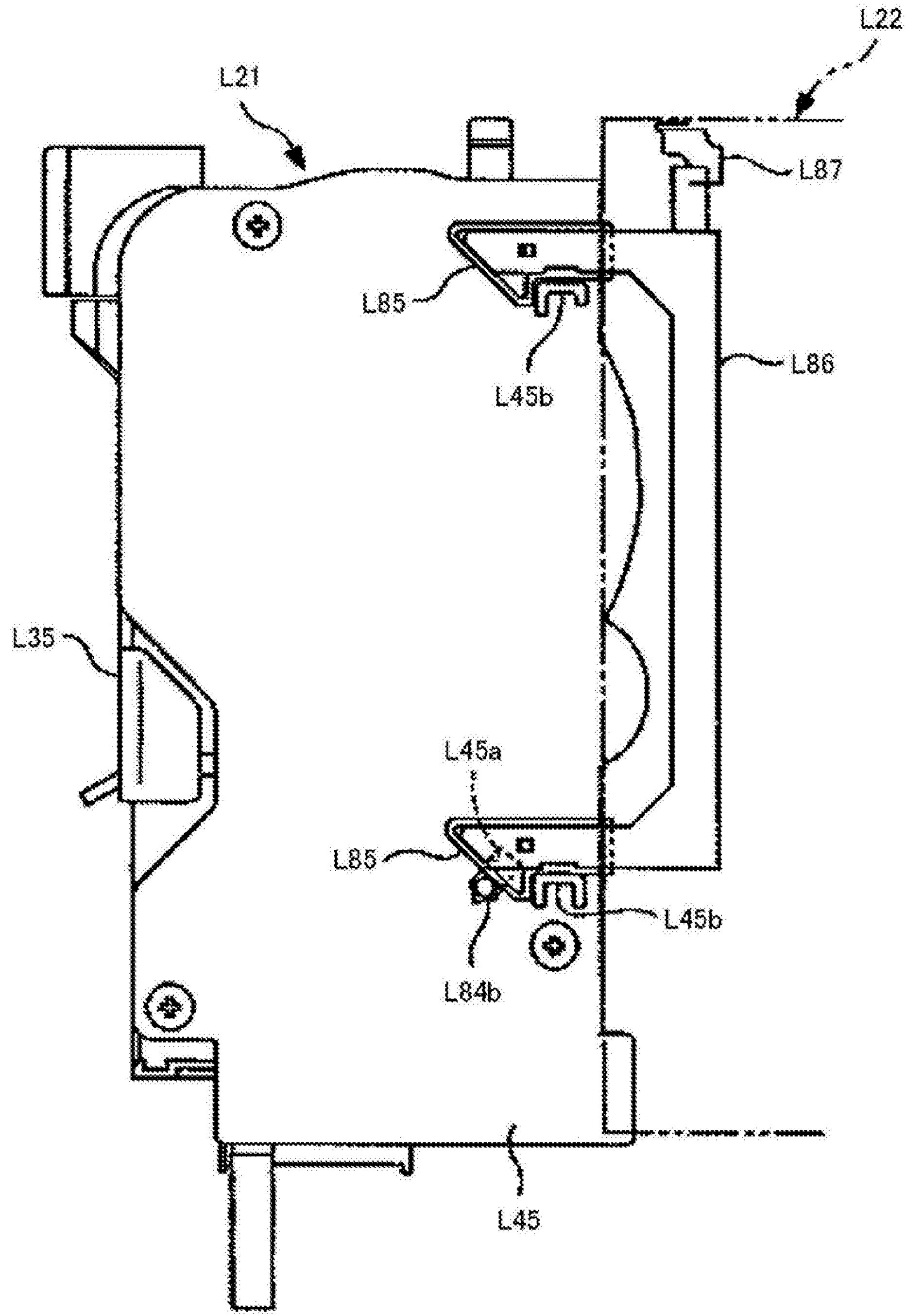


图113

Petitioner Exhibit 1002-2191

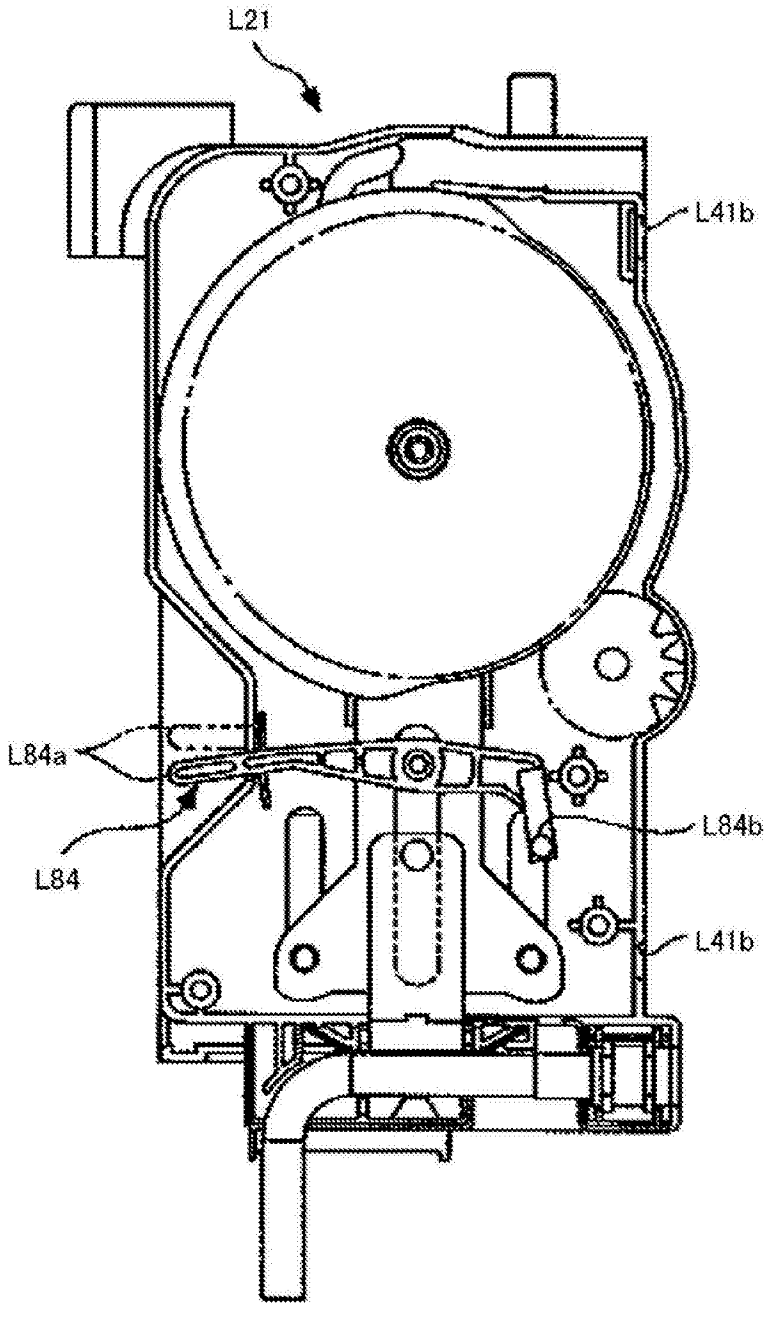


图114

Petitioner Exhibit 1002-2192

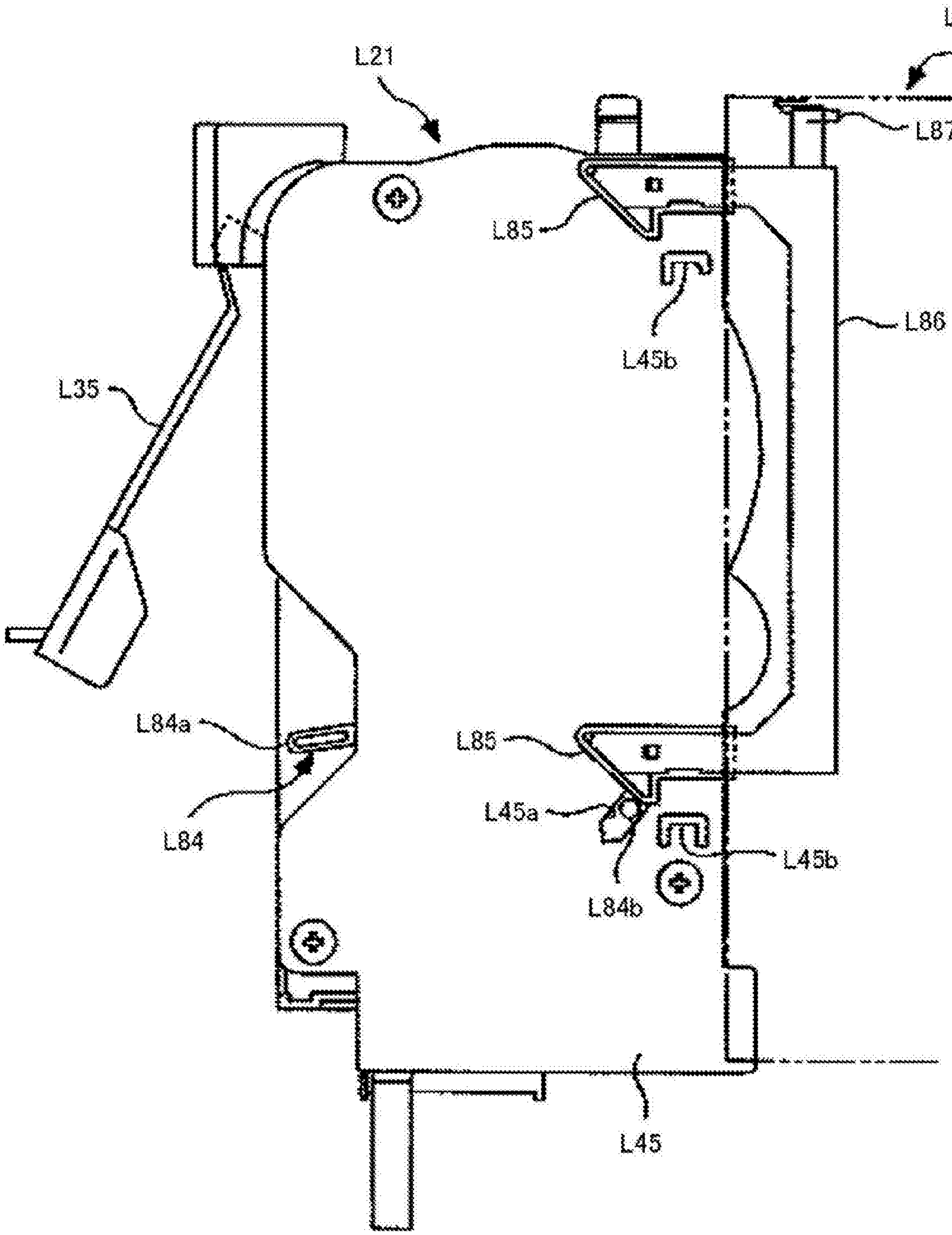
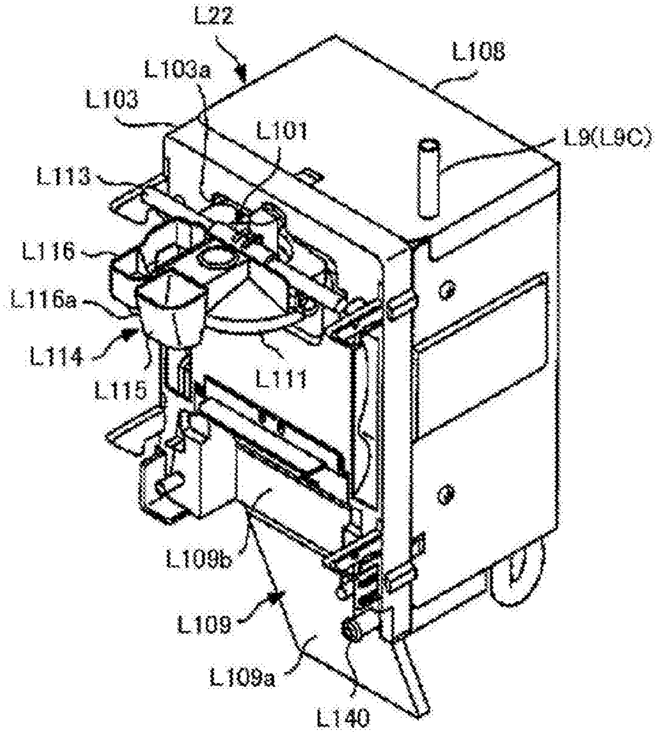


图115

Petitioner Exhibit 1002-2193

(a)



(b)

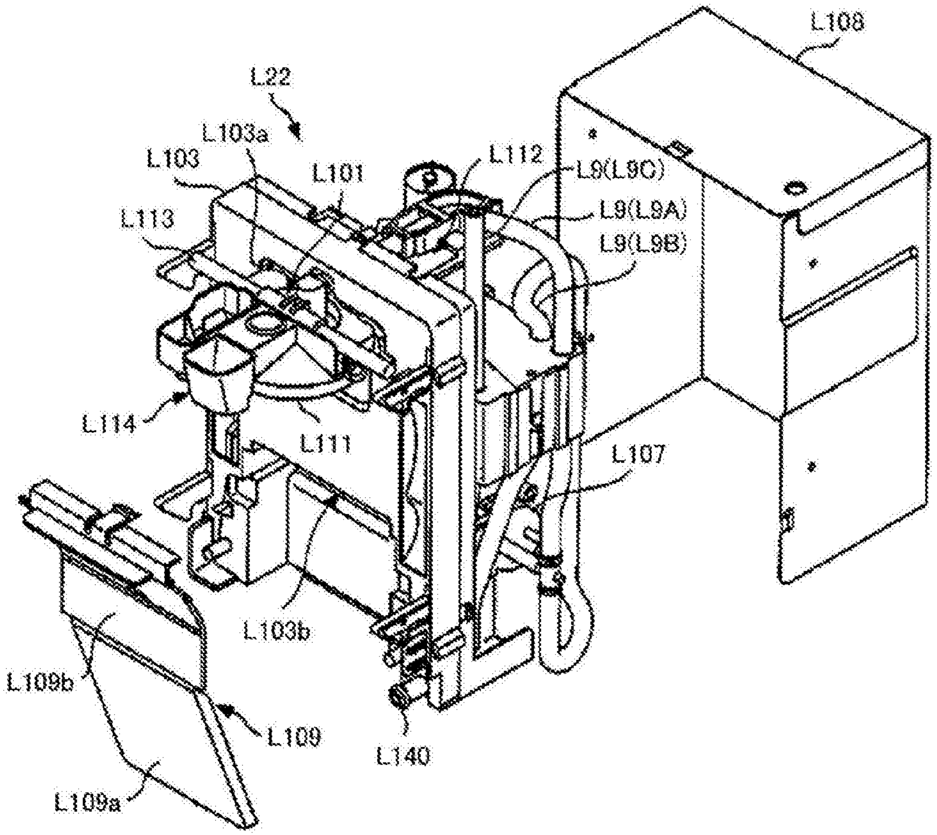
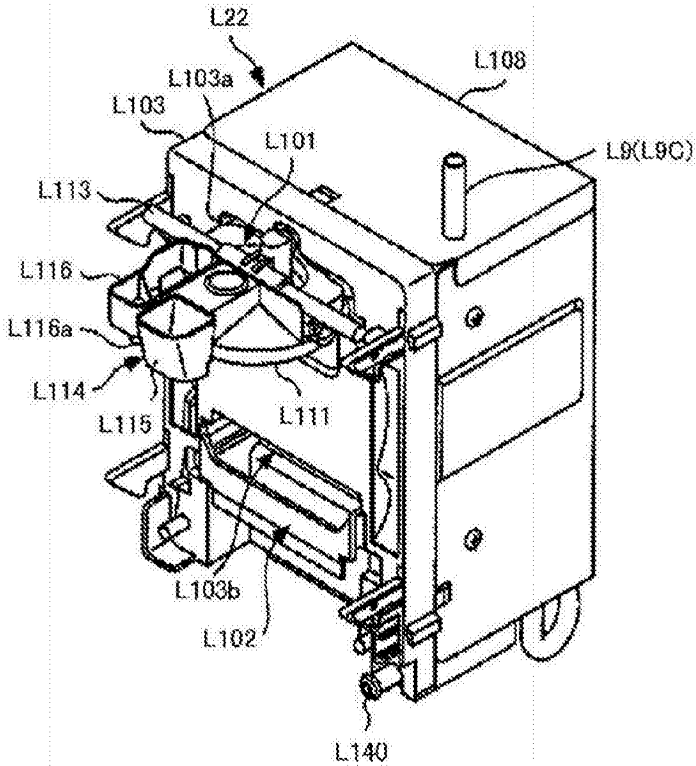


图116

Petitioner Exhibit 1002-2194

(a)



(b)

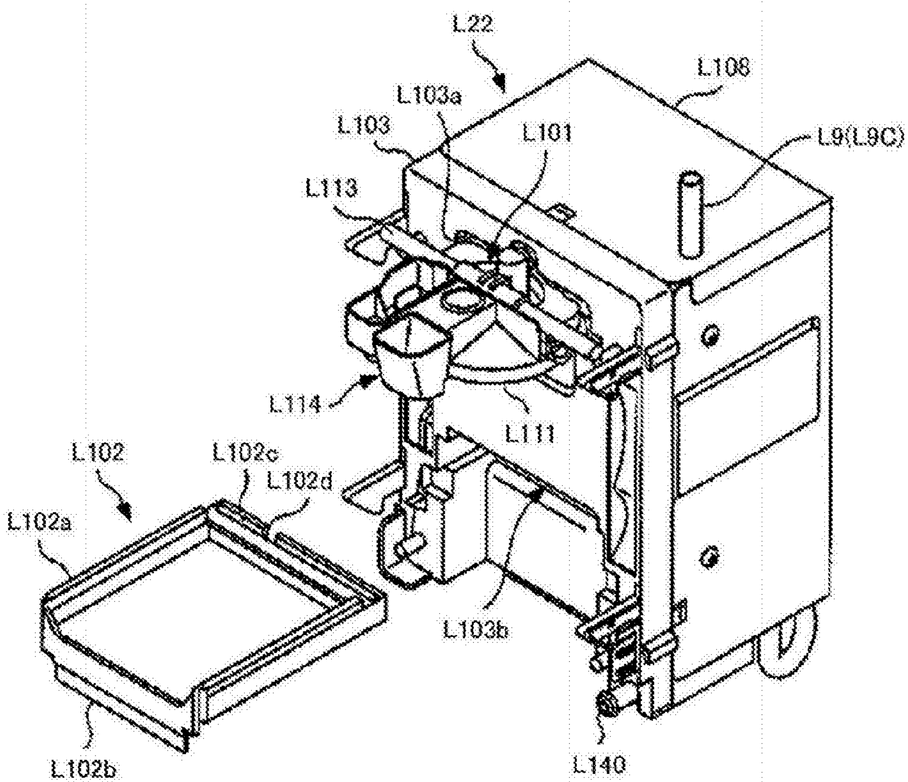


图117

Petitioner Exhibit 1002-2195

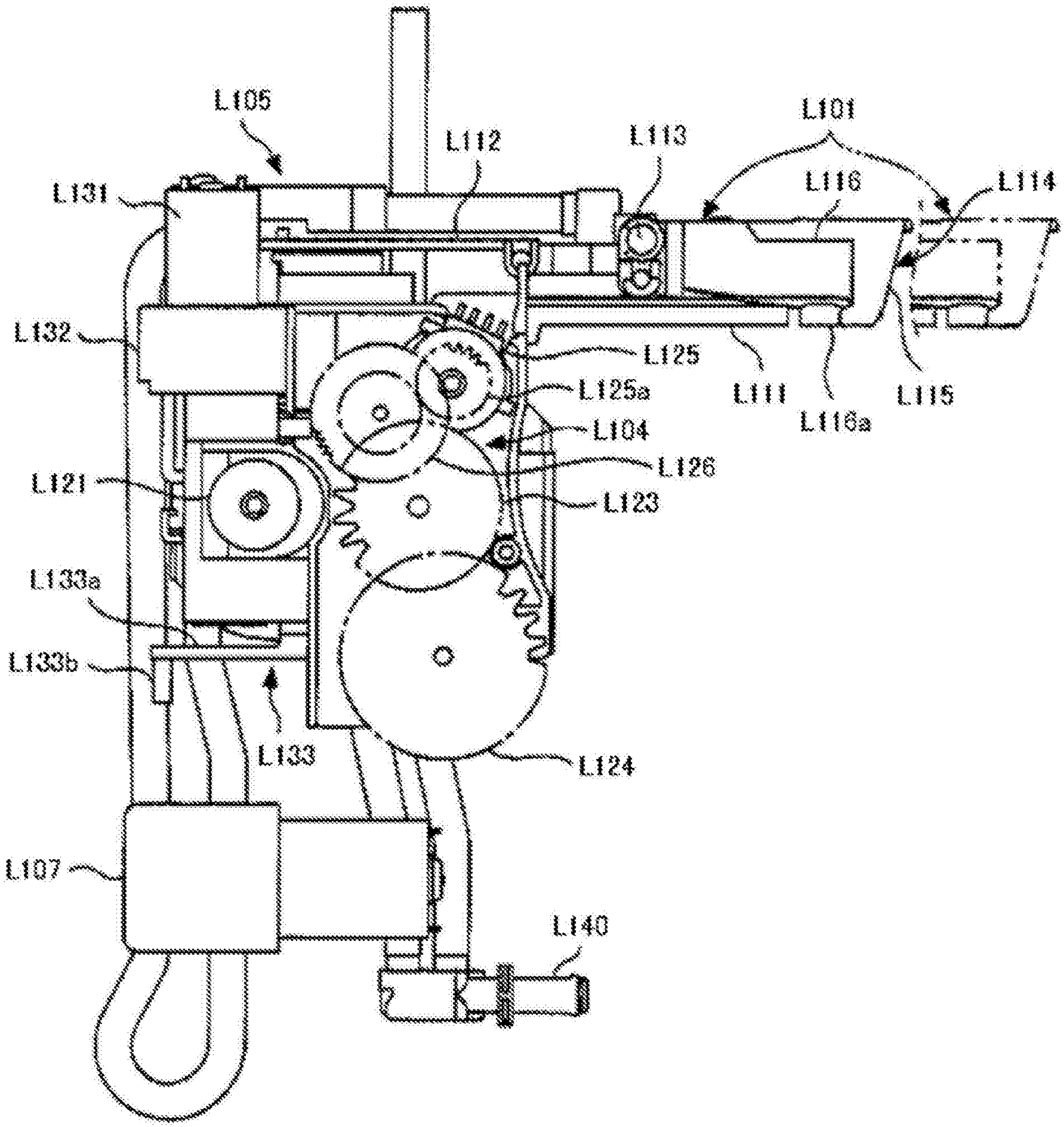


图118

Petitioner Exhibit 1002-2196

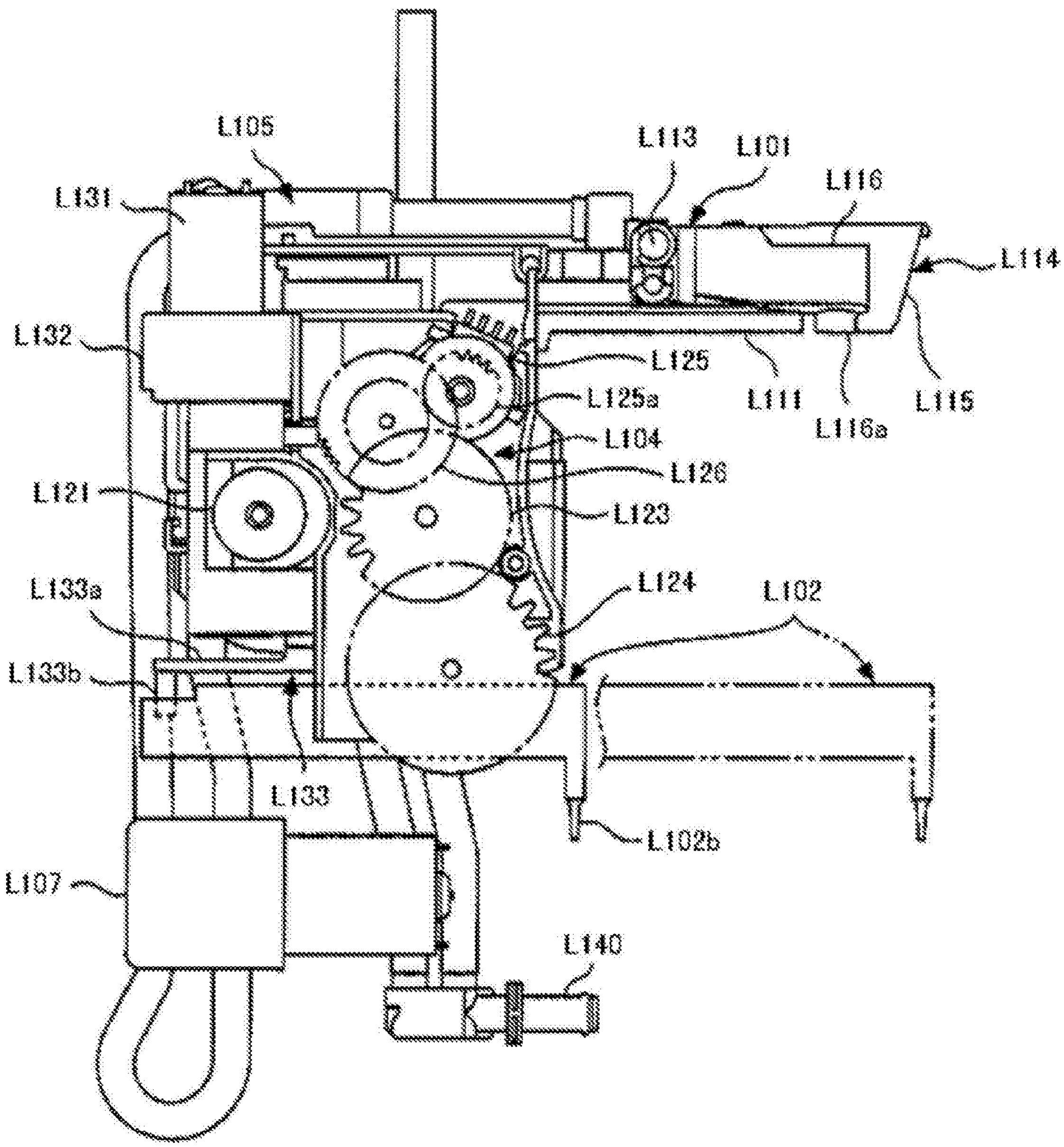


图119

Petitioner Exhibit 1002-2197

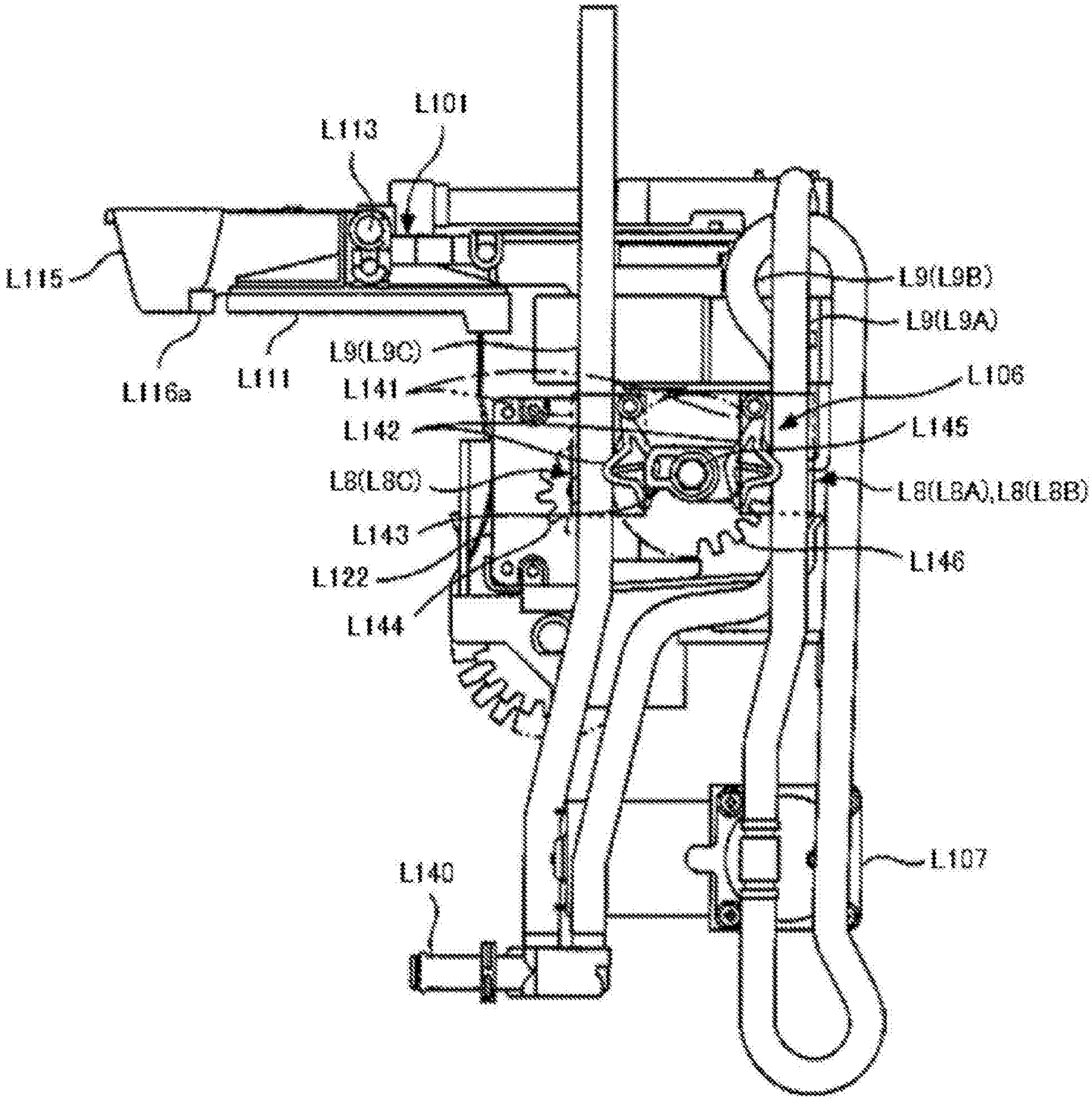
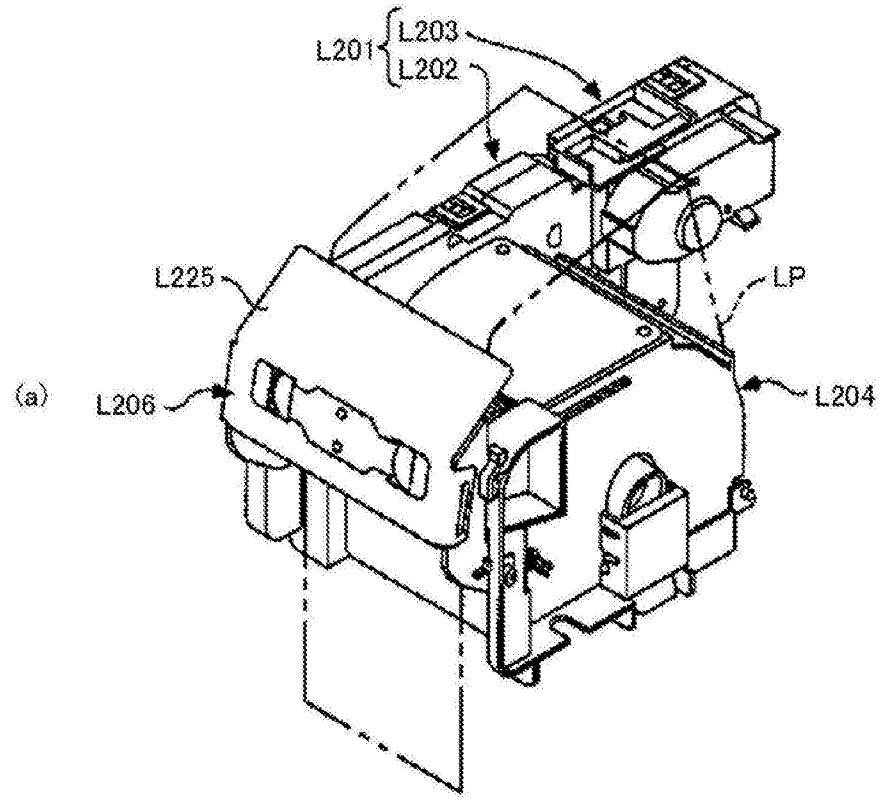


图120

Petitioner Exhibit 1002-2198



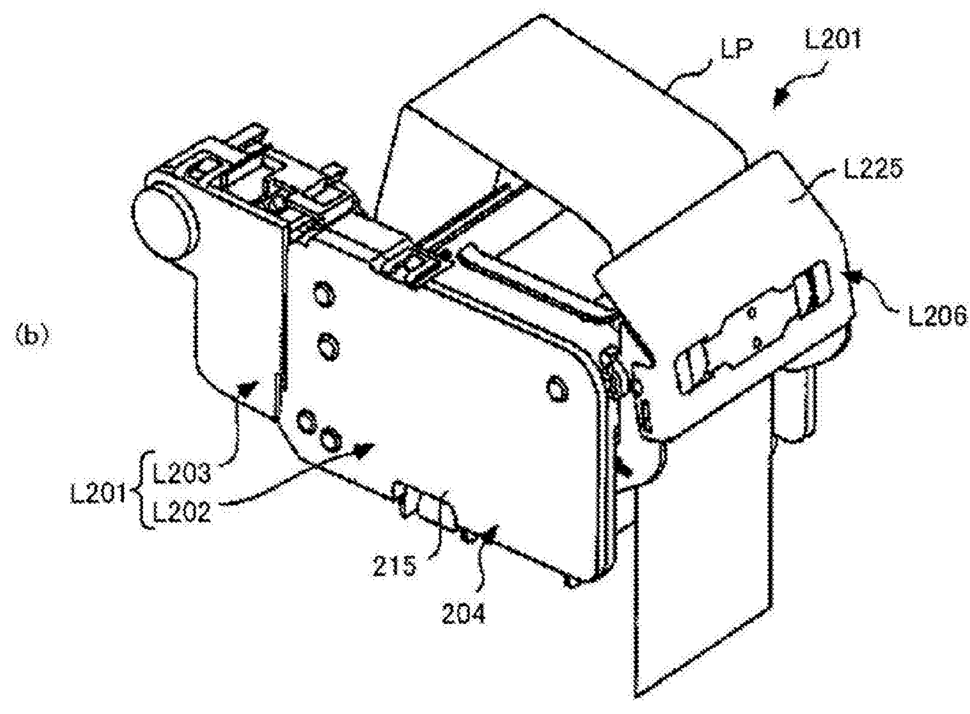
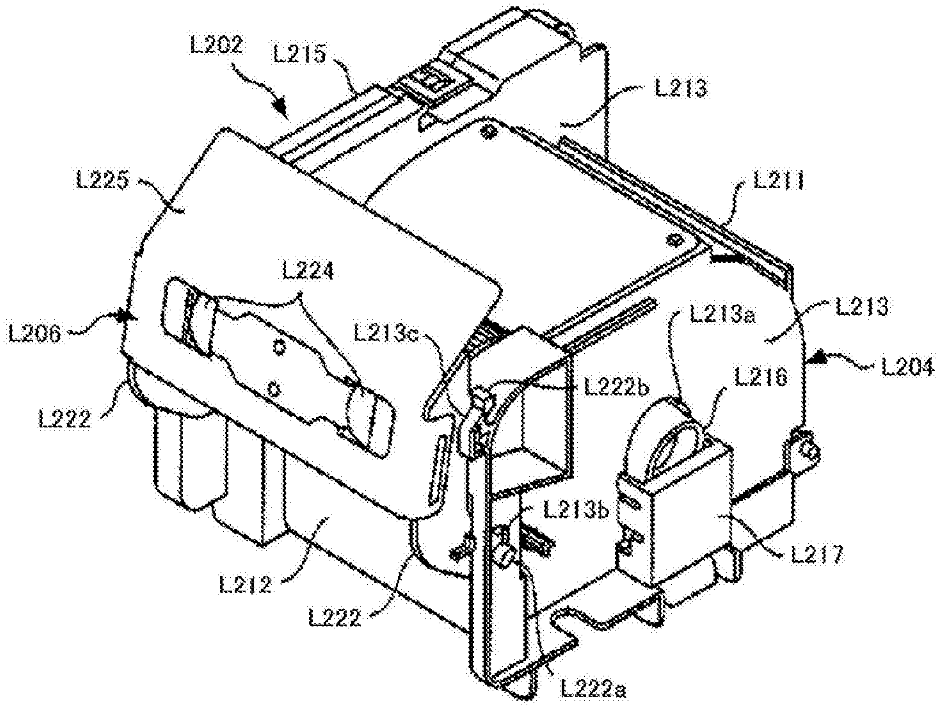


图121

Petitioner Exhibit 1002-2199

(a)



(b)

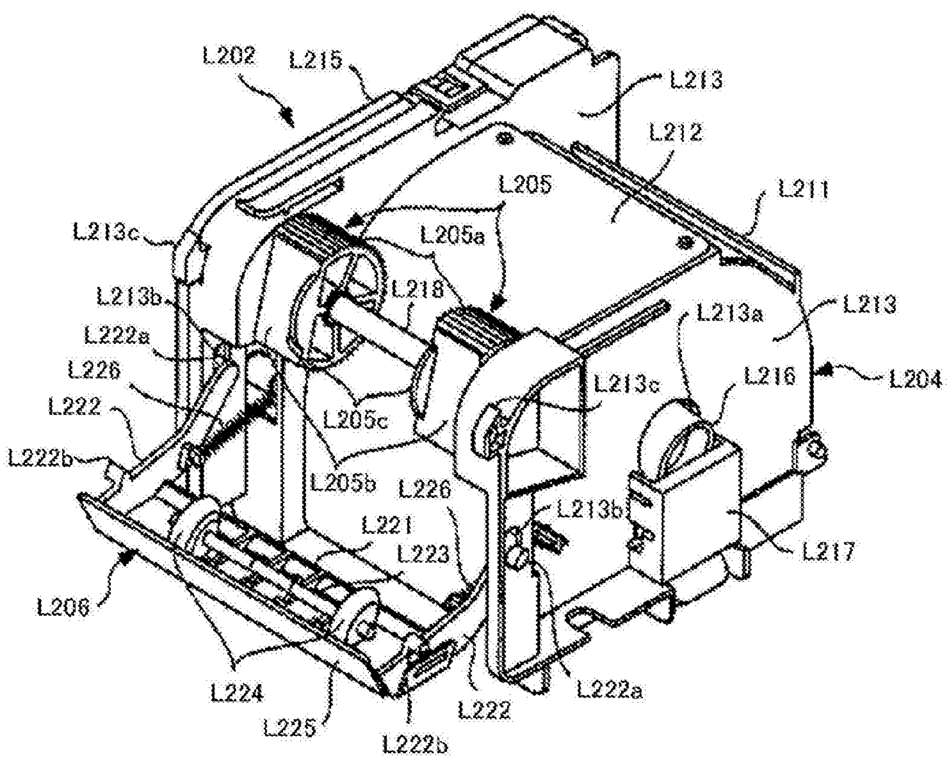
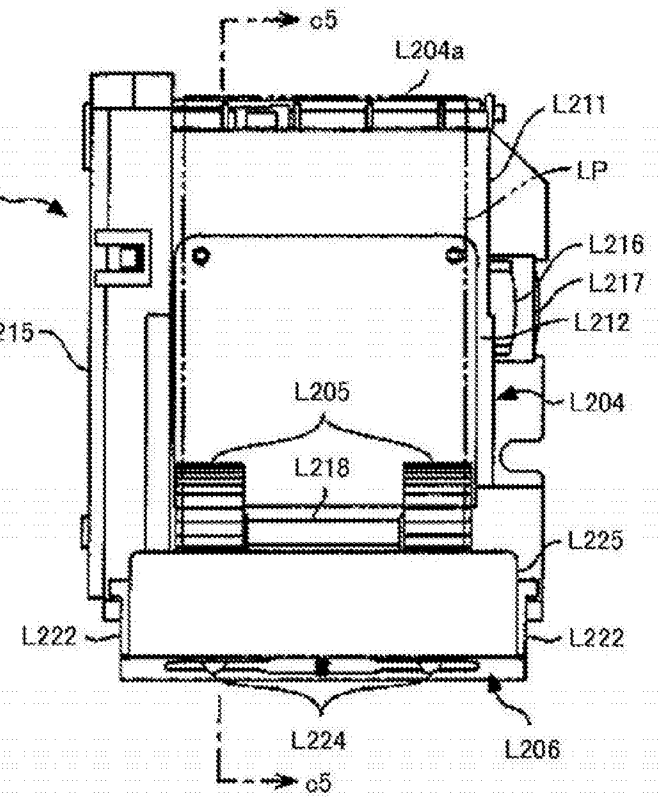


图122

Petitioner Exhibit 1002-2200

(a)



(b)

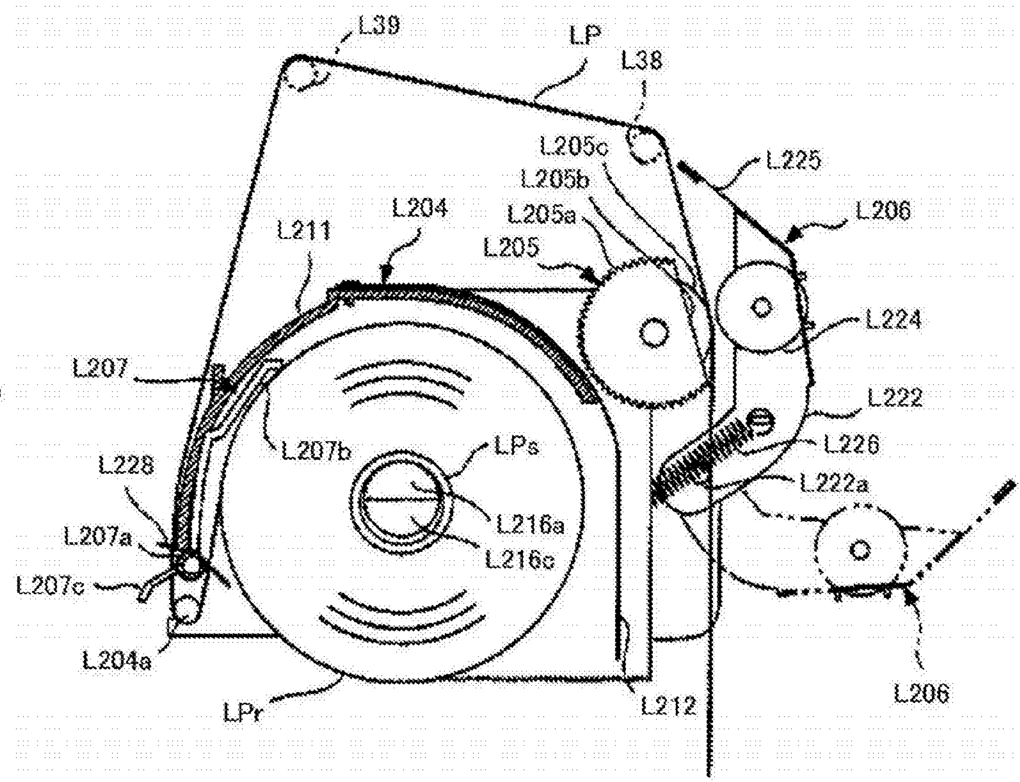
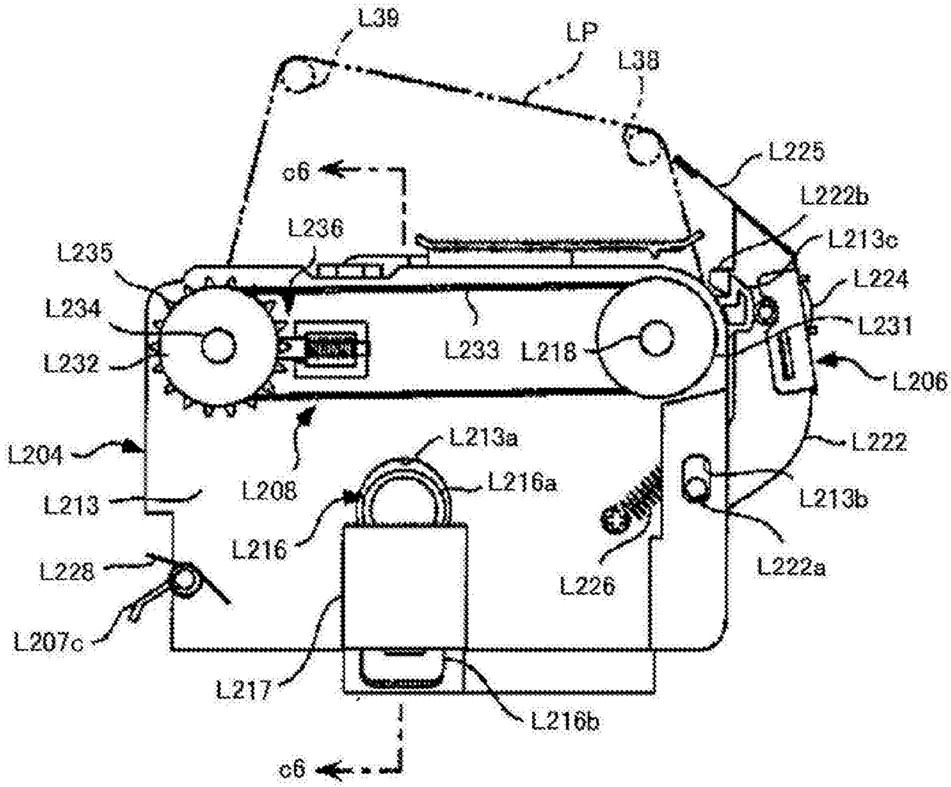


图123

Petitioner Exhibit 1002-2201

(a)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L225
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L236
L213c
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L204
L213a
L222
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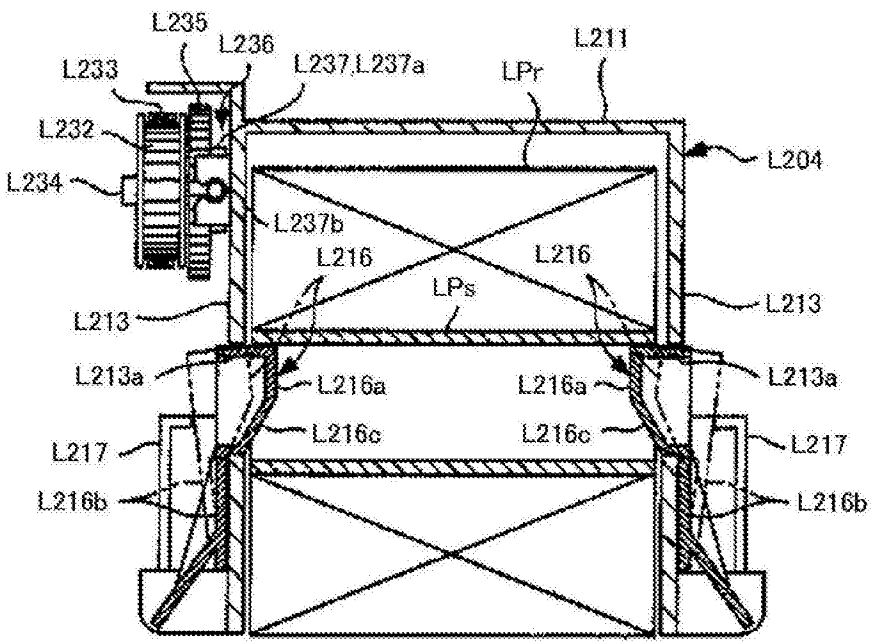
L213b
L216
L228
L226
L222a
L207c
L217
L216b
c6

(b)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LPs
L213
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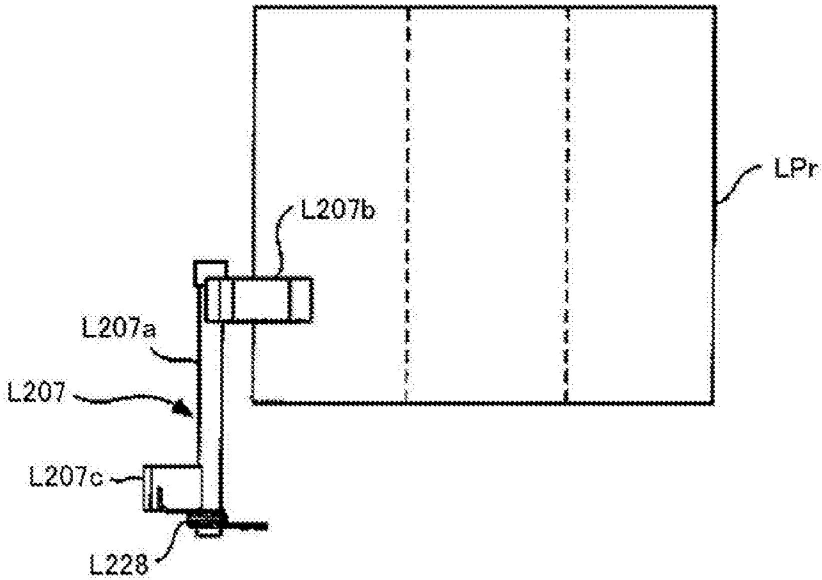
L216a
L216c
L216c
L217
L217
L216b
L216b

图124

(a)



(b)

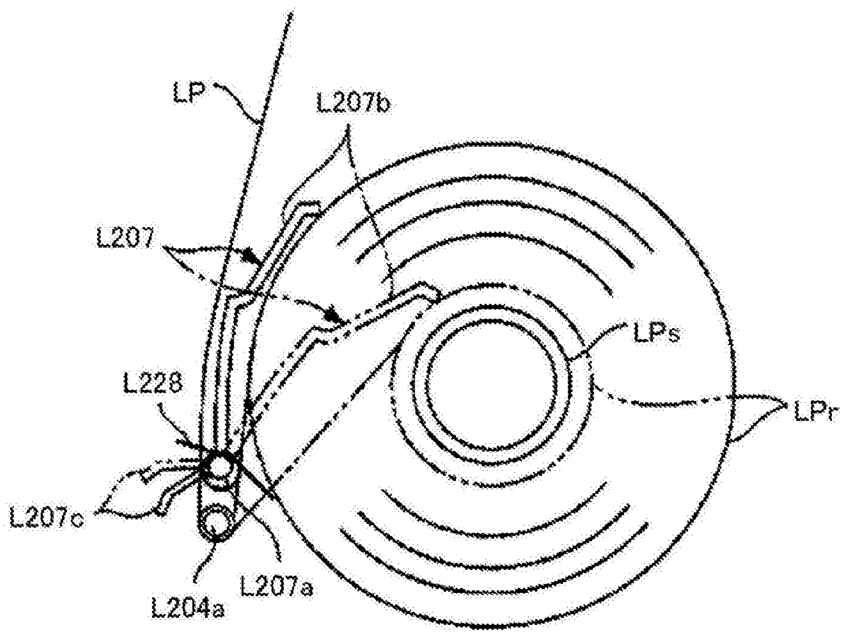
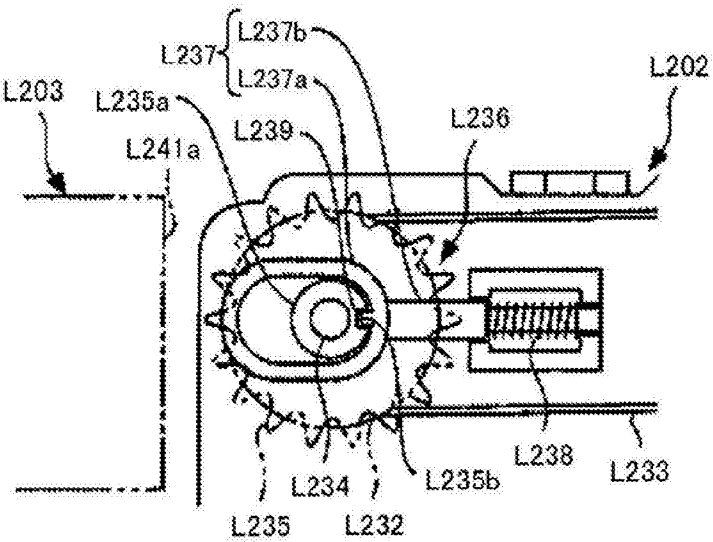


图125

Petitioner Exhibit 1002-2203

(a)



(b)

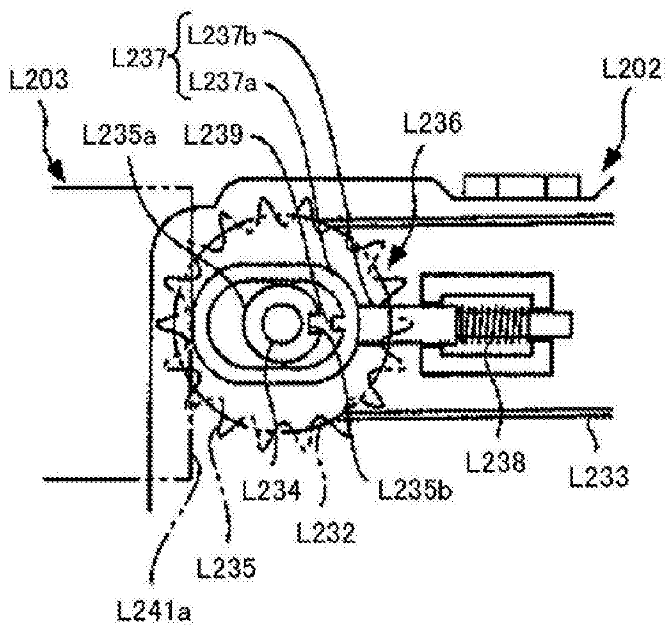


图126

Petitioner Exhibit 1002-2204

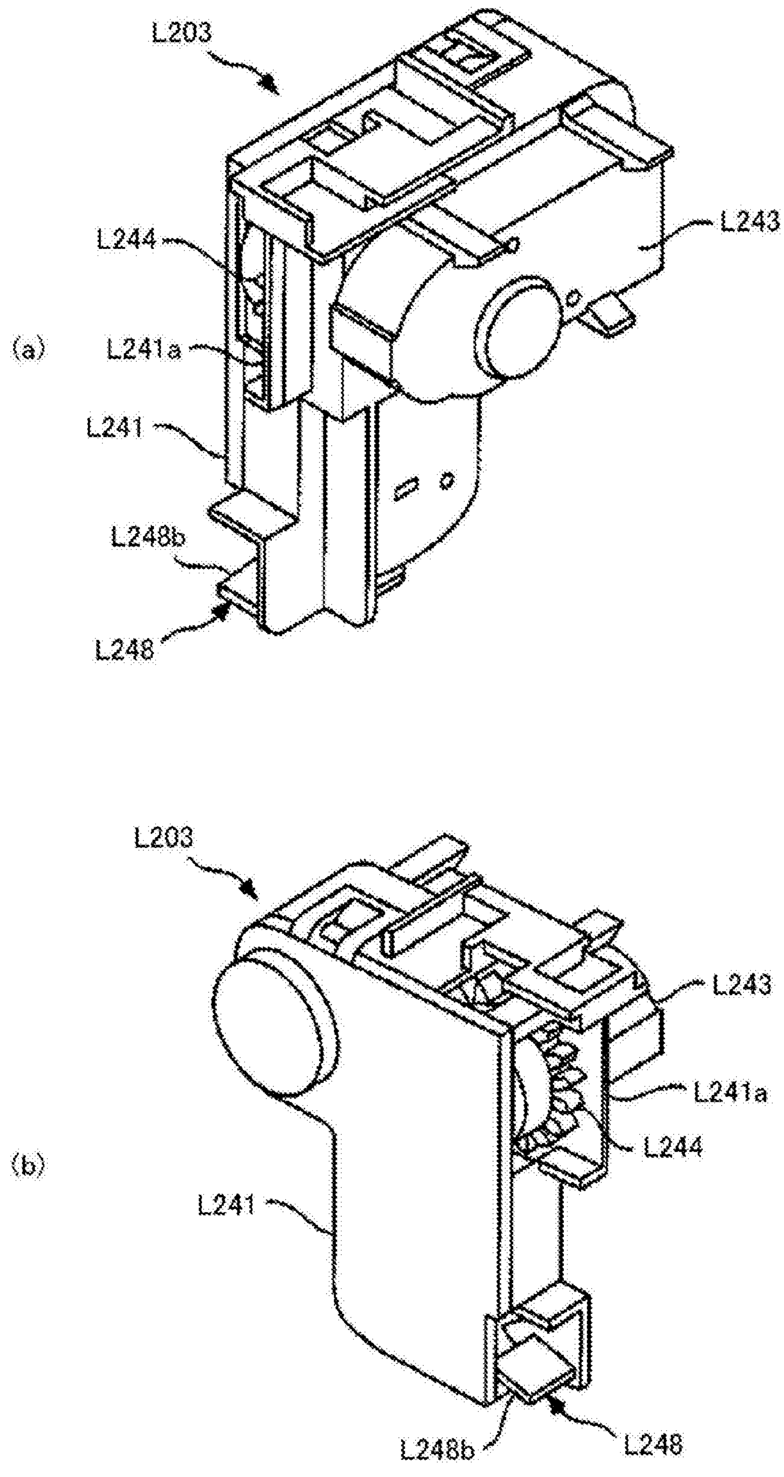
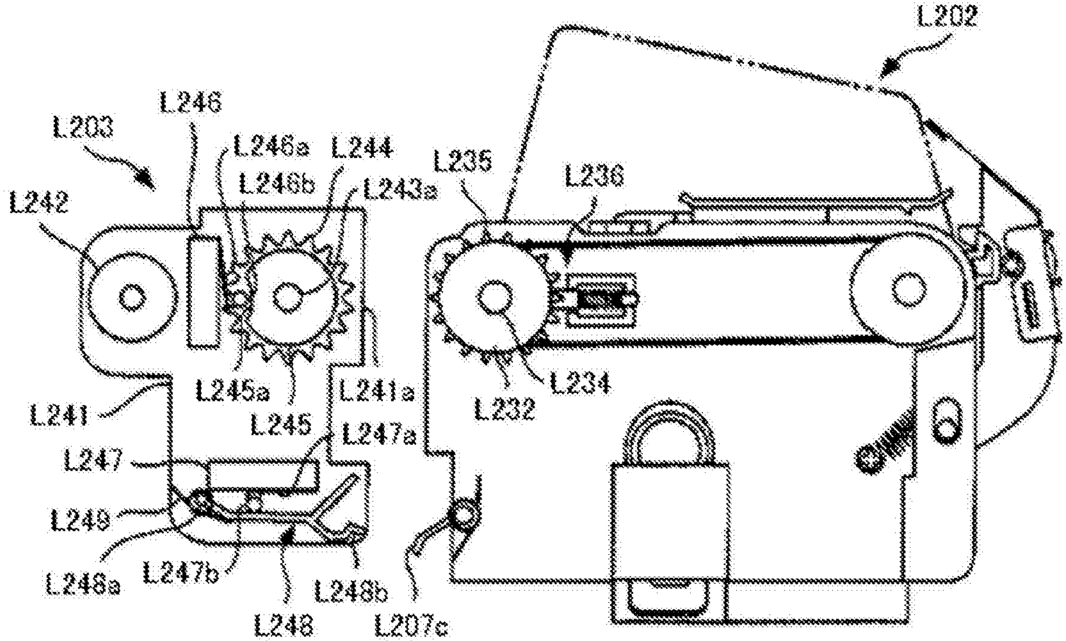


图127

Petitioner Exhibit 1002-2205

(a)


L202
L203
L246
L246a
L244
L246b
L243a
L242
L235
L236
L245a
L245
L241a
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L247a
L247
L249
L248a
L247b
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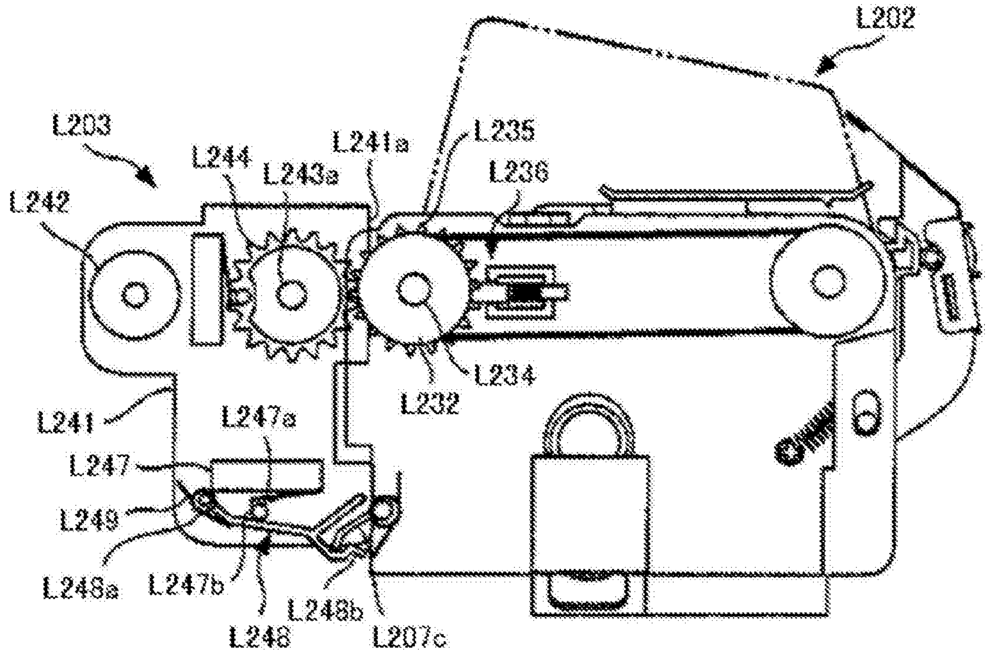
L248b
L207c
L234
L232

(b)


L202
L203
L244
L243a
L241a
L235
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L241
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L247
L249
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L248
L248b
L207c

图128

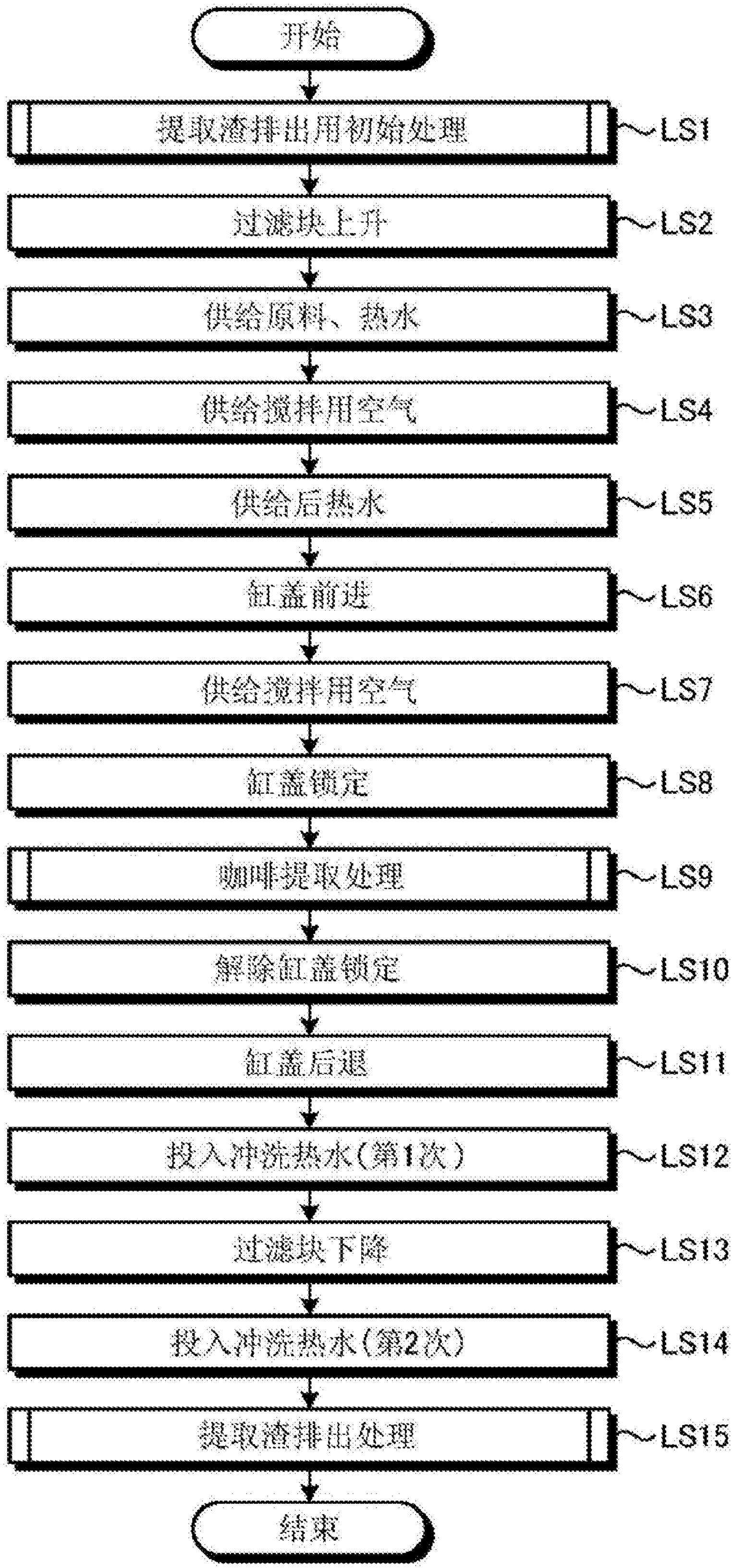


图129

Petitioner Exhibit 1002-2207

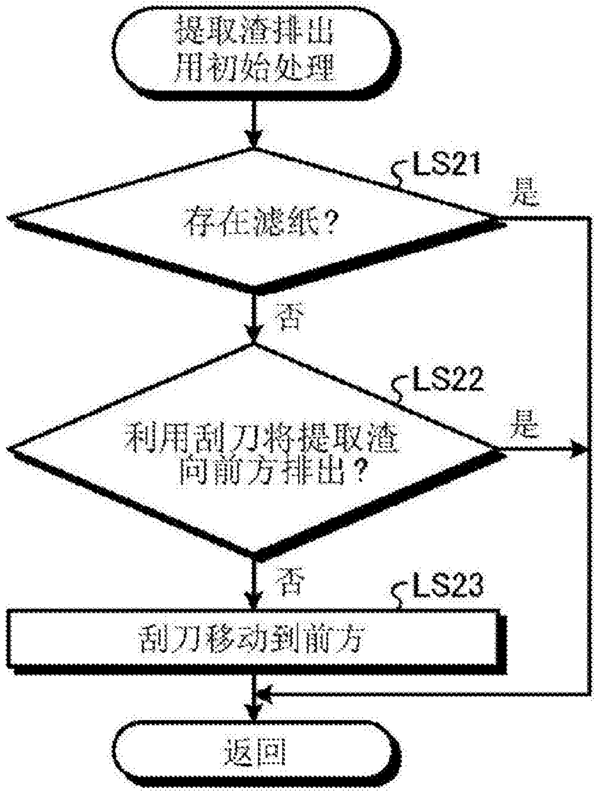


图130

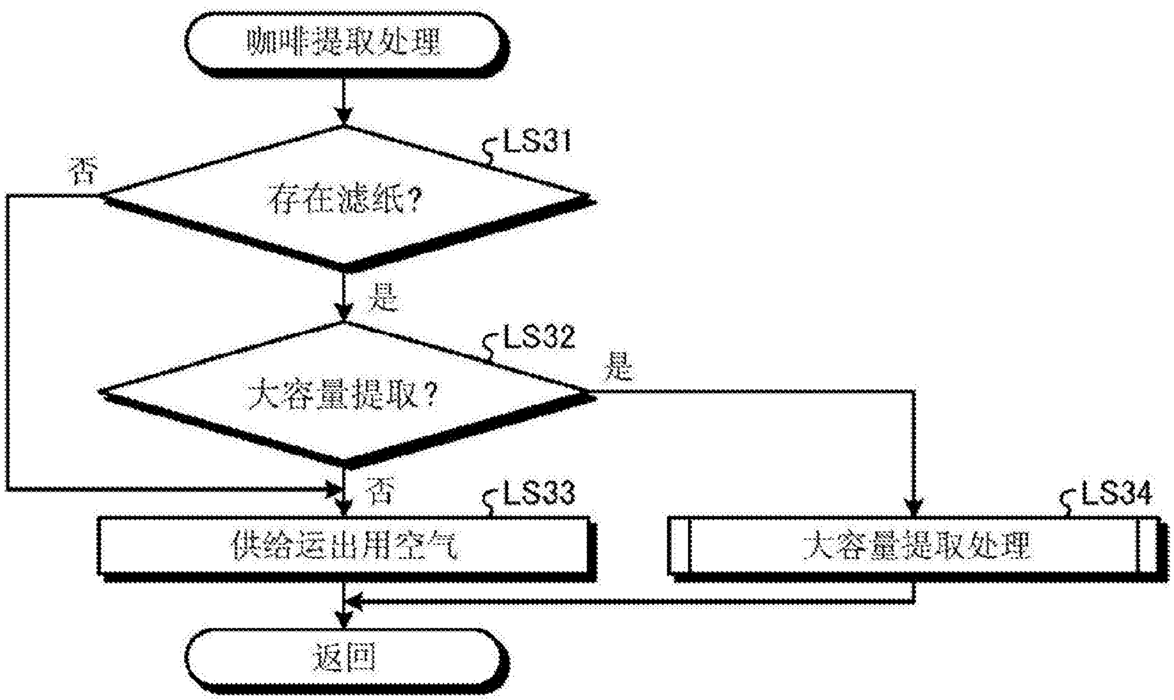


图131

Petitioner Exhibit 1002-2208

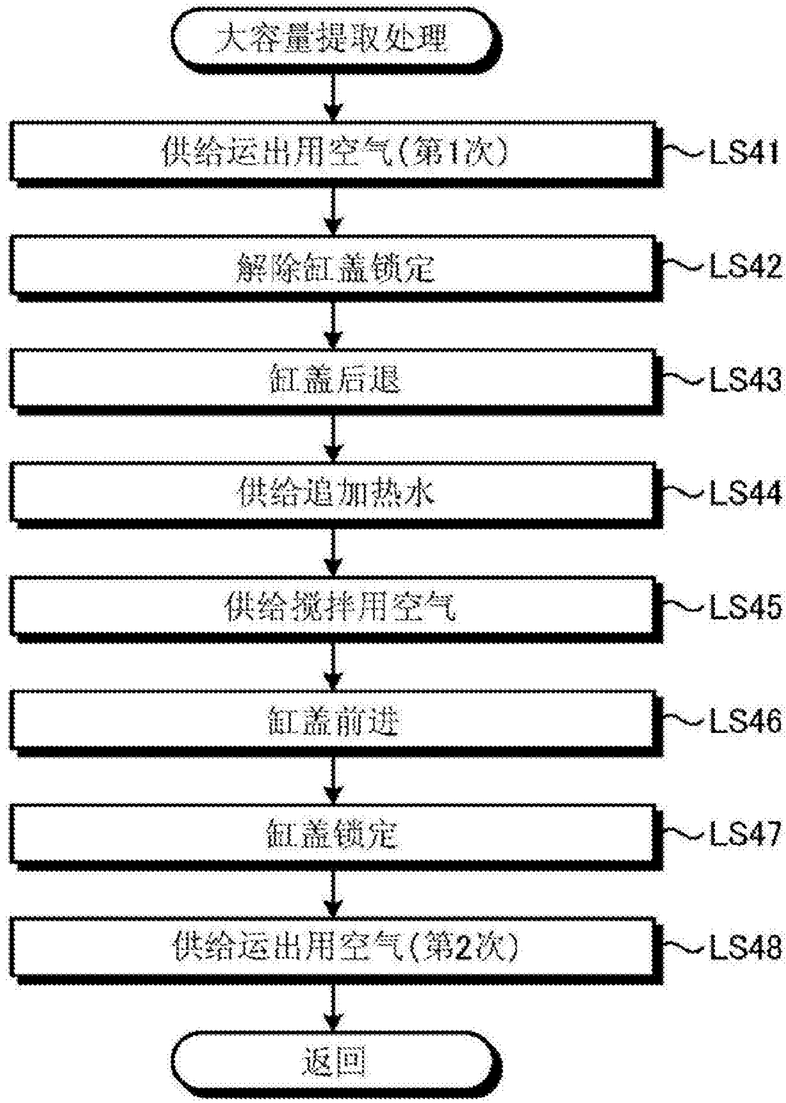


图132

Petitioner Exhibit 1002-2209

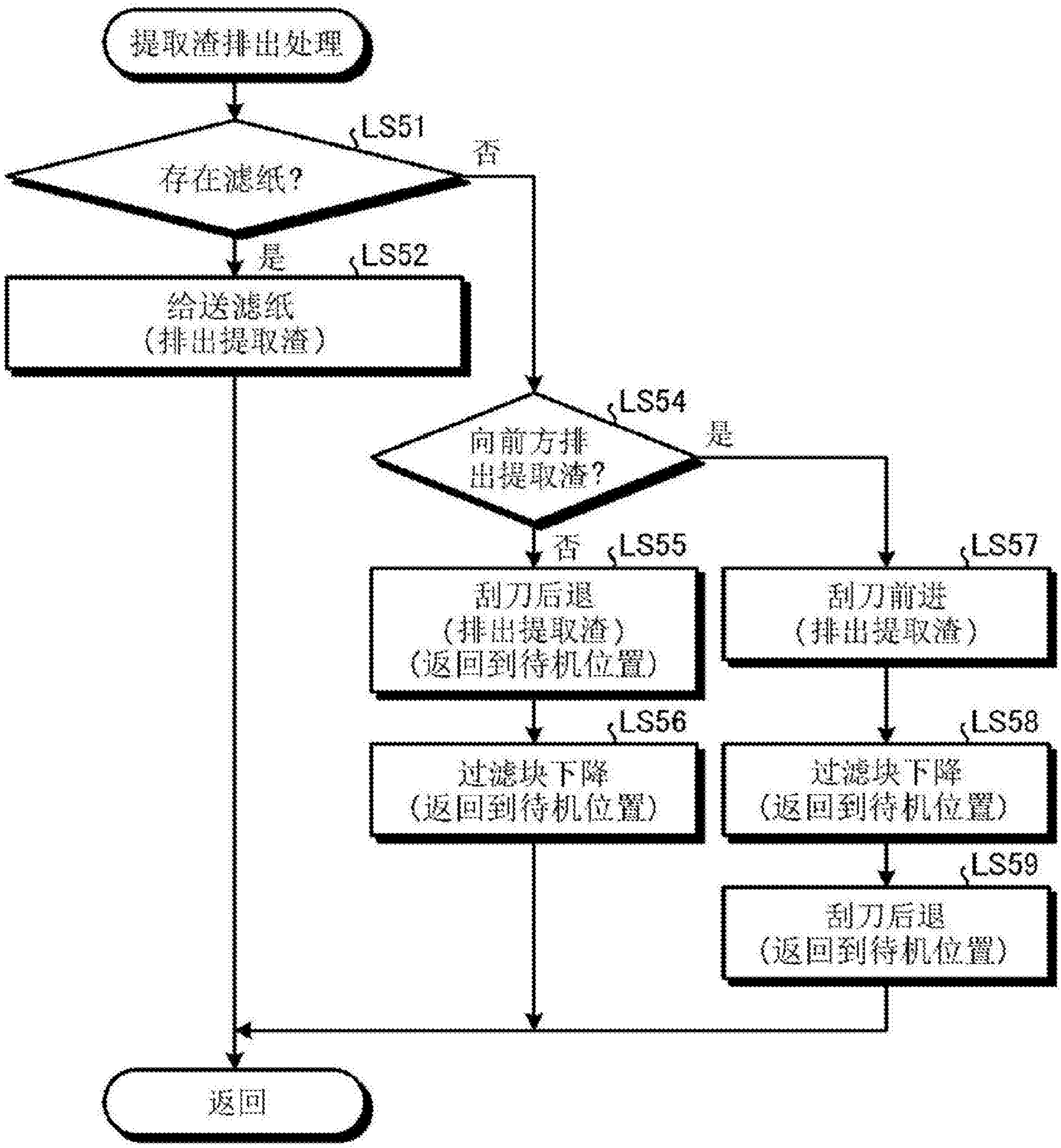


图133

Petitioner Exhibit 1002-2210

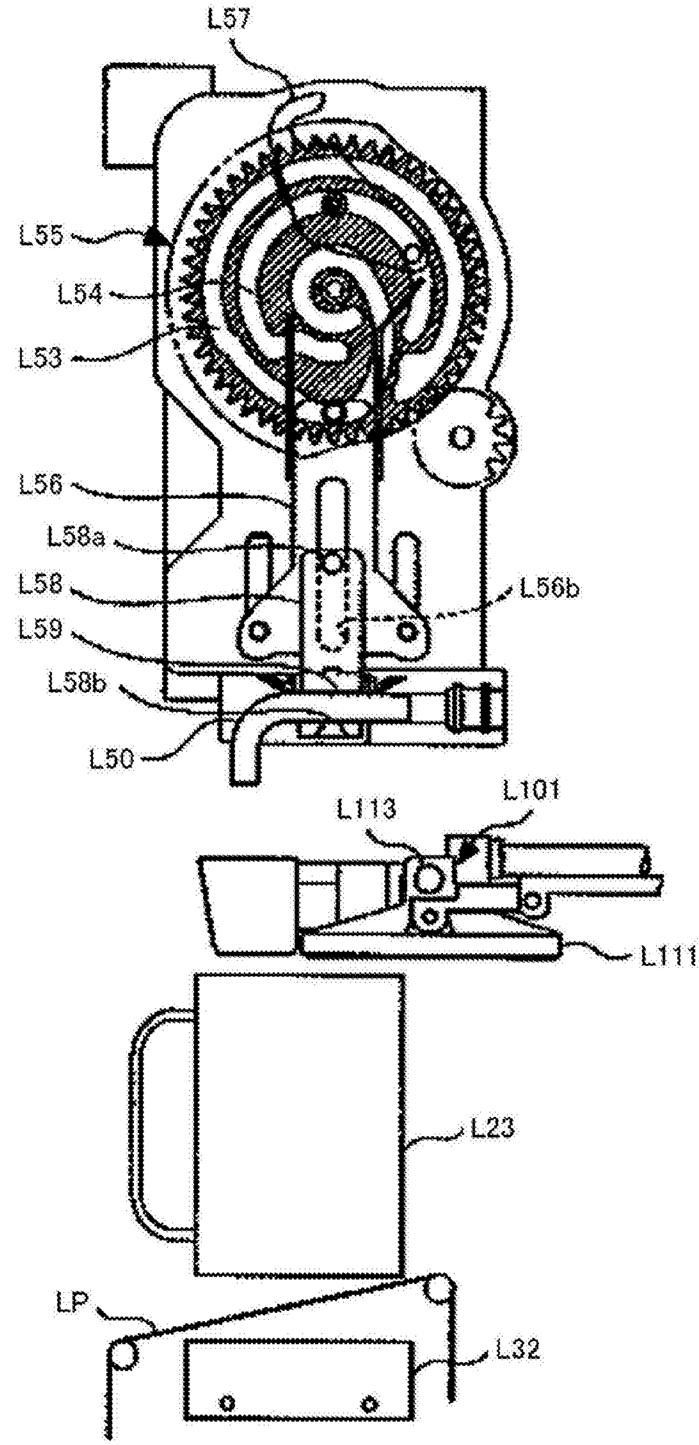


图134

Petitioner Exhibit 1002-2211

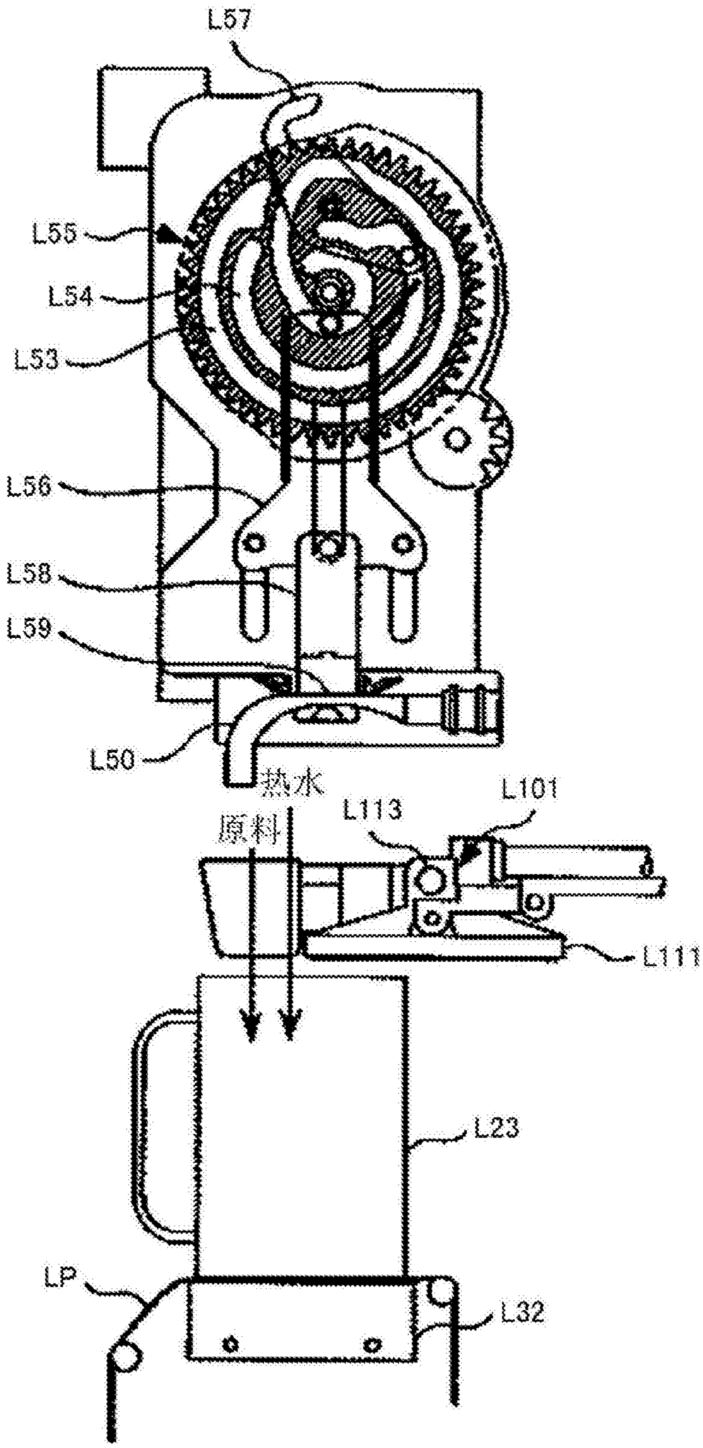


图135

Petitioner Exhibit 1002-2212

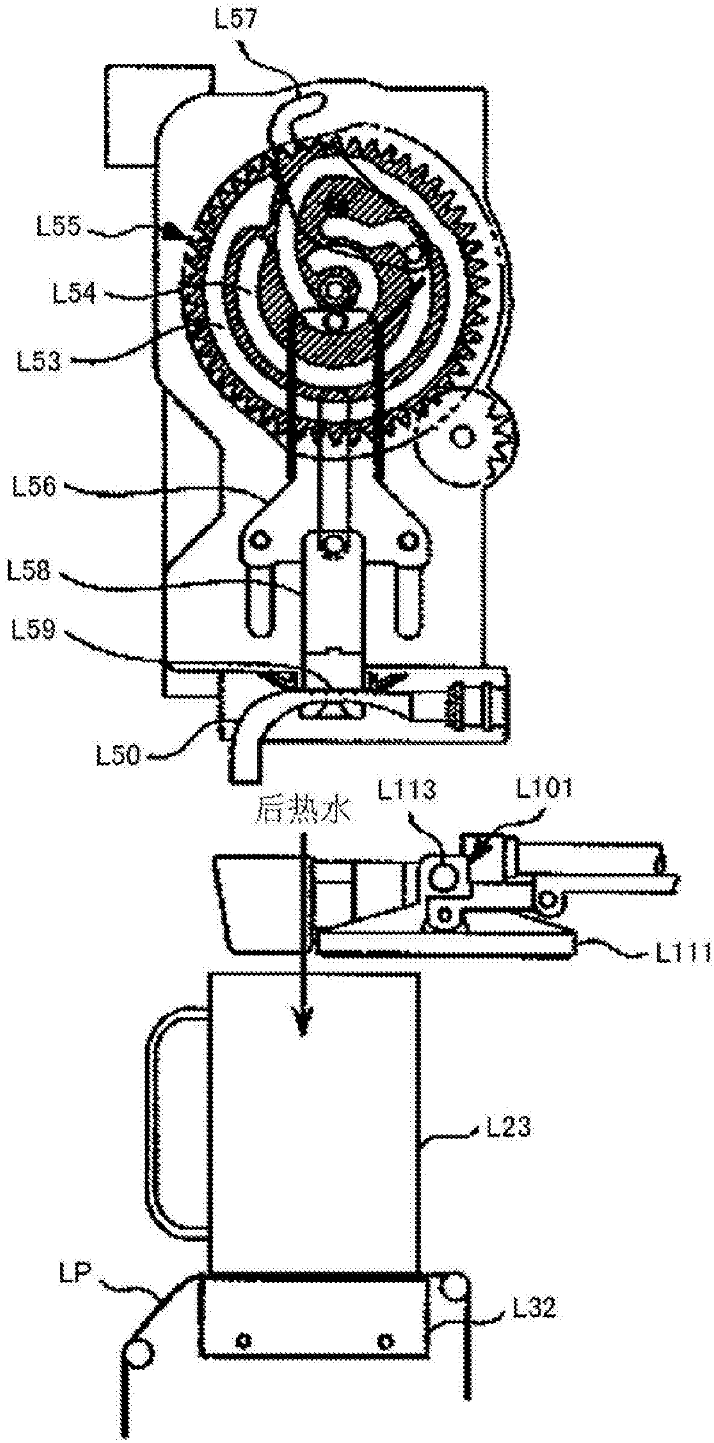


图136

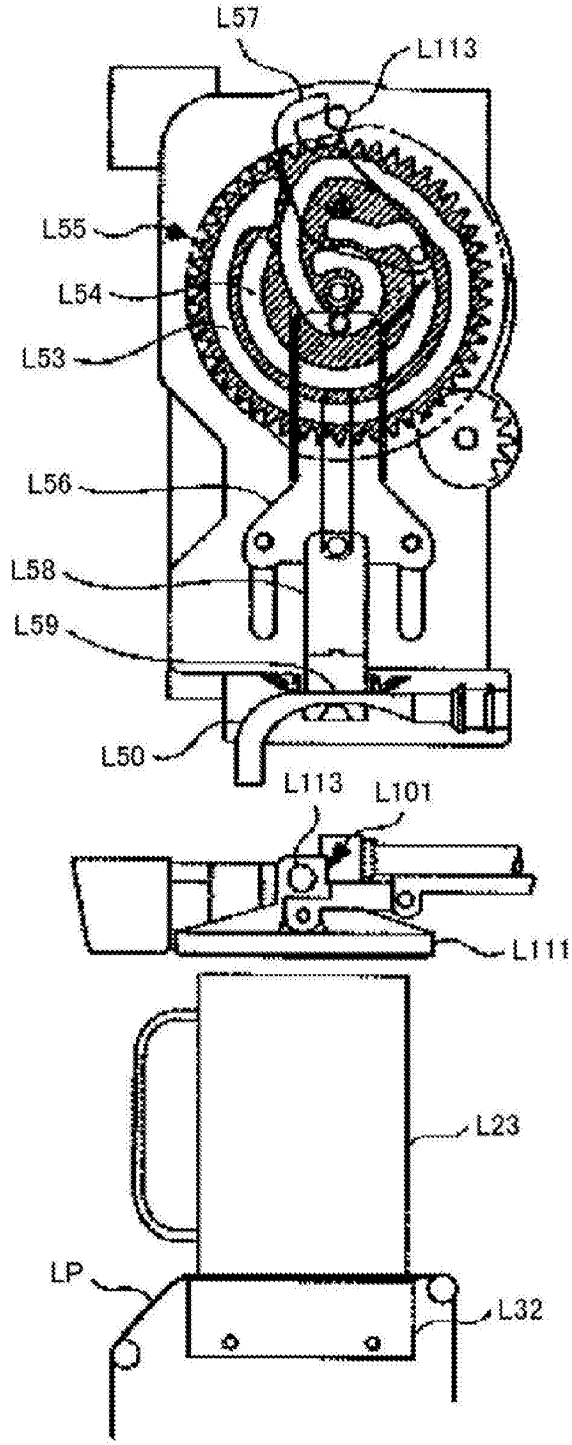


图137

Petitioner Exhibit 1002-2214

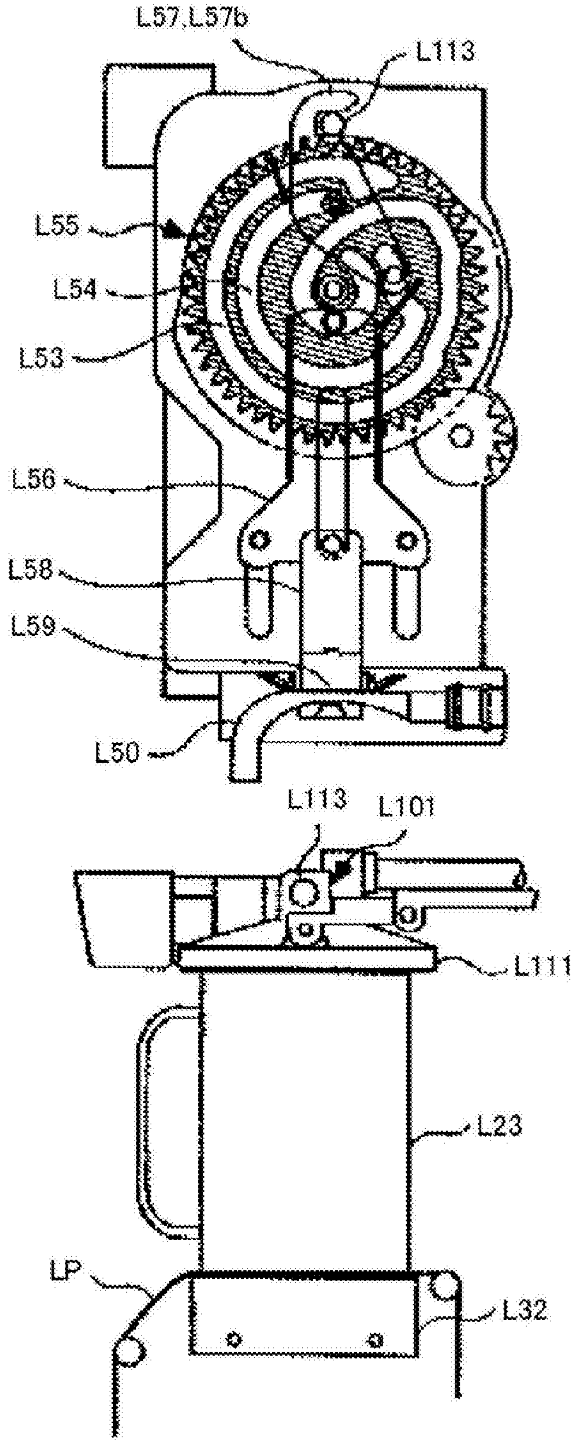


图138

Petitioner Exhibit 1002-2215

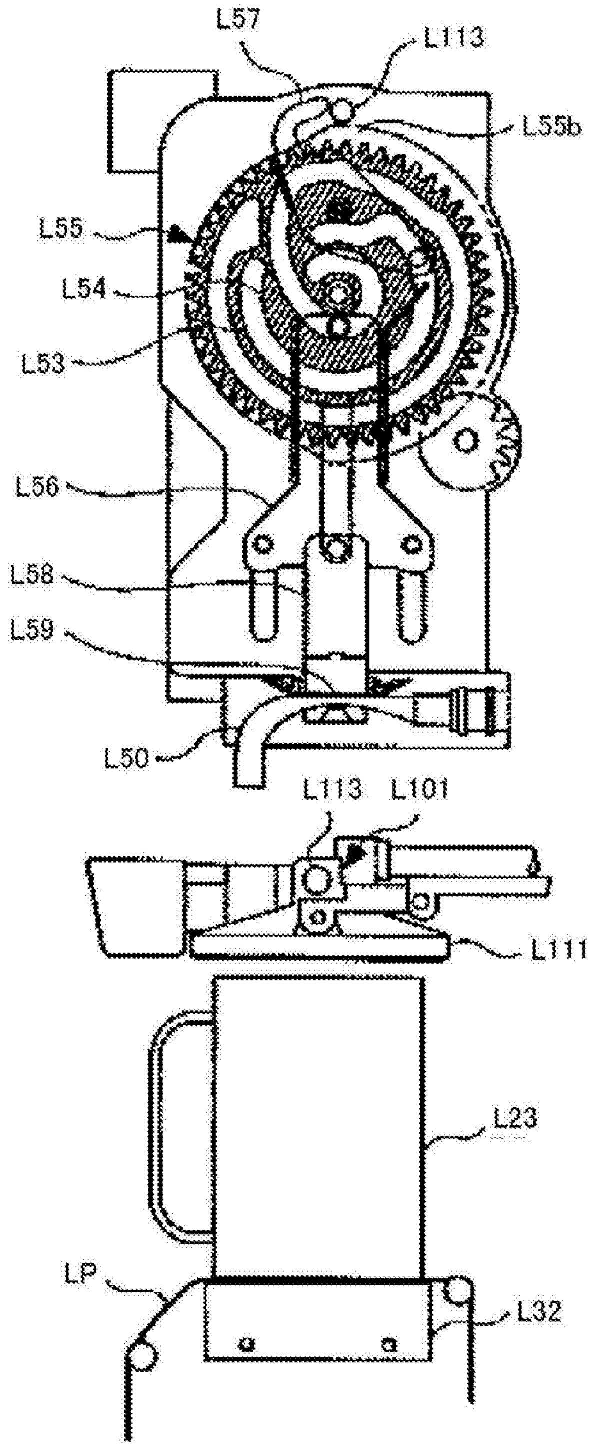


图139

Petitioner Exhibit 1002-2216

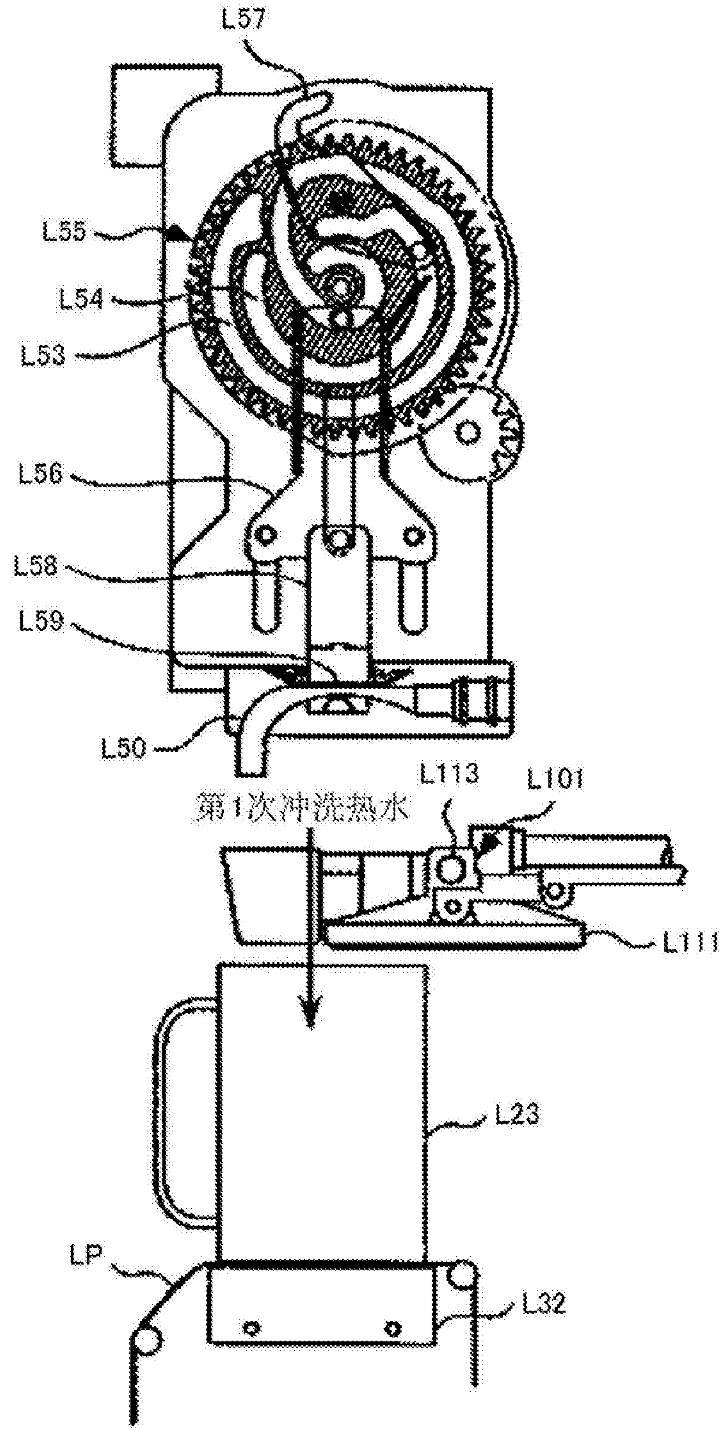


图140

Petitioner Exhibit 1002-2217

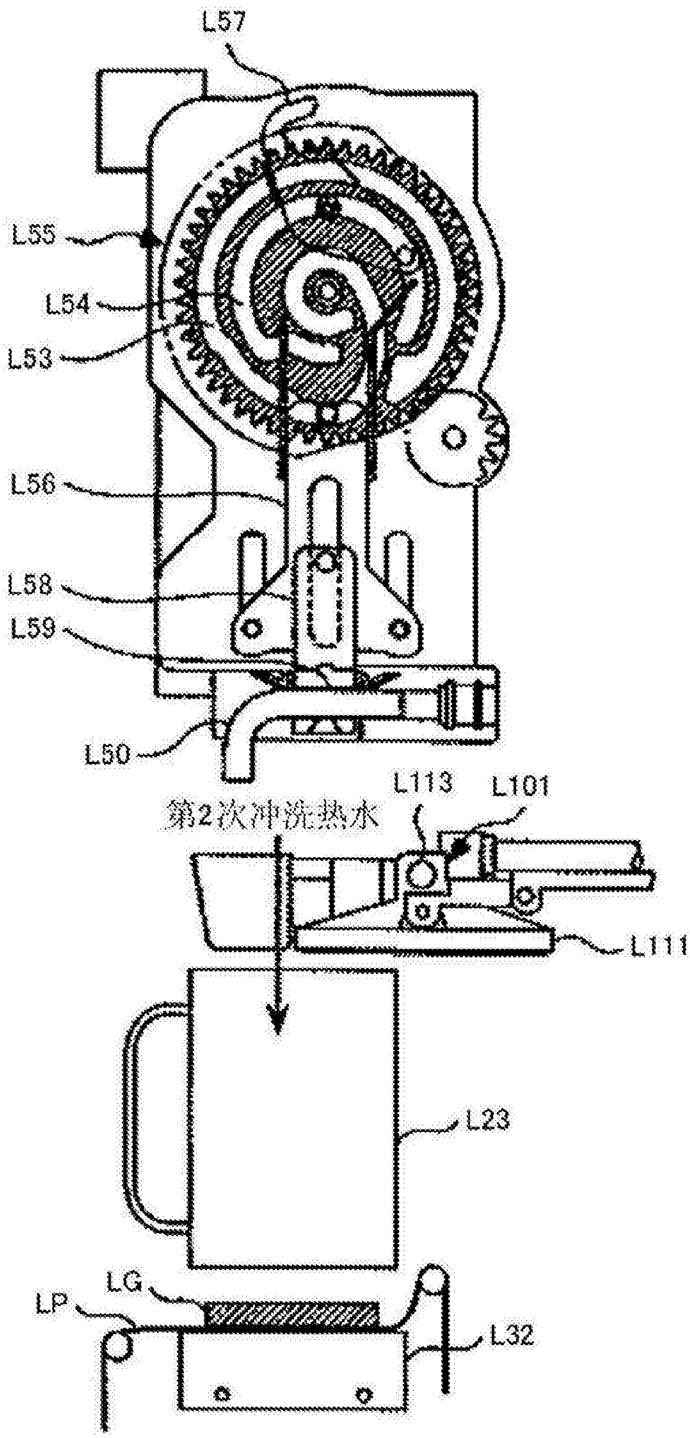


图141

Petitioner Exhibit 1002-2218

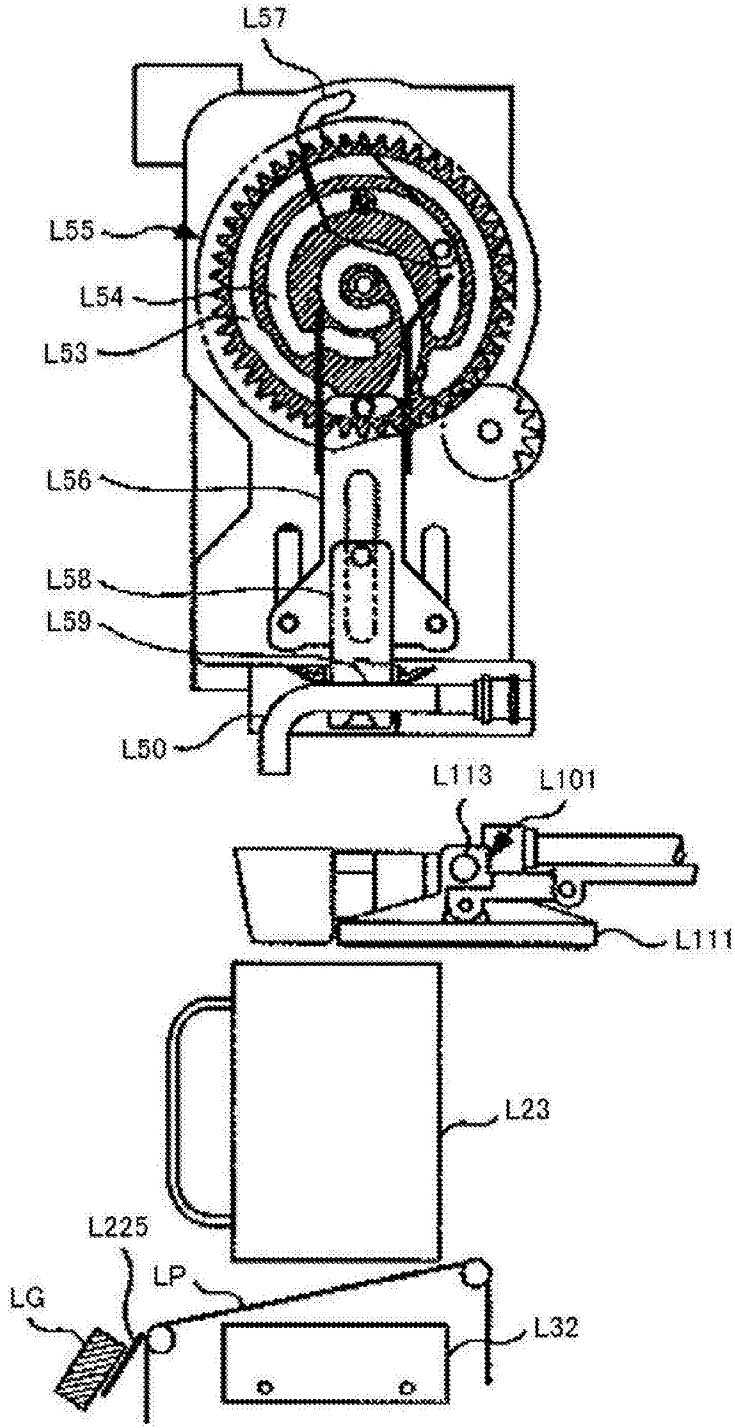


图142

Petitioner Exhibit 1002-2219

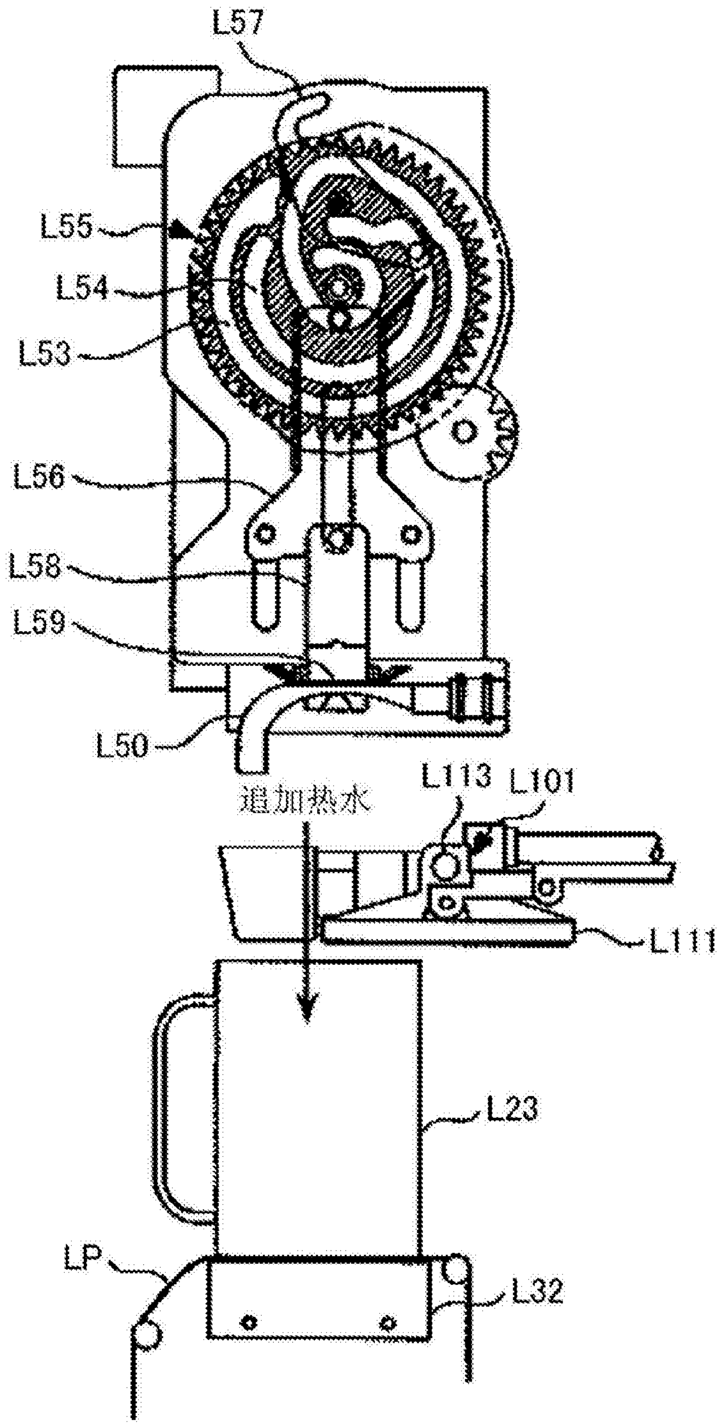


图143

Petitioner Exhibit 1002-2220

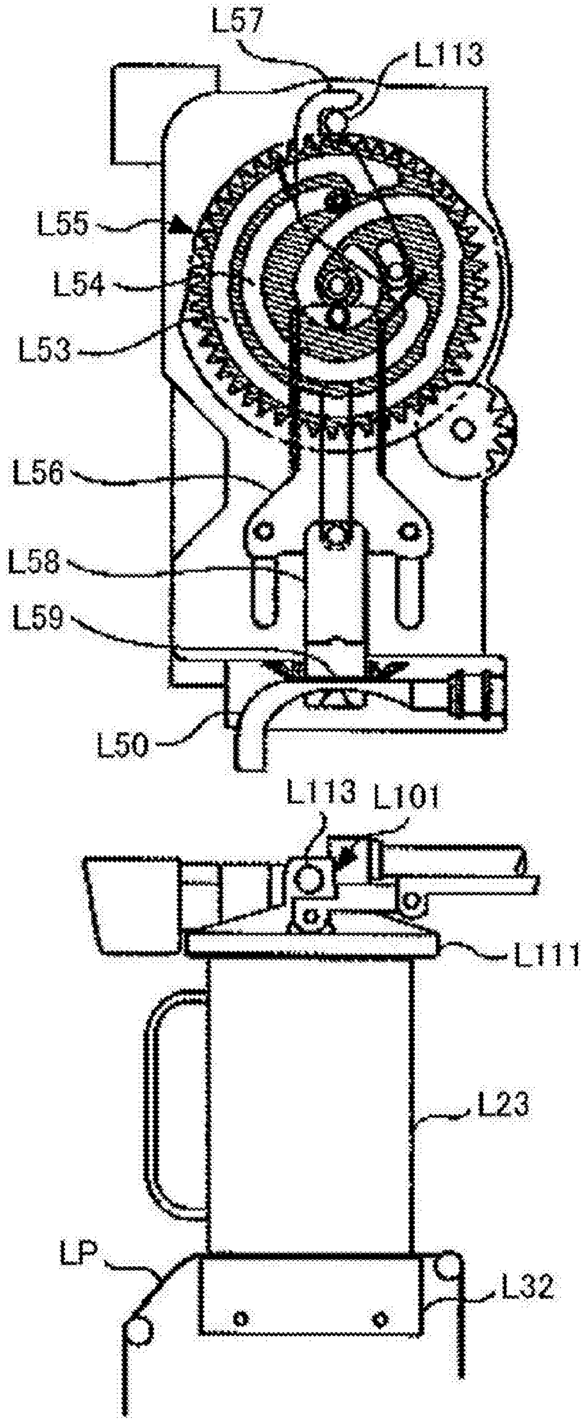


图144

Petitioner Exhibit 1002-2221

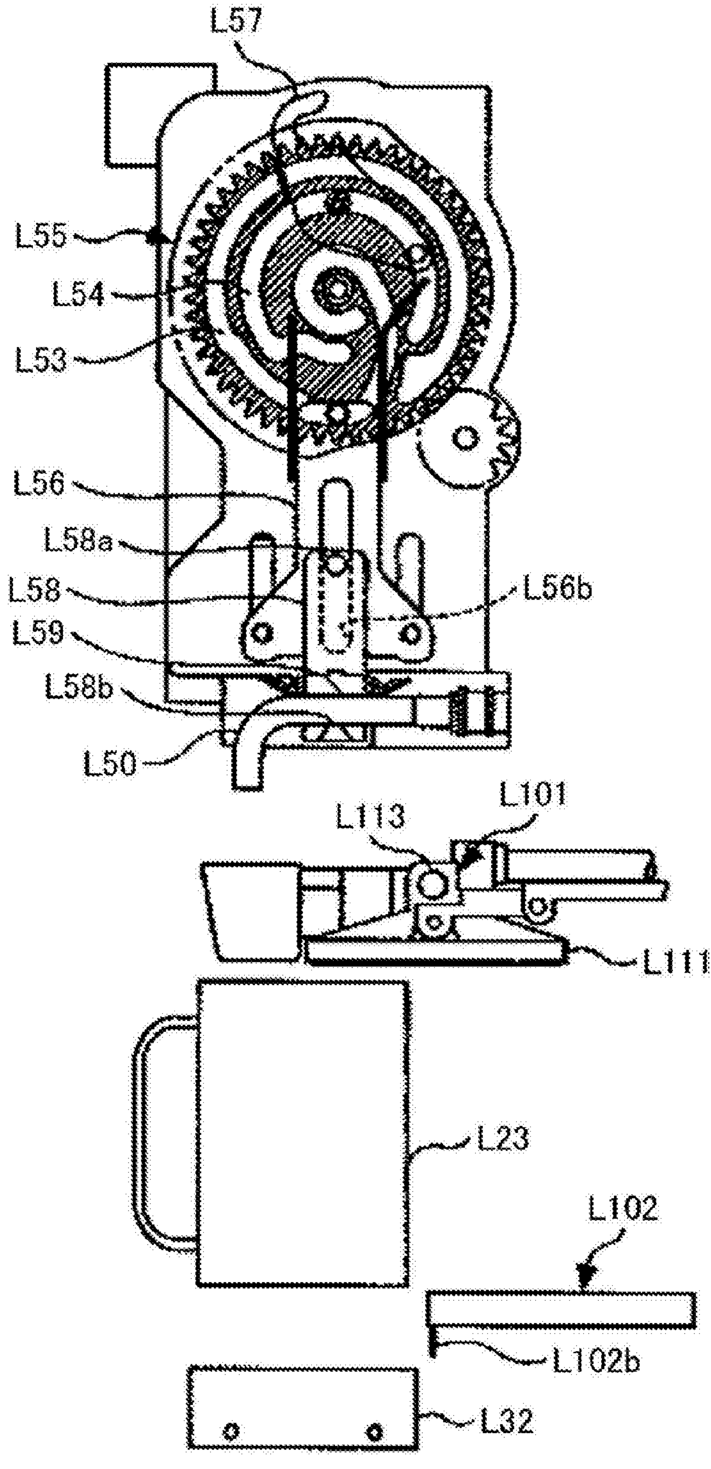


图145

Petitioner Exhibit 1002-2222

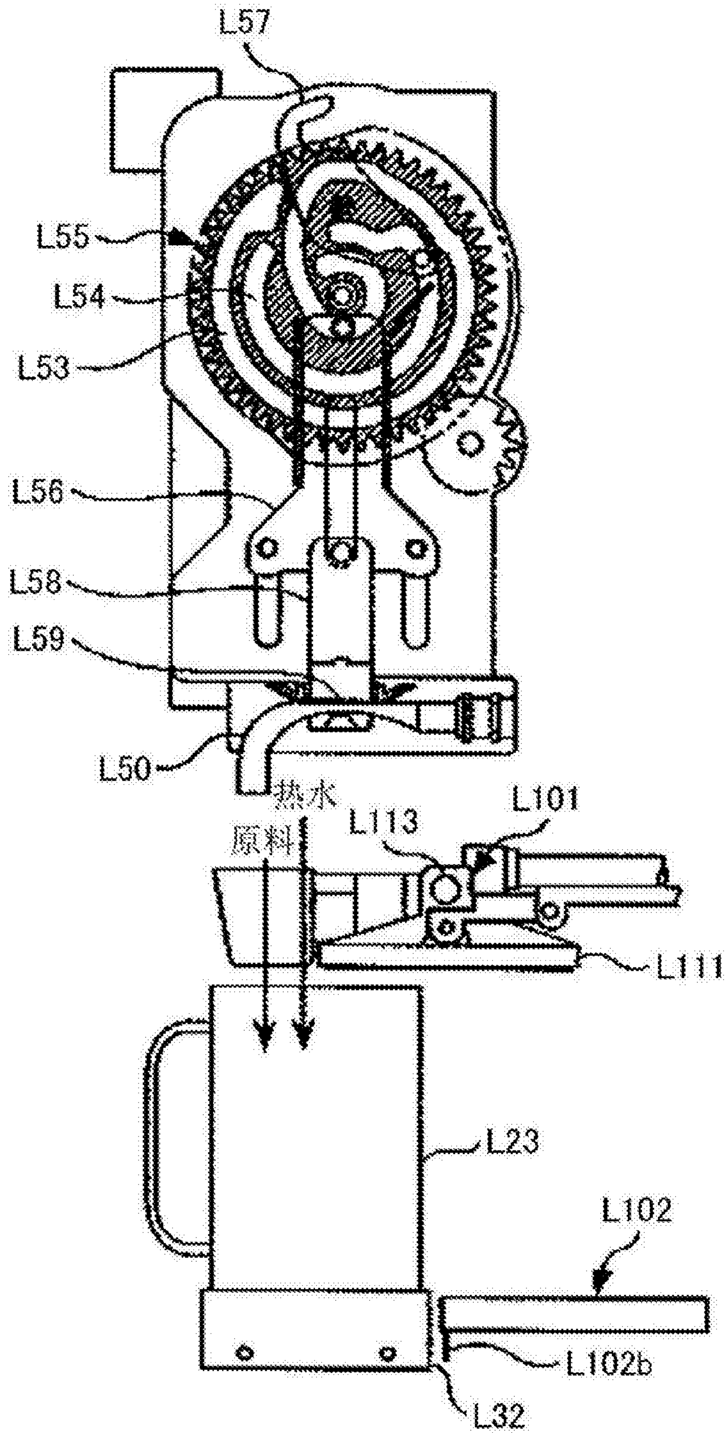


图146

Petitioner Exhibit 1002-2223

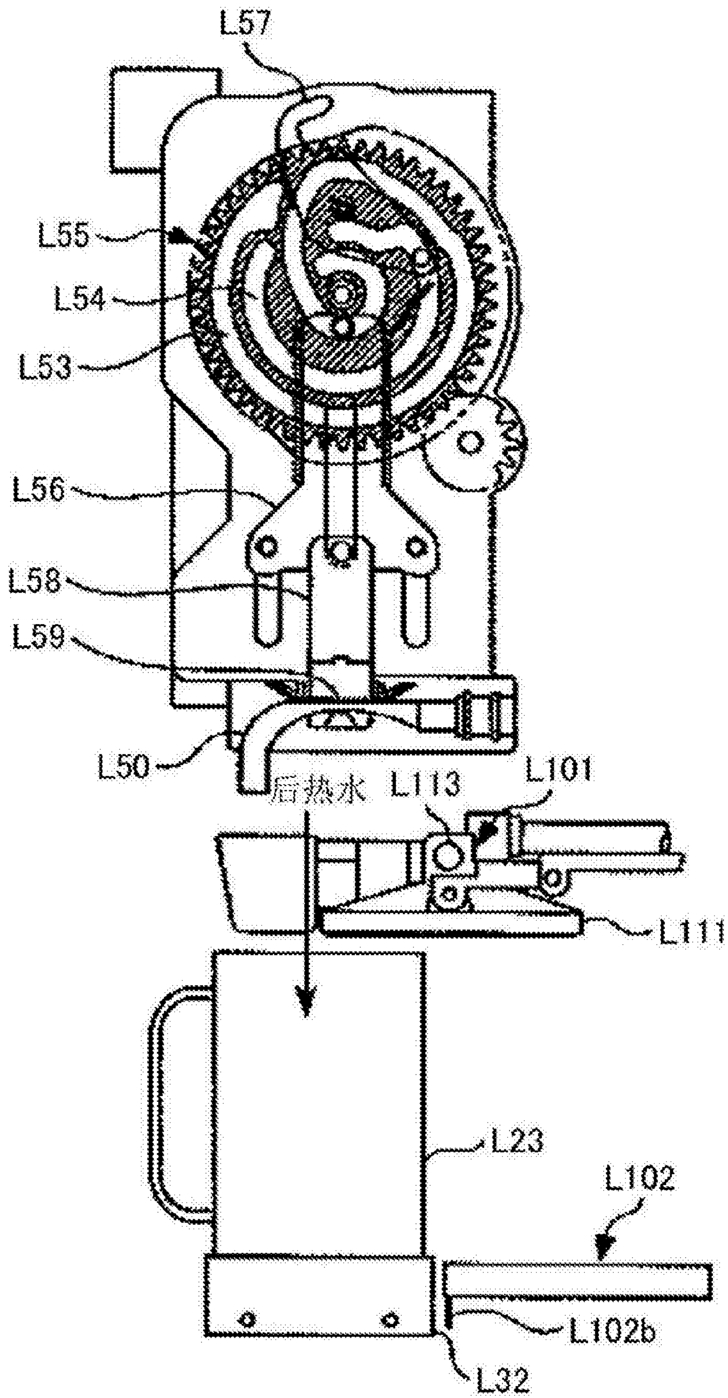


图147

Petitioner Exhibit 1002-2224

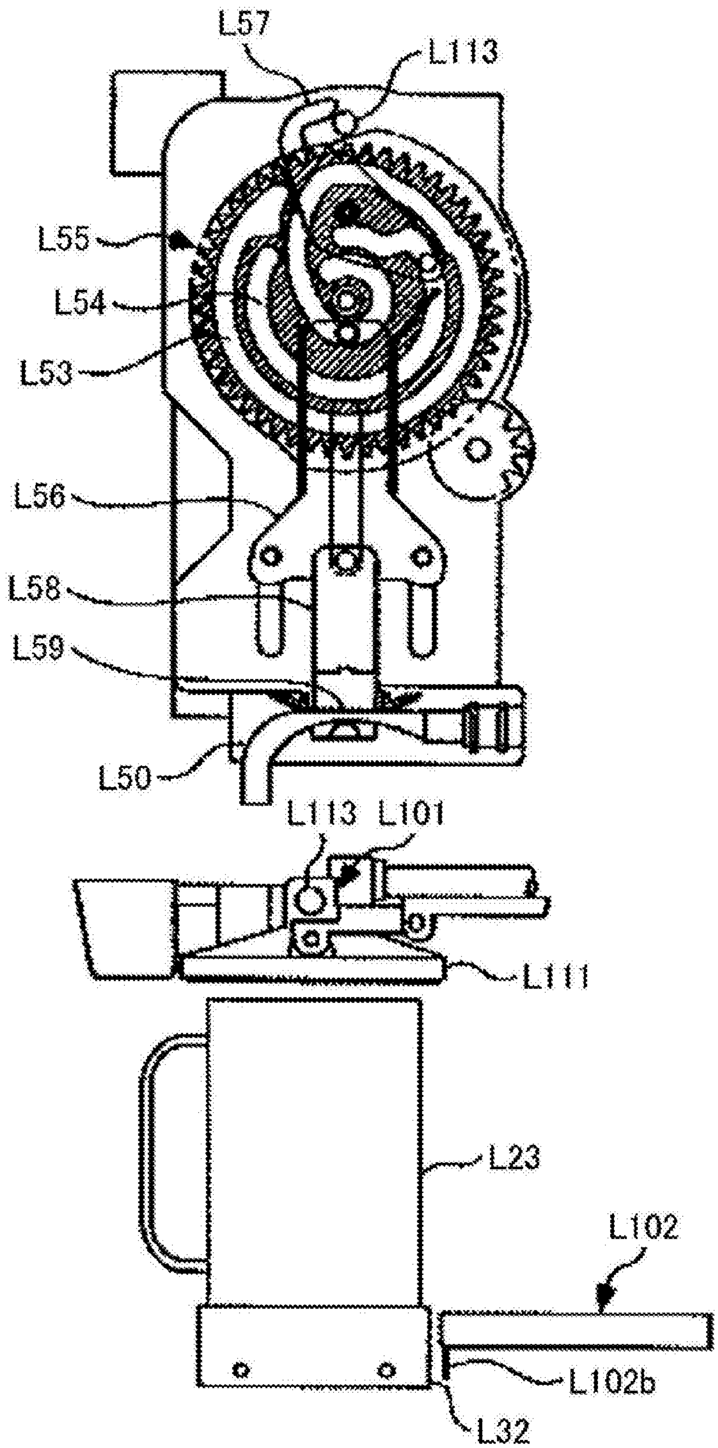


图148

Petitioner Exhibit 1002-2225

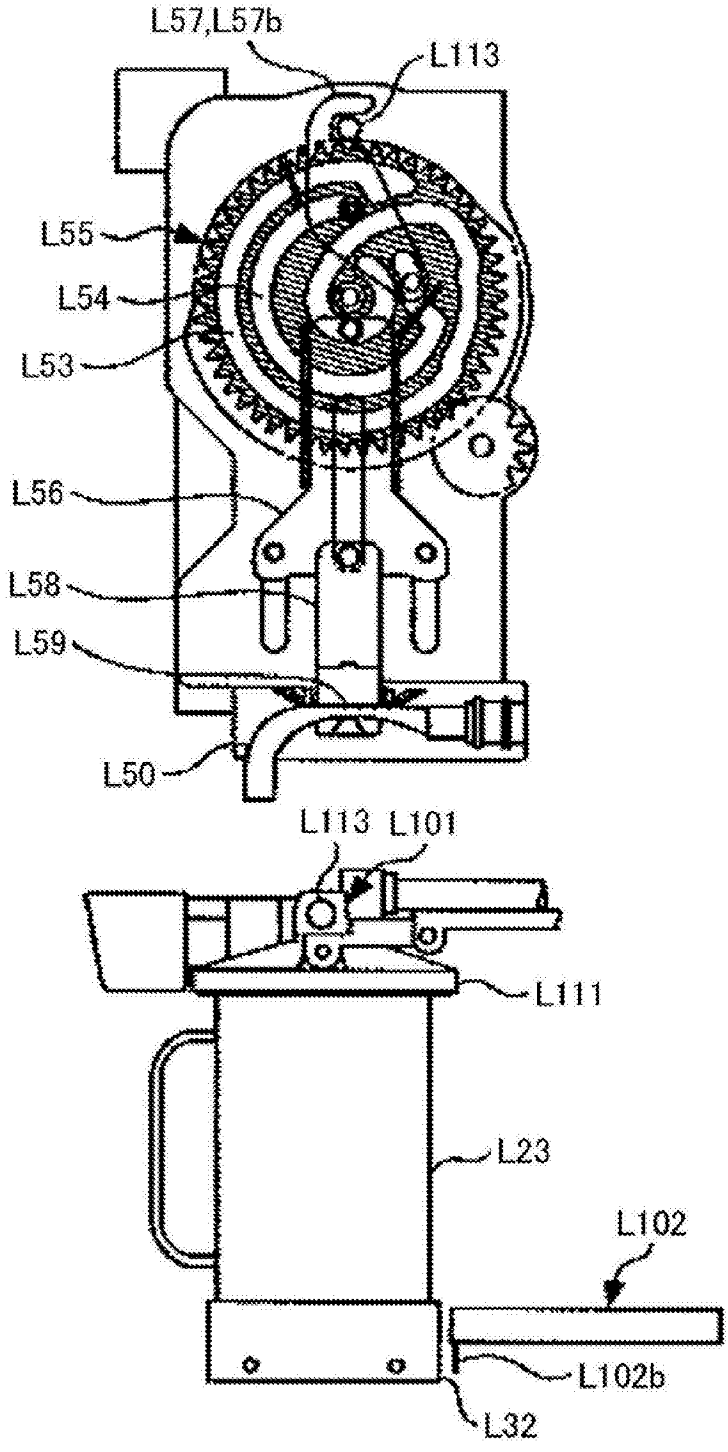


图149

Petitioner Exhibit 1002-2226

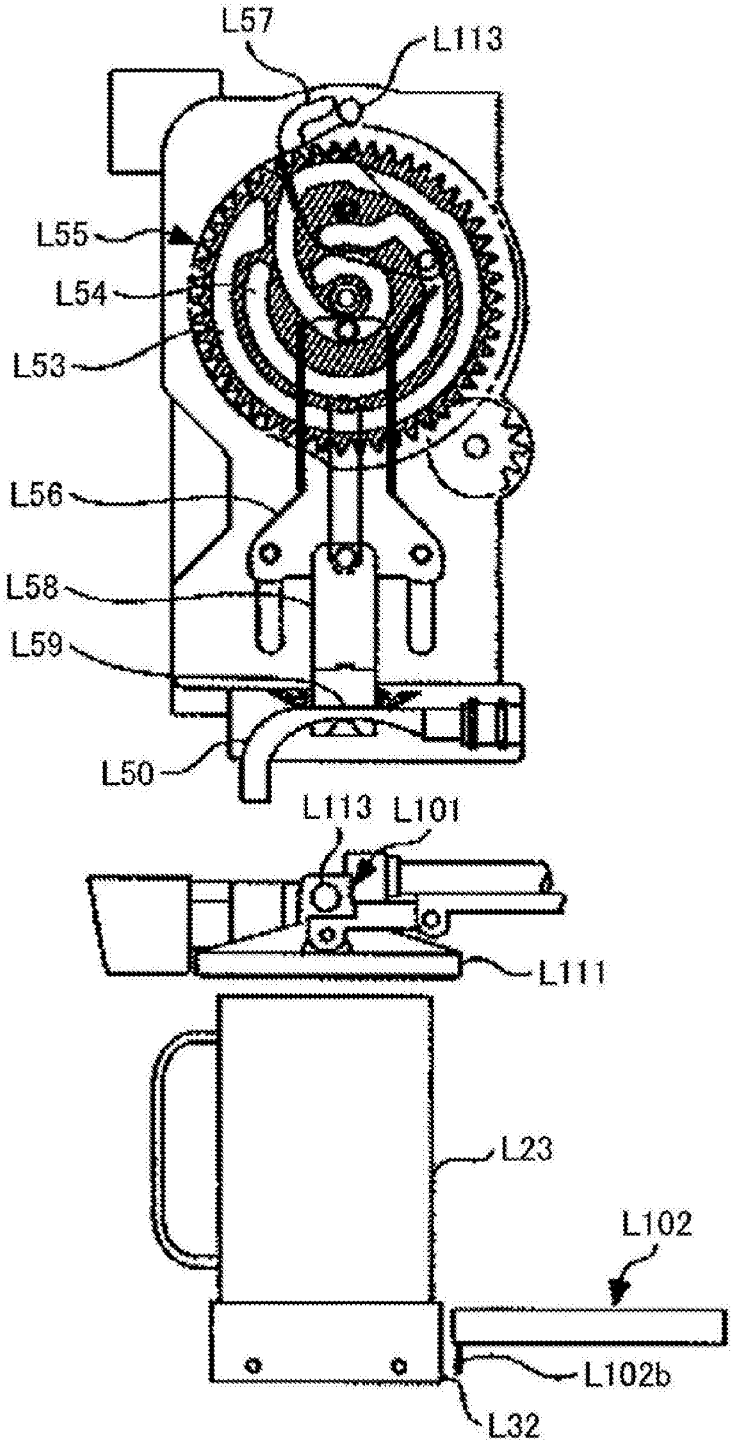


图150

Petitioner Exhibit 1002-2227

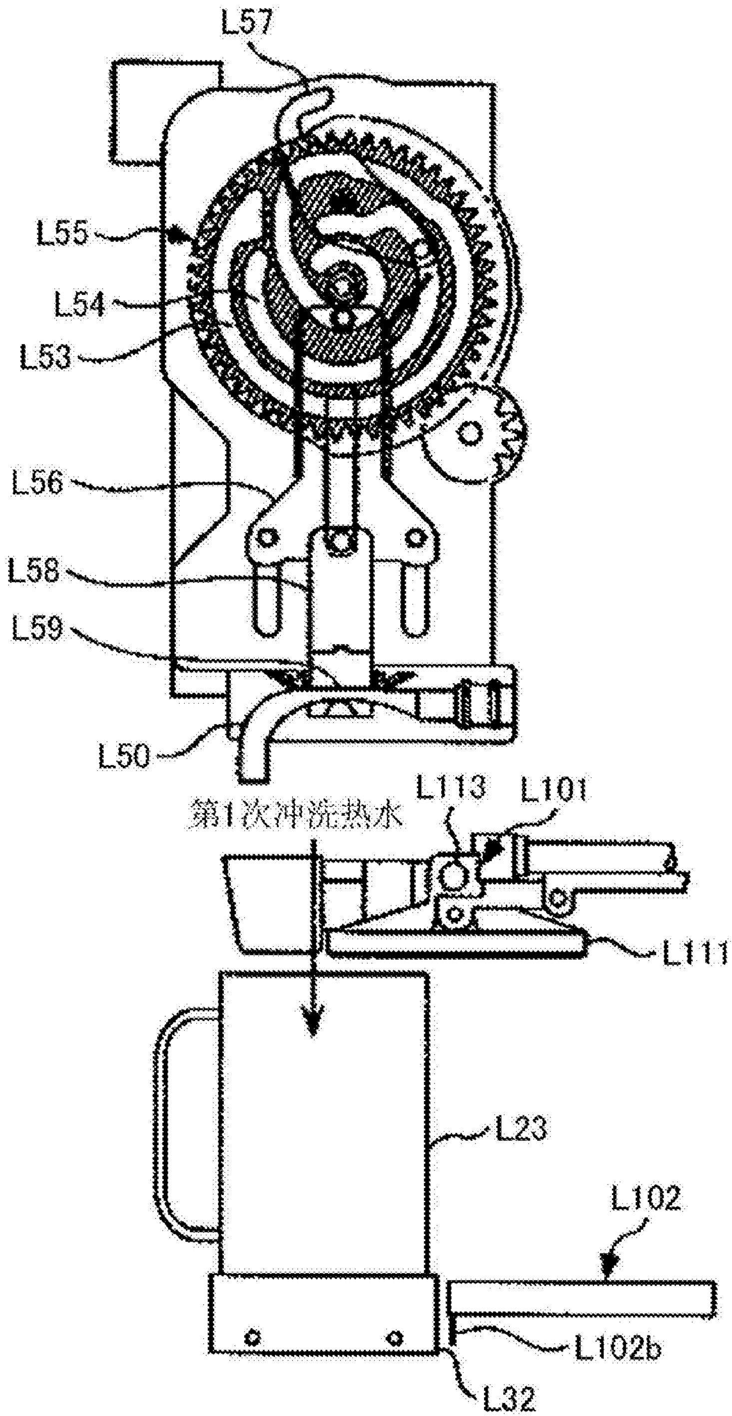


图151

Petitioner Exhibit 1002-2228

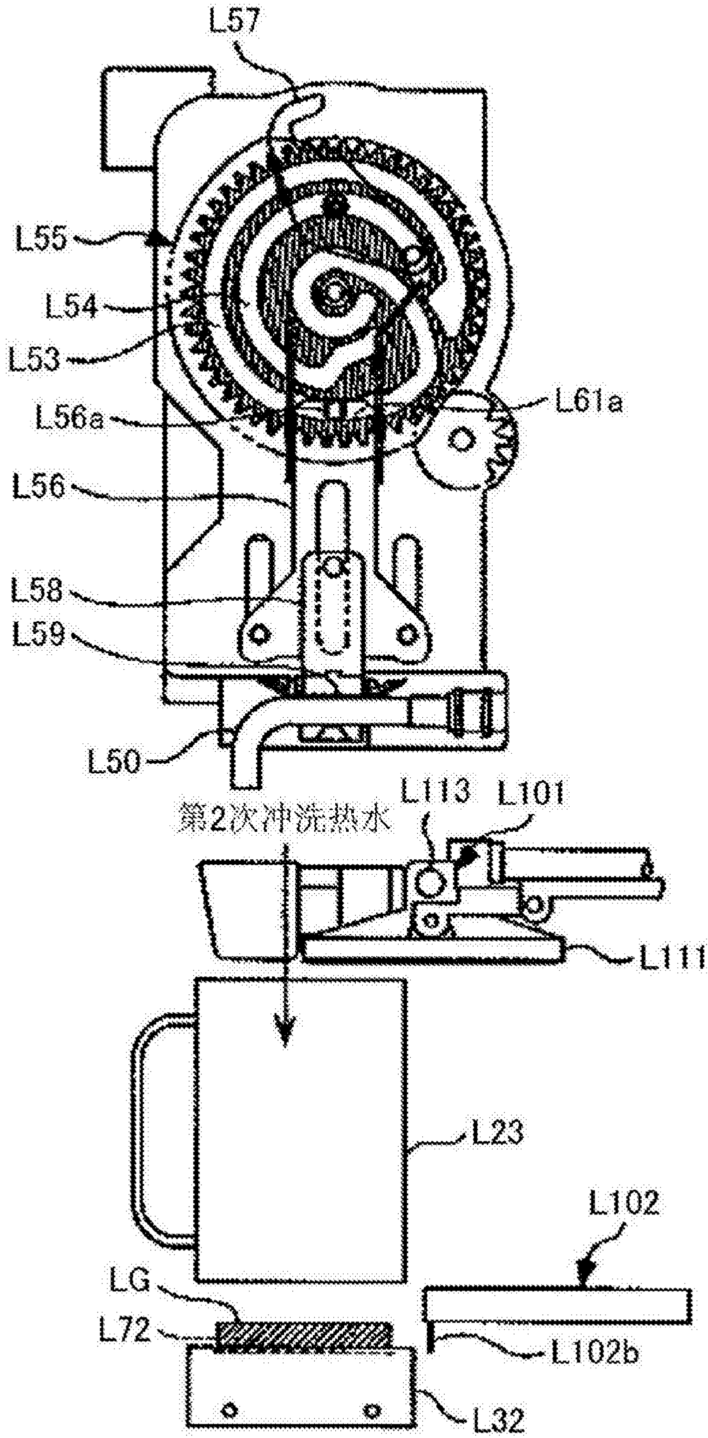


图152

Petitioner Exhibit 1002-2229

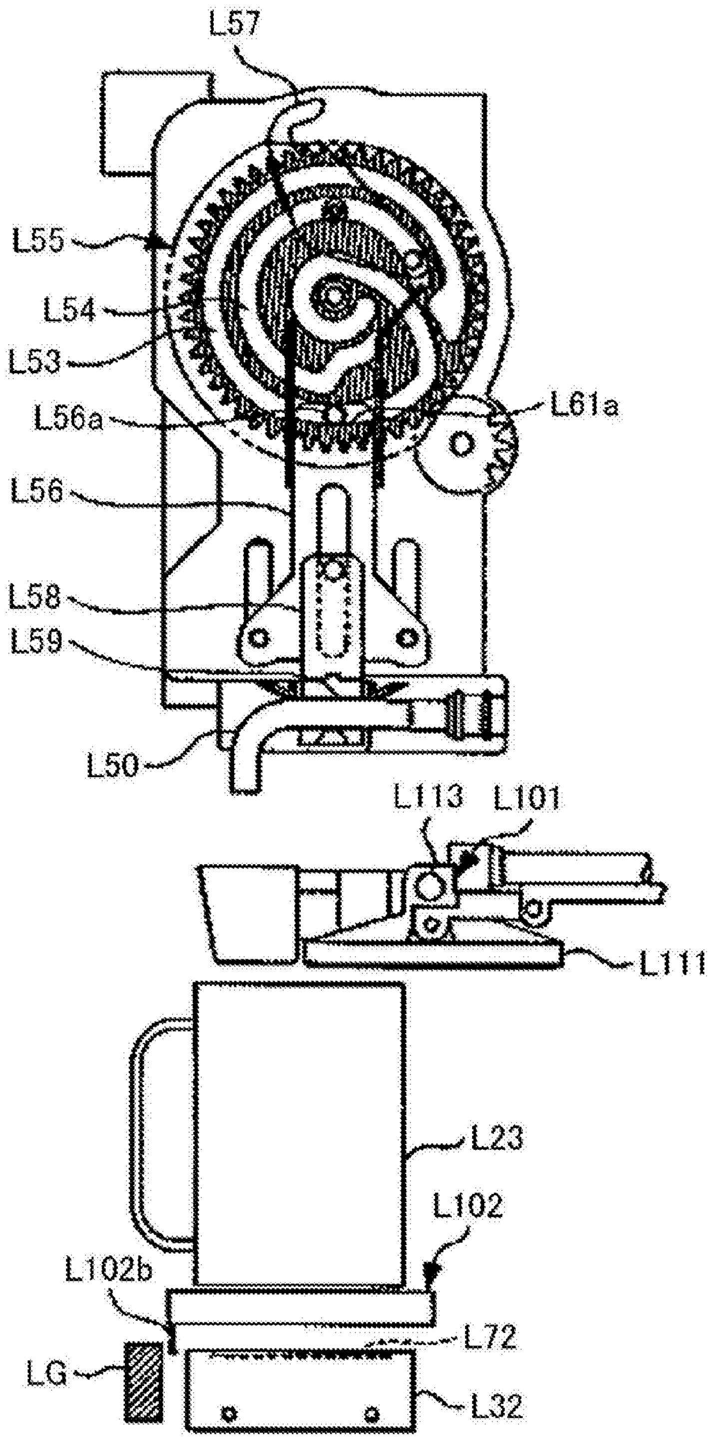


图153

Petitioner Exhibit 1002-2230

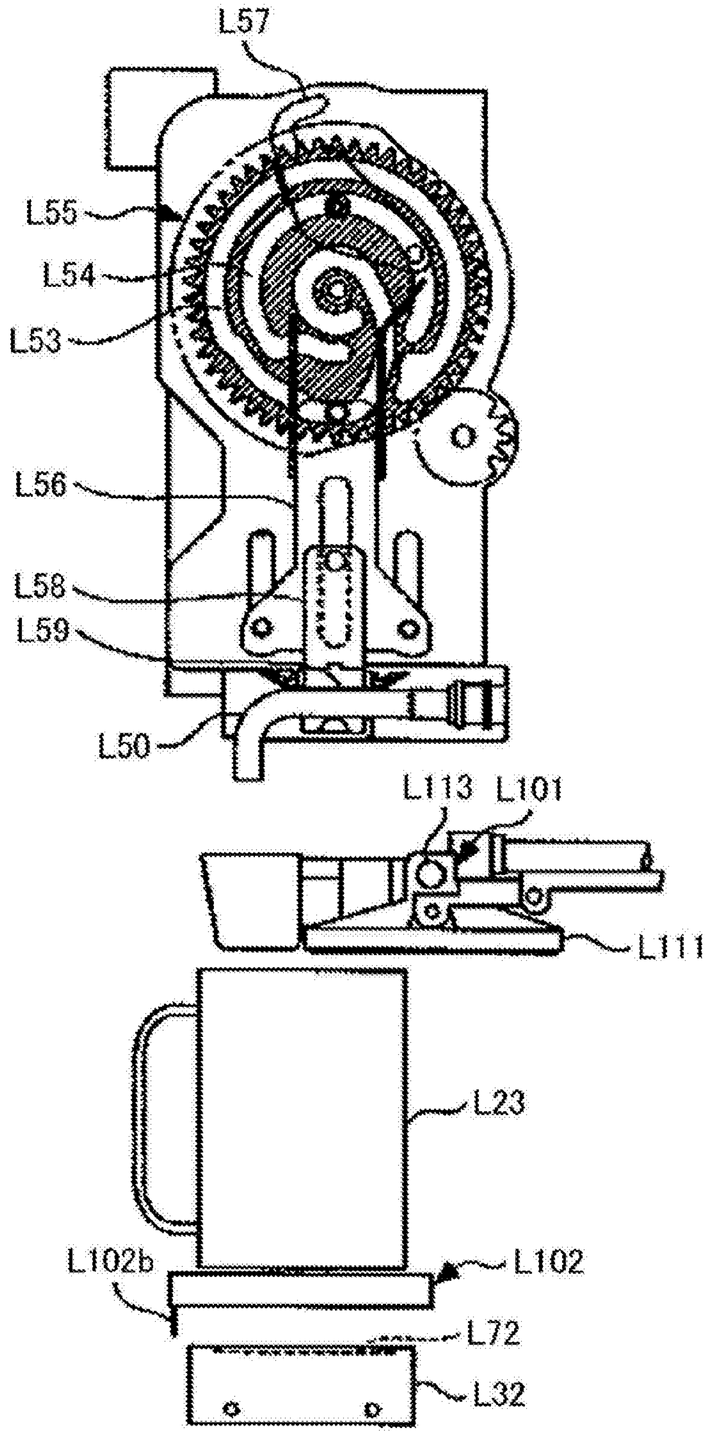


图154

Petitioner Exhibit 1002-2231

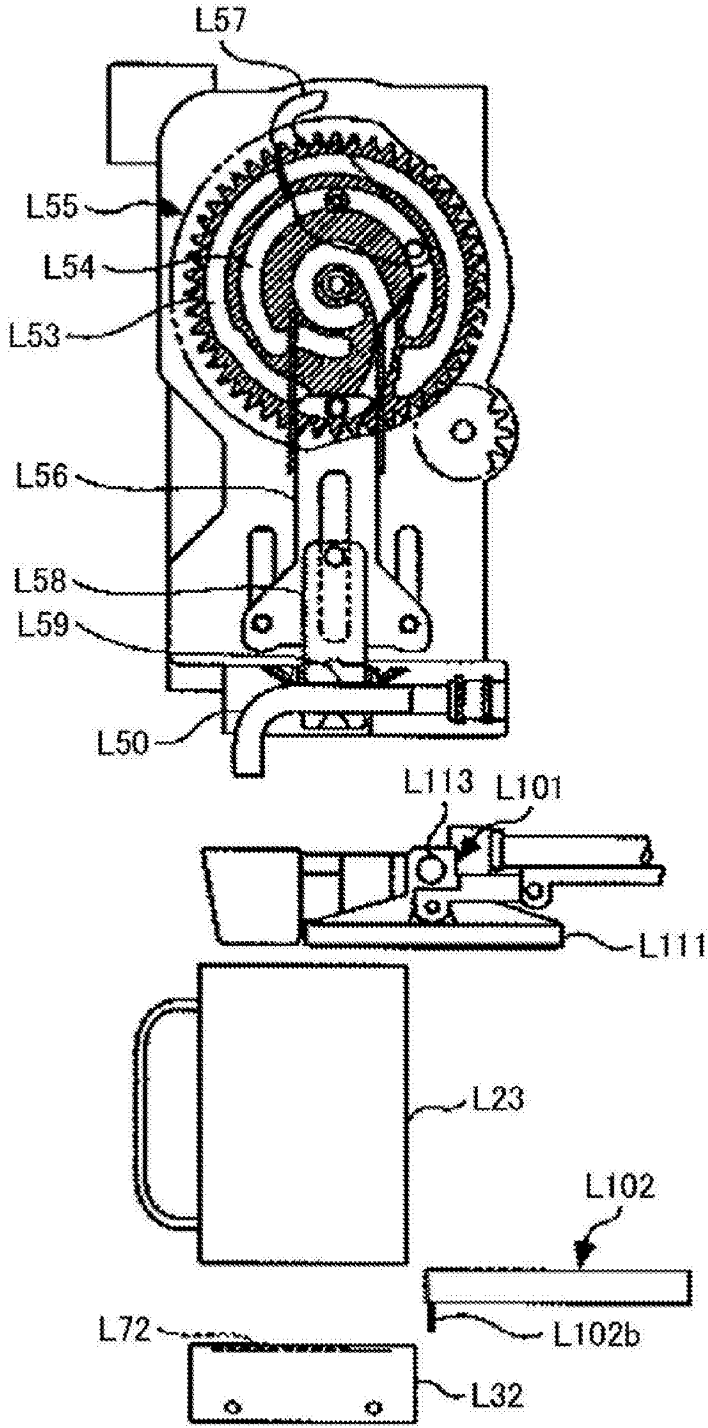


图155

Petitioner Exhibit 1002-2232

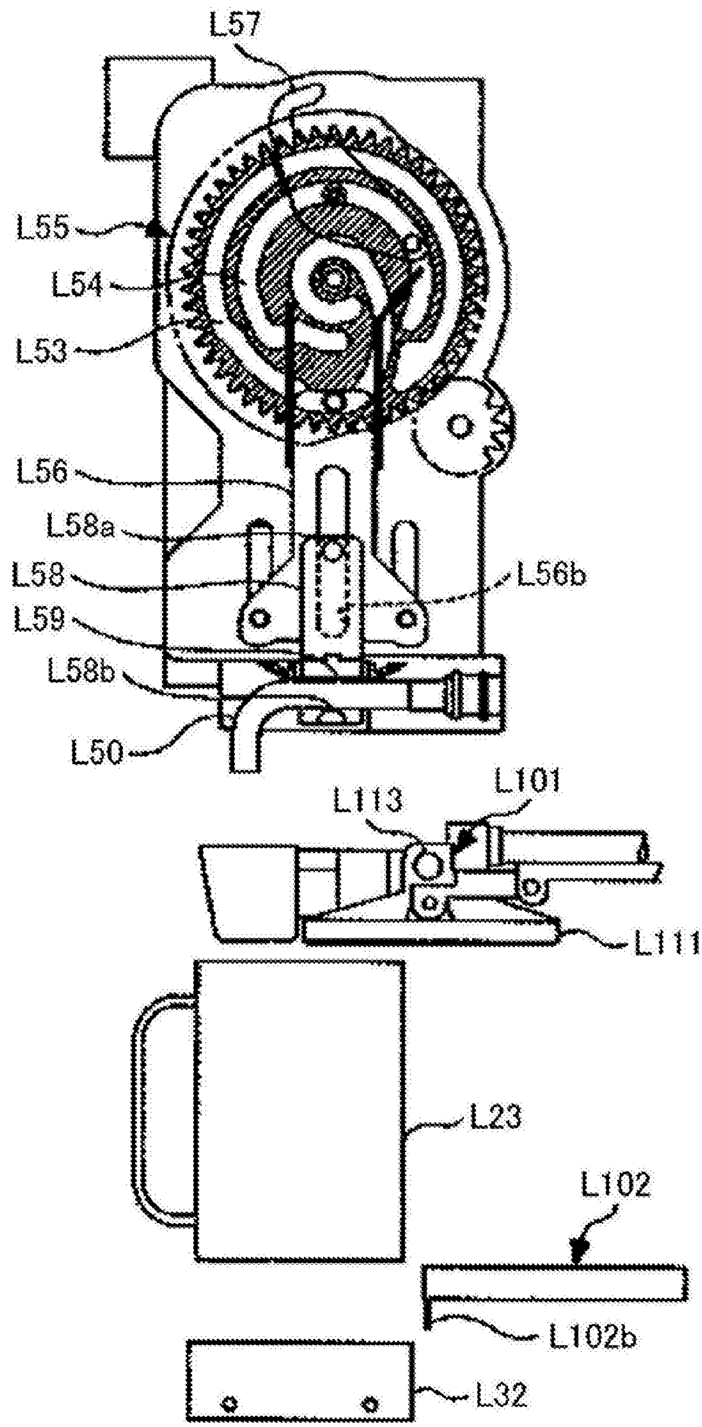


图156

Petitioner Exhibit 1002-2233

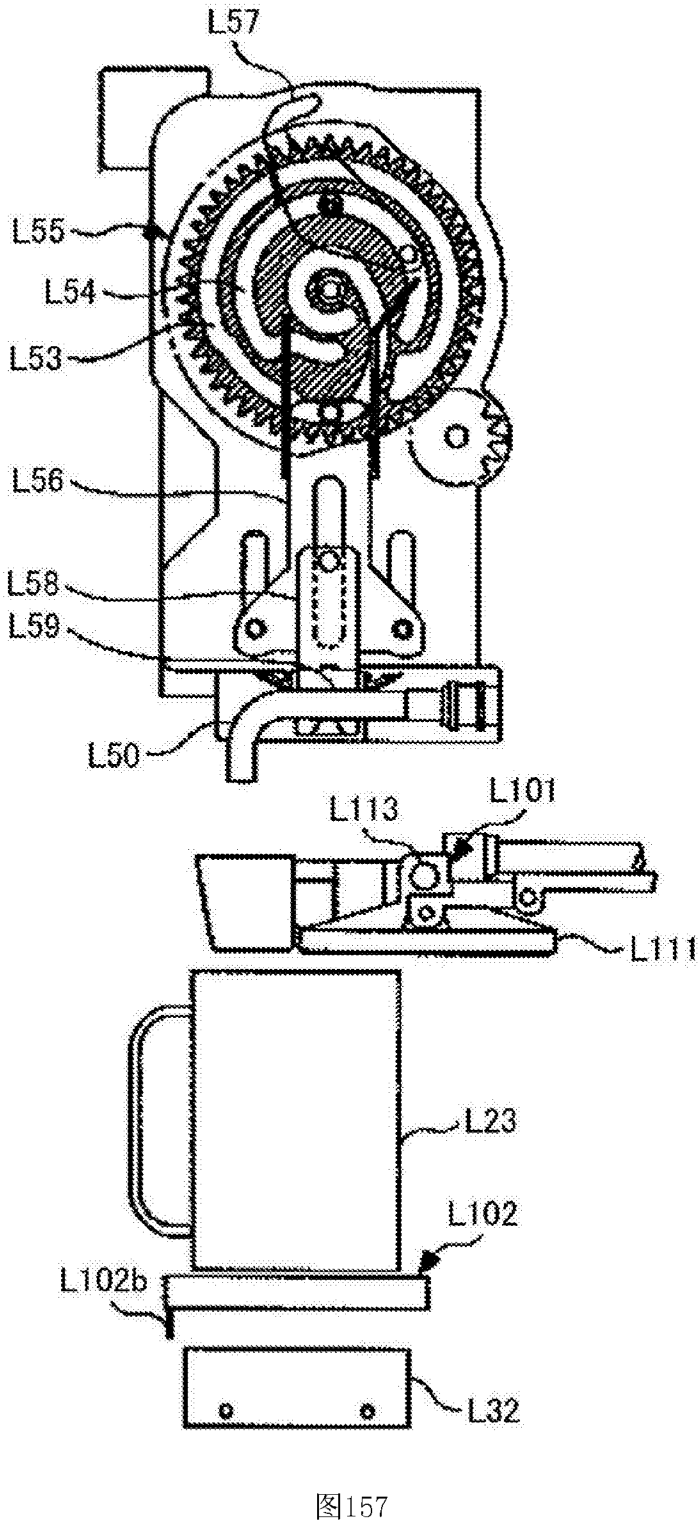


图157

Petitioner Exhibit 1002-2234

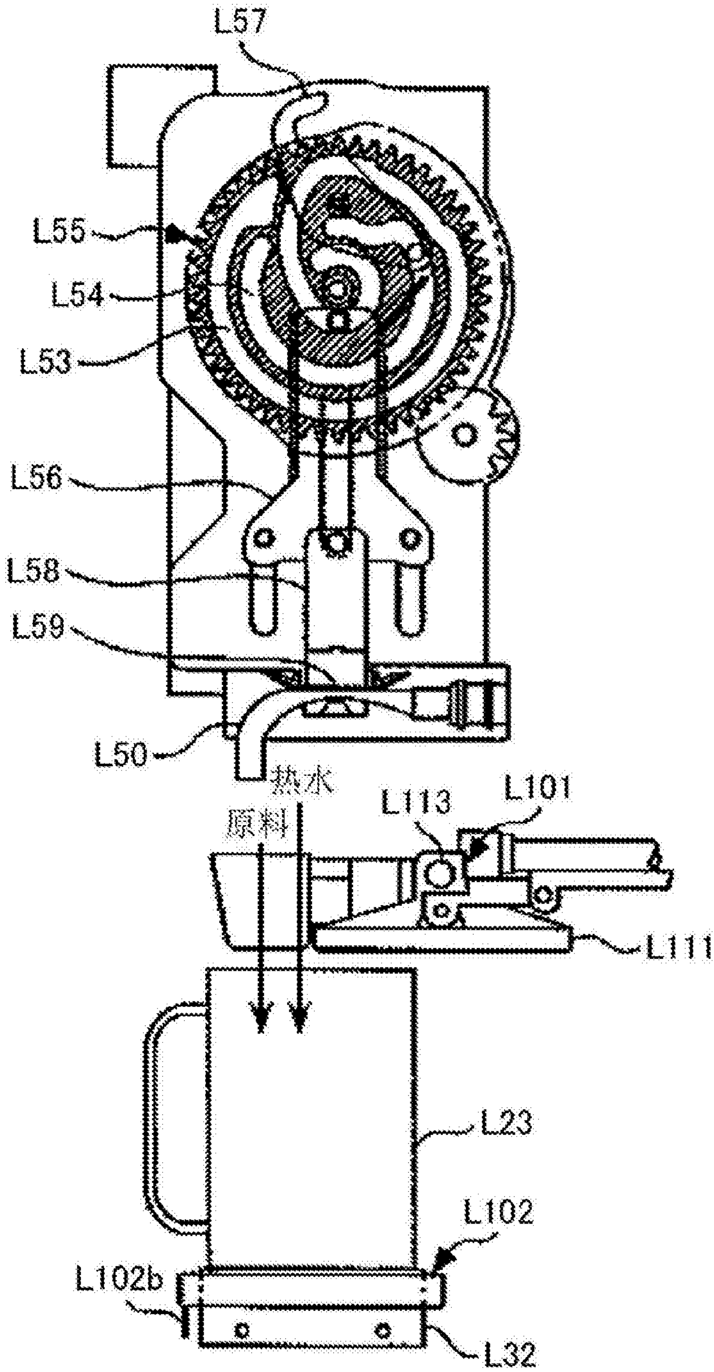


图158

Petitioner Exhibit 1002-2235

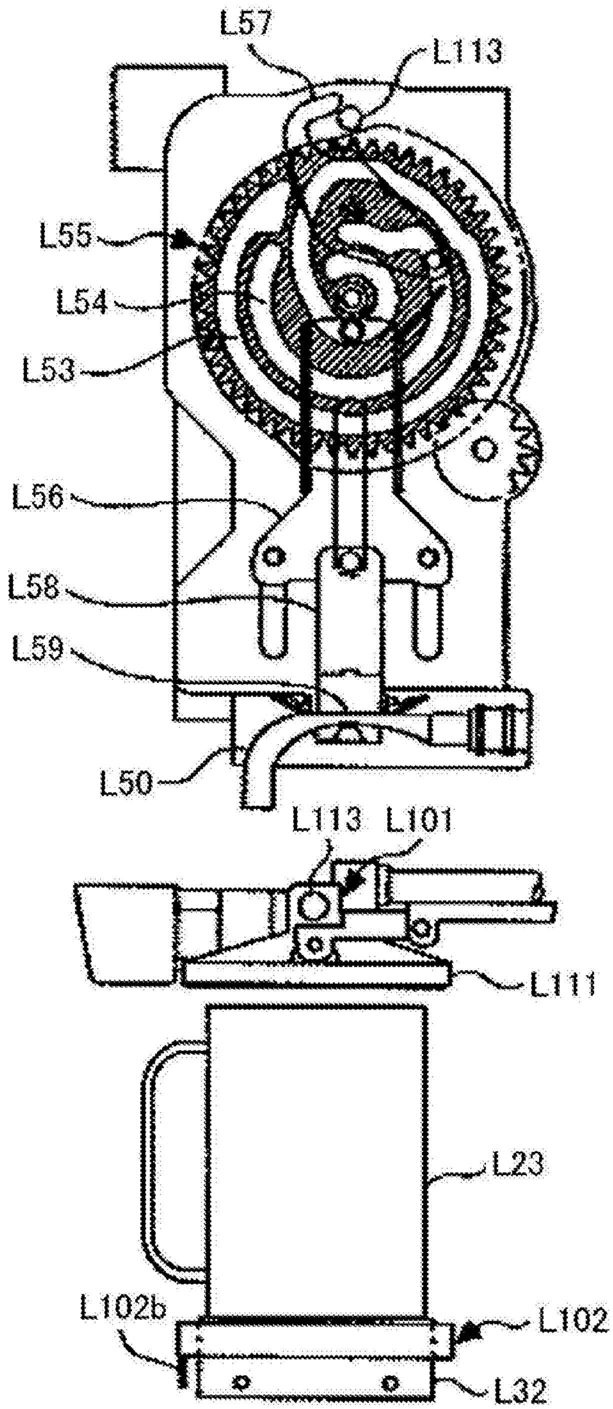


图159

Petitioner Exhibit 1002-2236

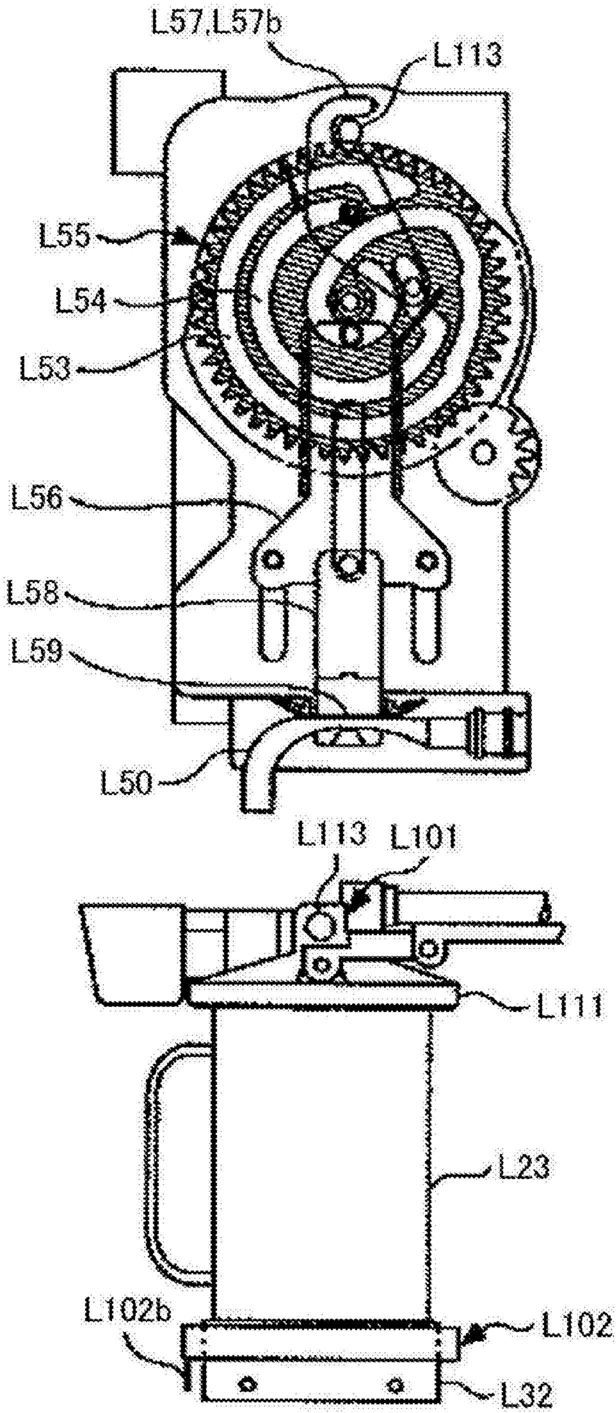


图160

Petitioner Exhibit 1002-2237

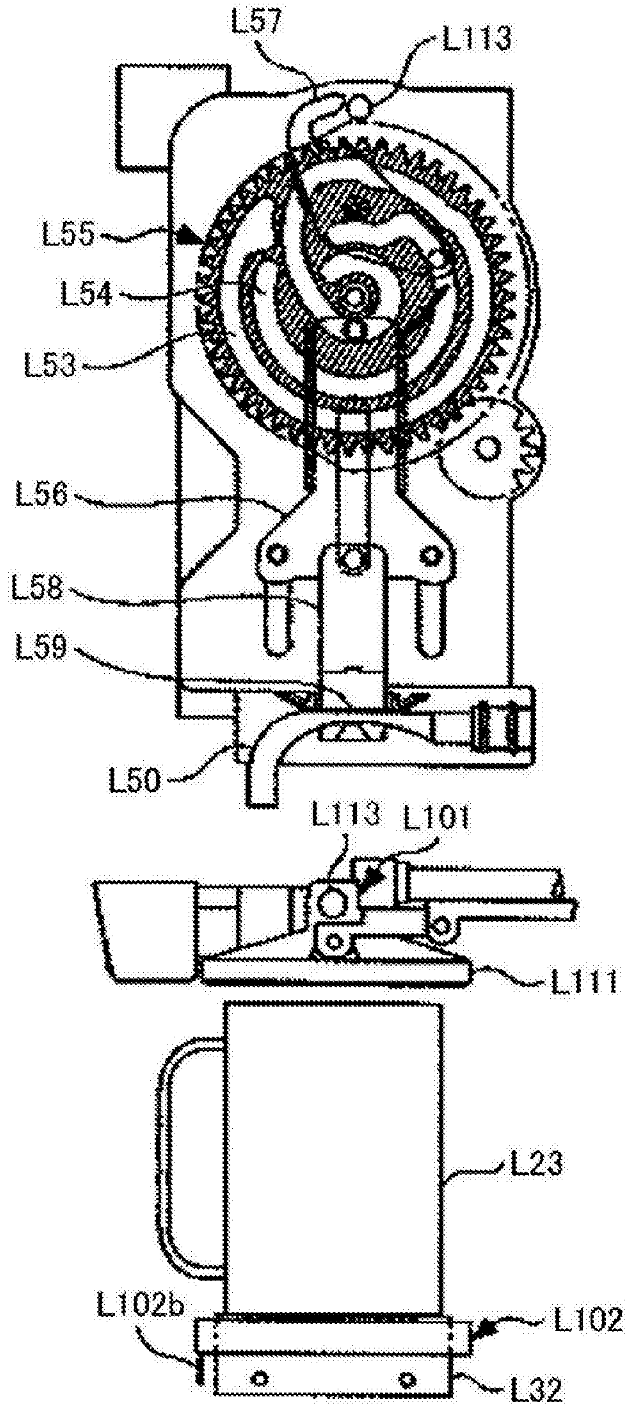


图161

Petitioner Exhibit 1002-2238

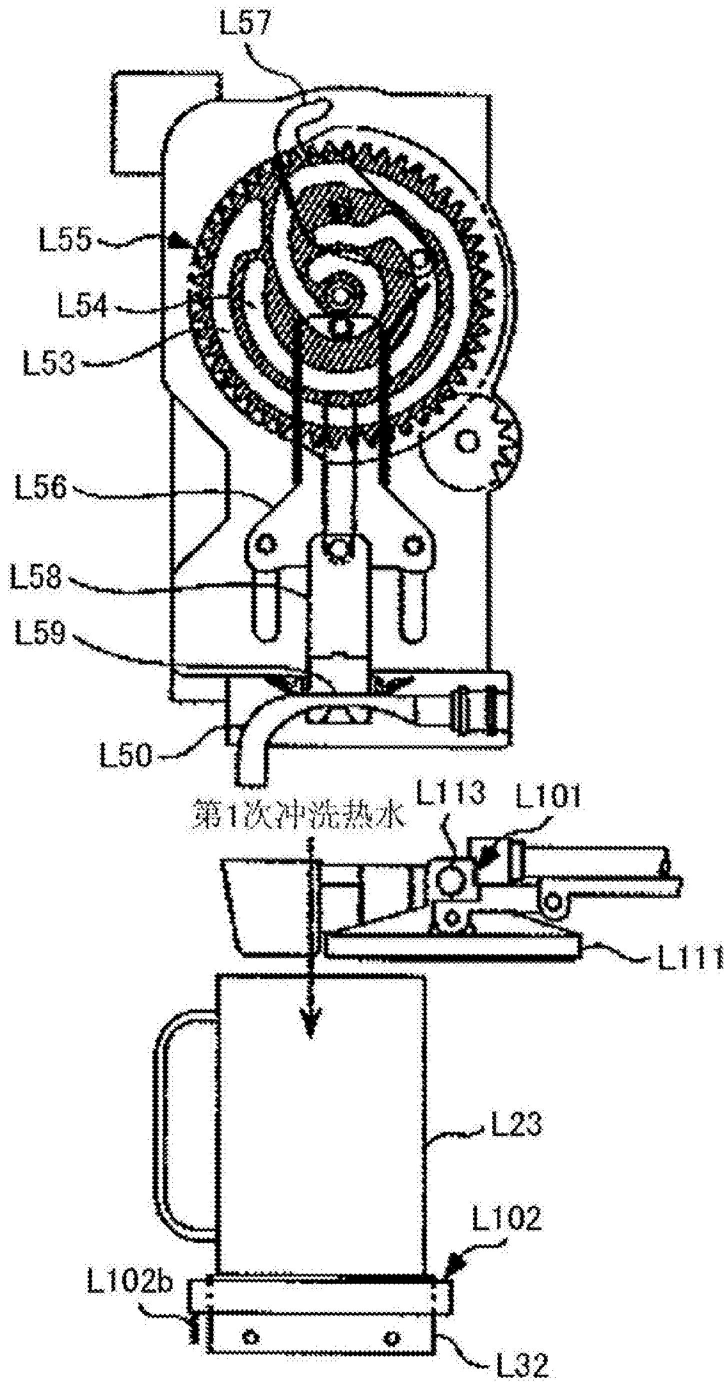


图162

Petitioner Exhibit 1002-2239

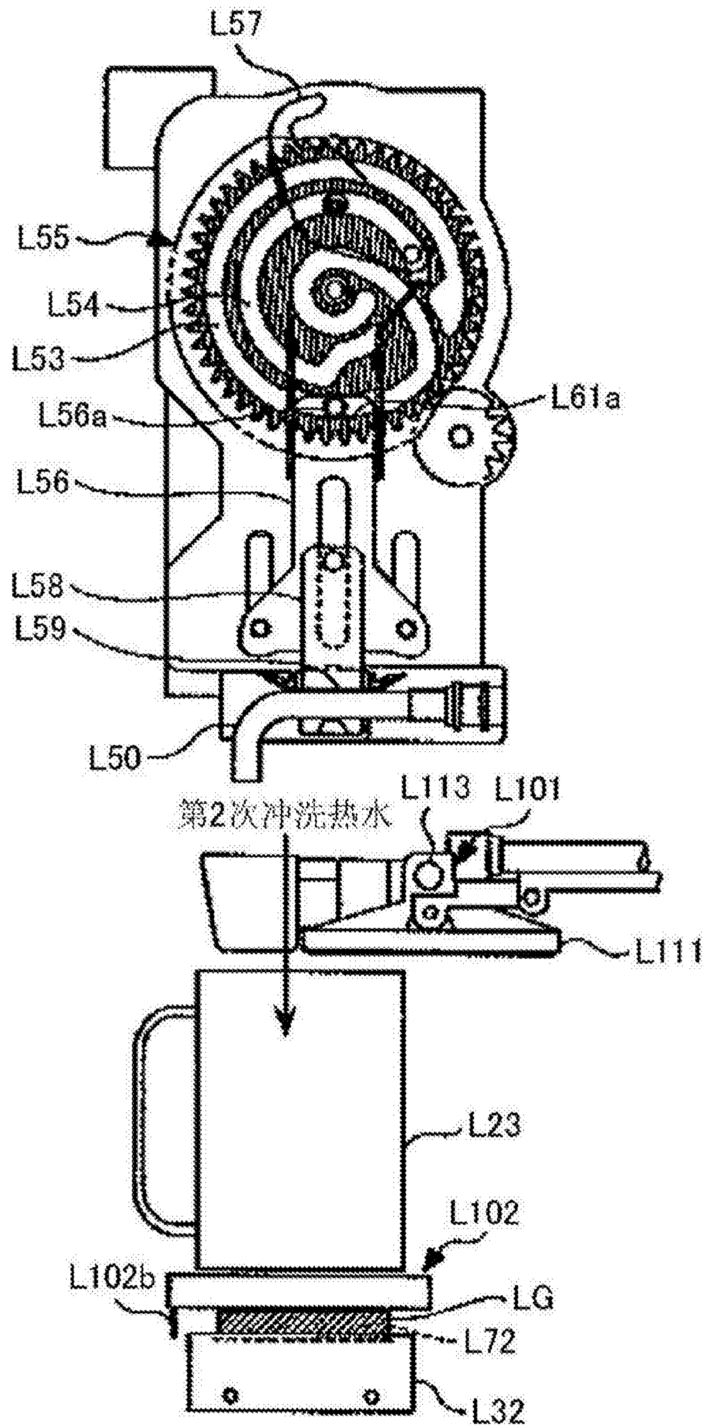


图163

Petitioner Exhibit 1002-2240

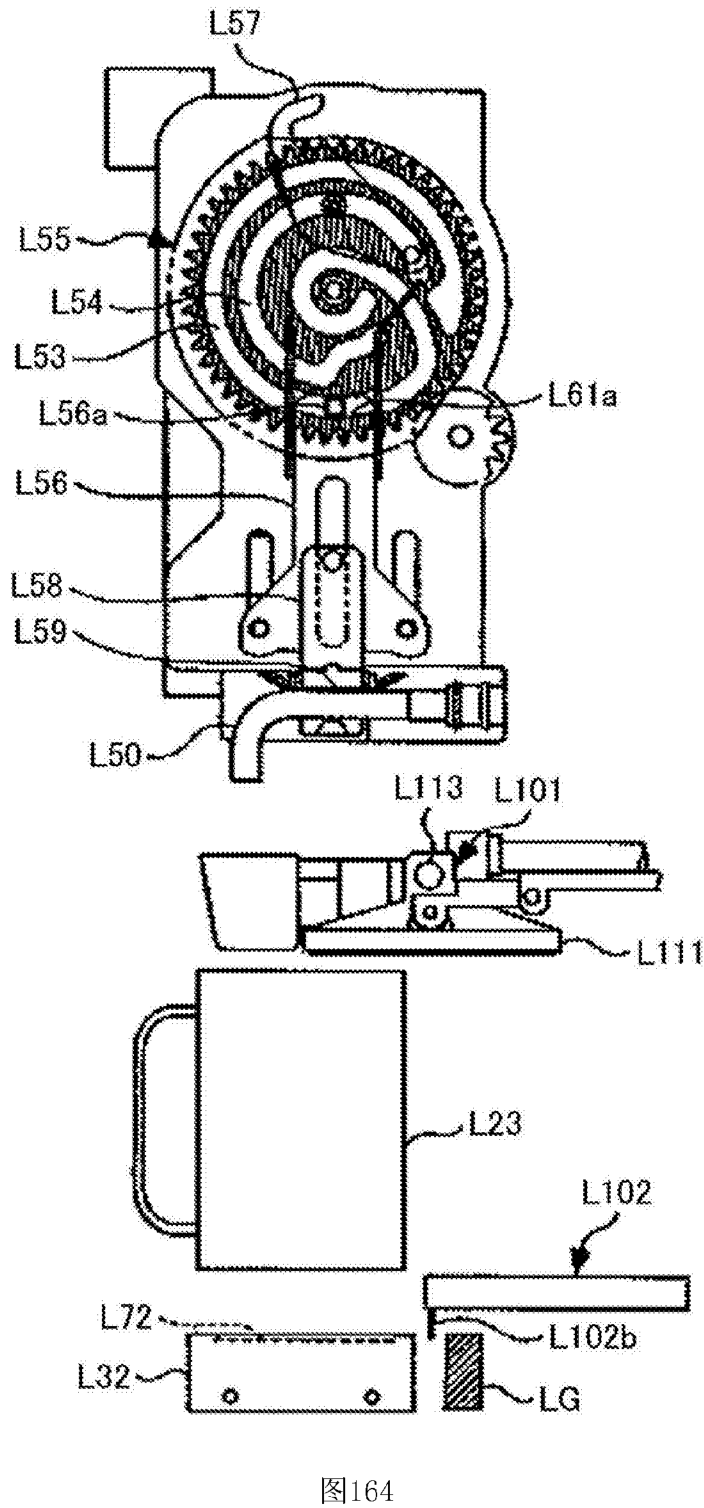


图164

Petitioner Exhibit 1002-2241

动作状态		夹紧件L8A	夹紧件L8B	夹紧件L8C	凸轮圆板L55旋转角度
(1)	待机	开放	开放	开放	0°
(2)	供给原料、热水并搅拌	封闭	开放	封闭	180°
(3)	运出咖啡	开放	封闭	开放	240°
(4)	排出提取渣	开放	开放	开放	-40°

图165

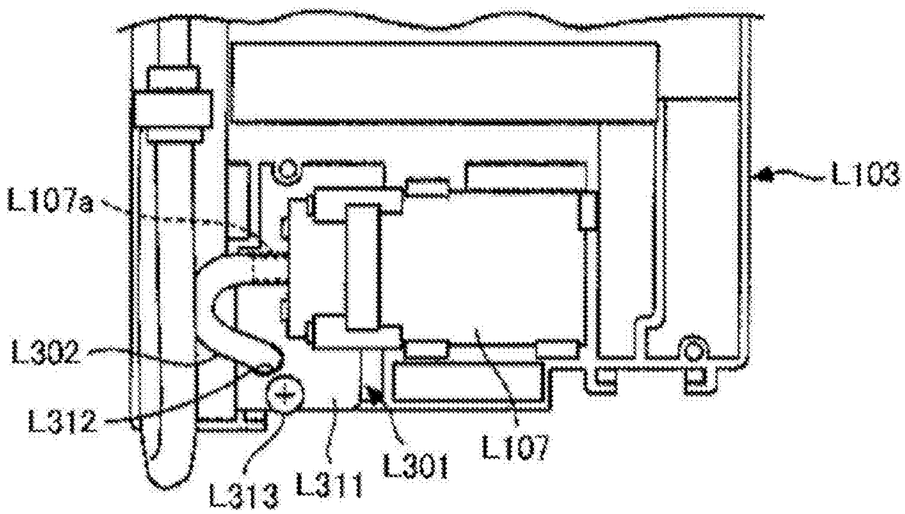
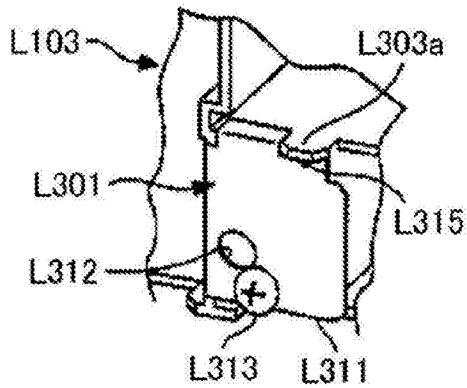


图166

Petitioner Exhibit 1002-2242

(a)



(b)

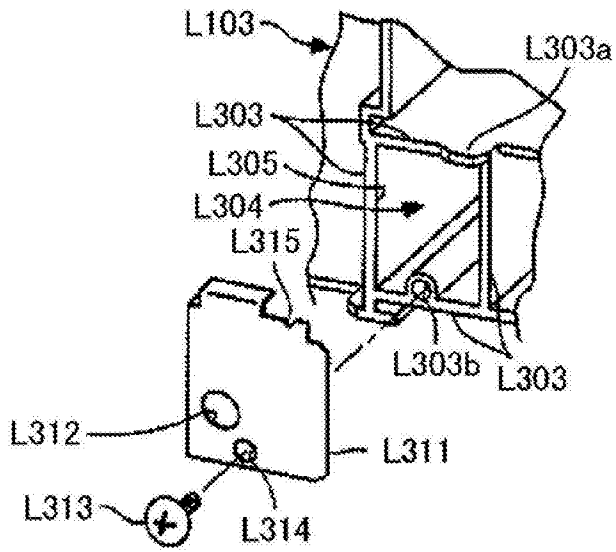
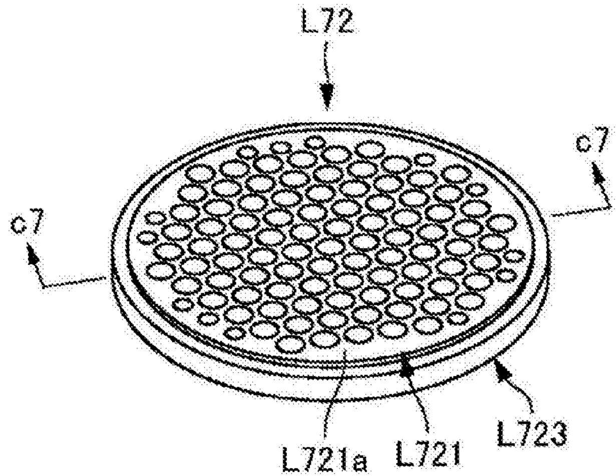


图167

Petitioner Exhibit 1002-2243

(a)



(b)

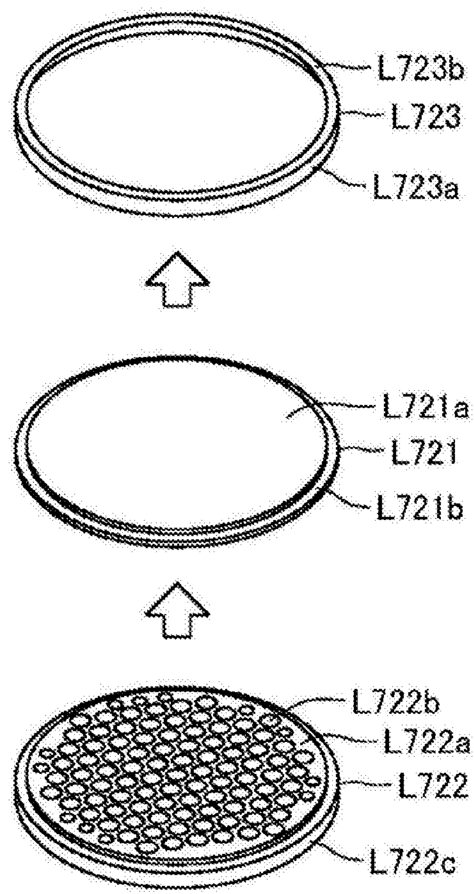


图168

Petitioner Exhibit 1002-2244

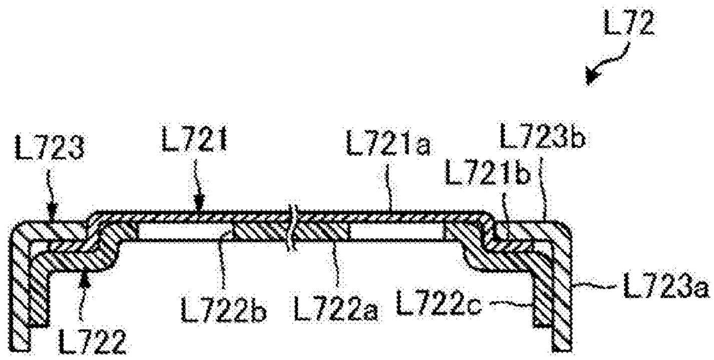


图169

Petitioner Exhibit 1002-2245

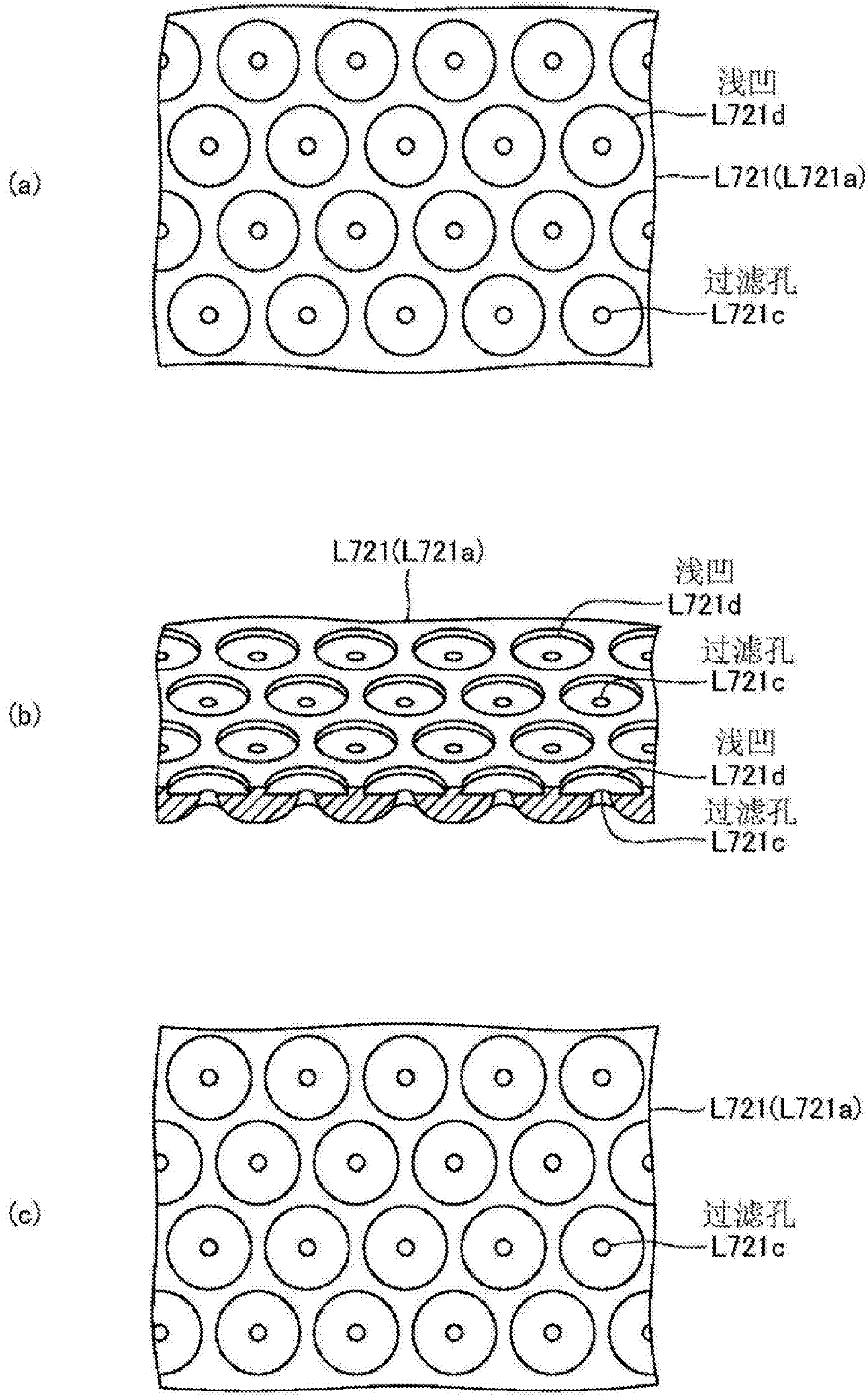


图170

Petitioner Exhibit 1002-2246

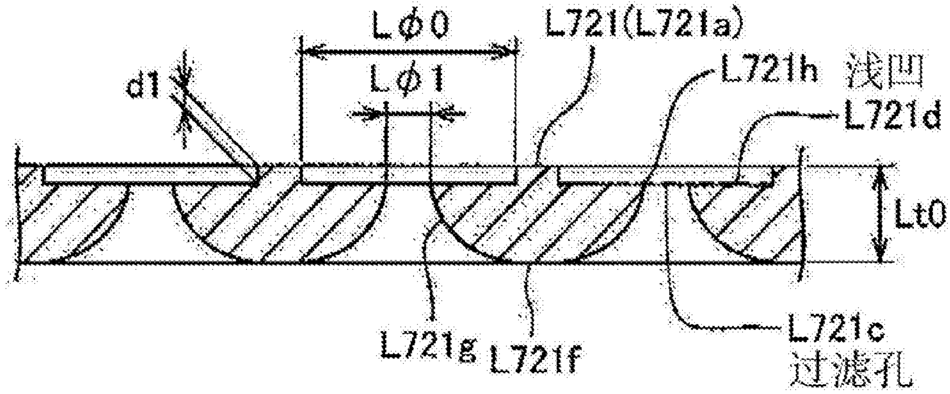


图171

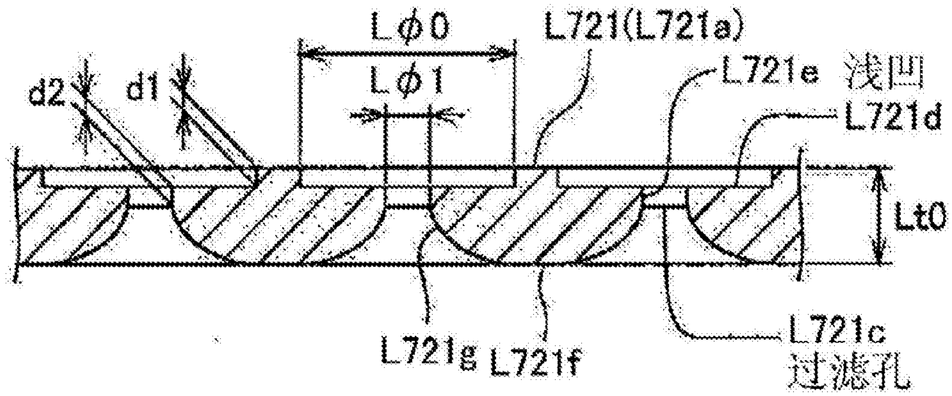


图172

Petitioner Exhibit 1002-2247

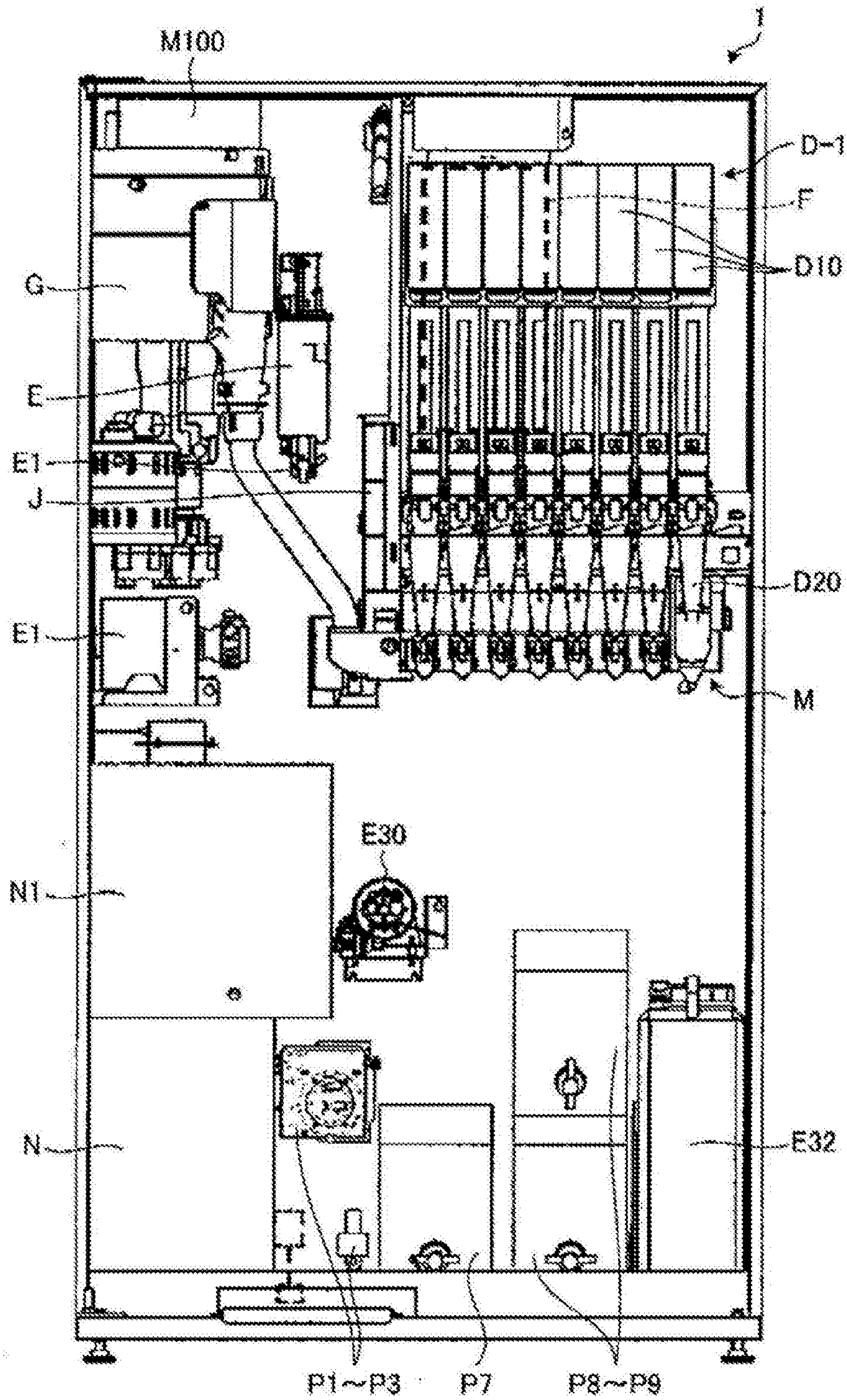


图173

Petitioner Exhibit 1002-2248

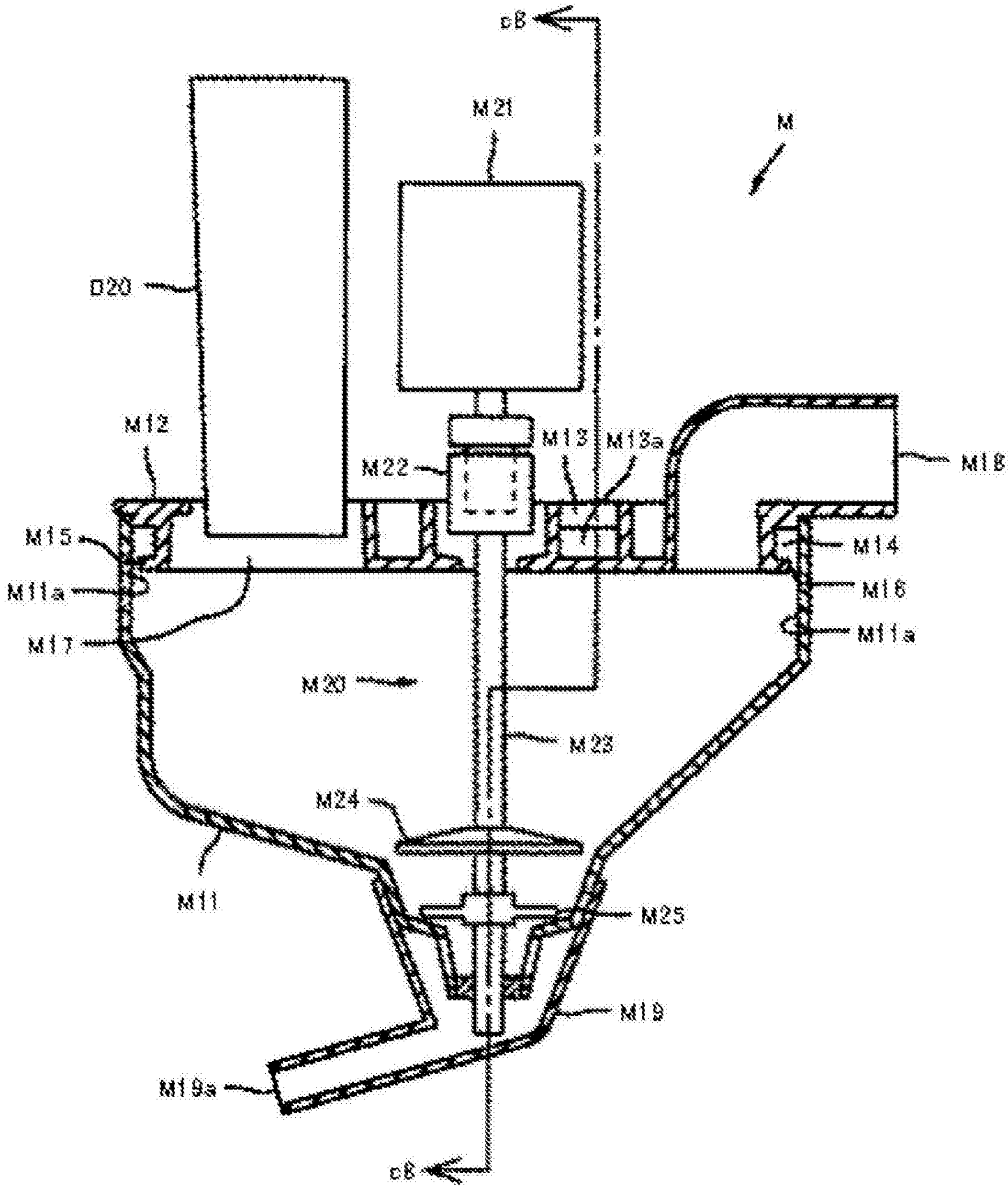


图174

Petitioner Exhibit 1002-2249

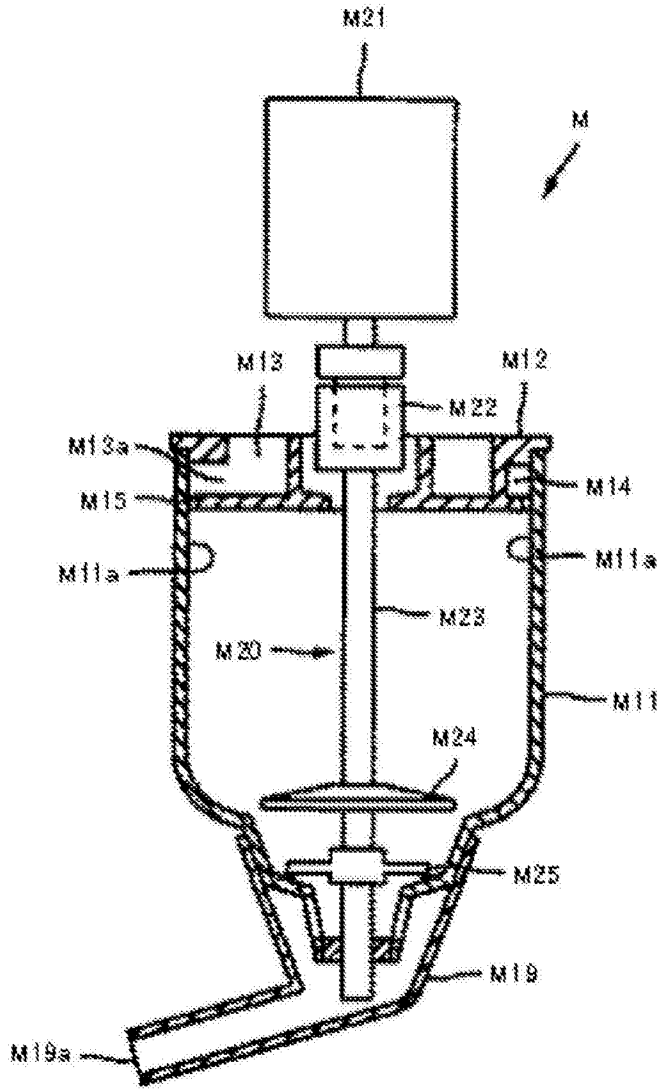


图175

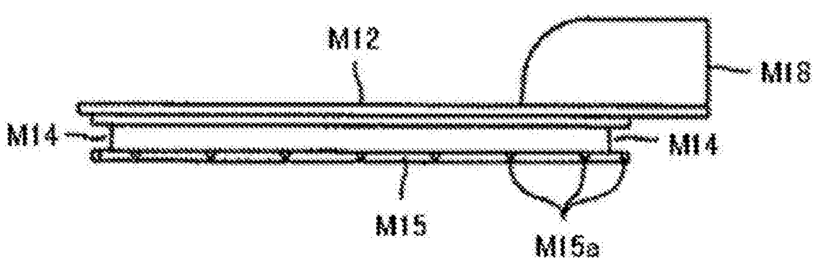


图176

Petitioner Exhibit 1002-2250

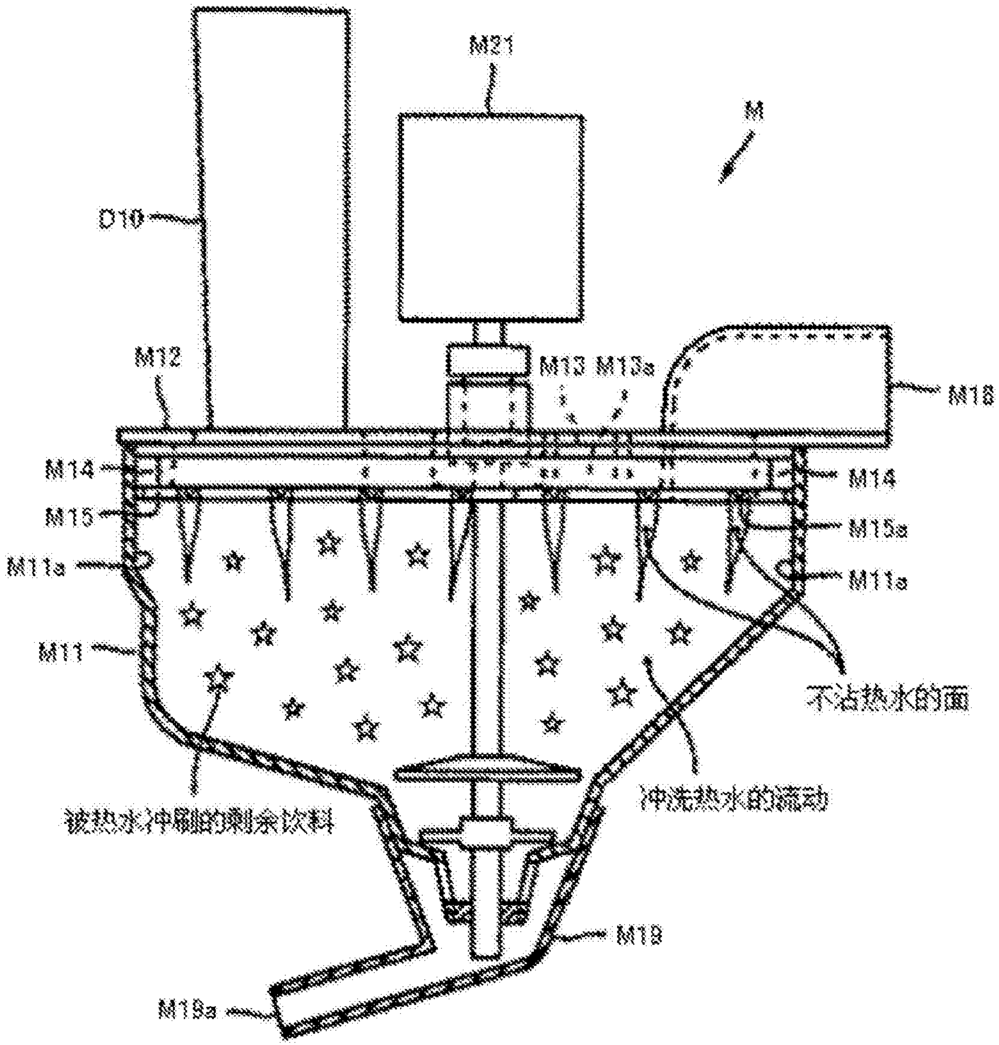


图177

Petitioner Exhibit 1002-2251

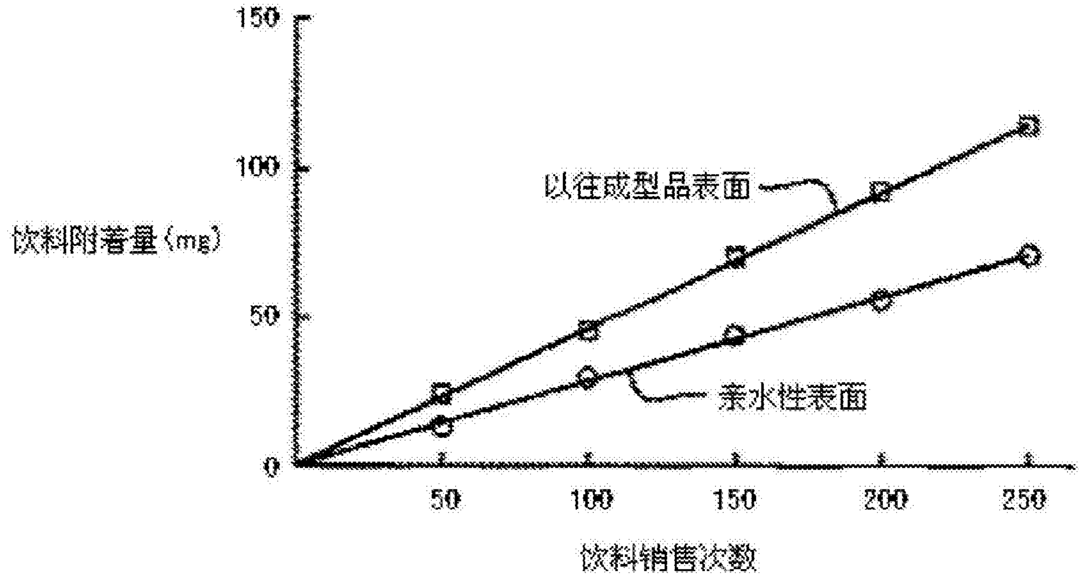


图178

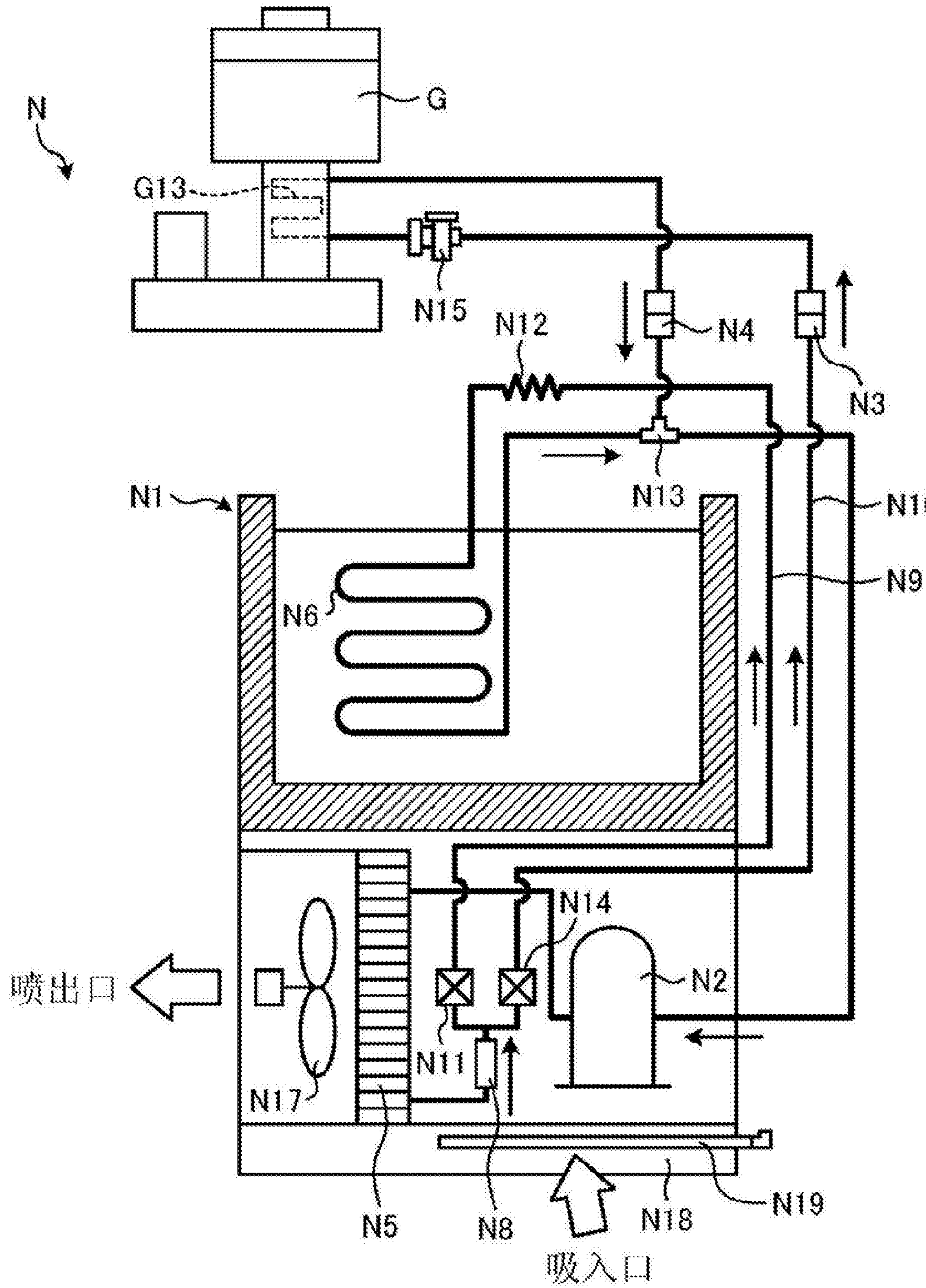


图179

Petitioner Exhibit 1002-2253

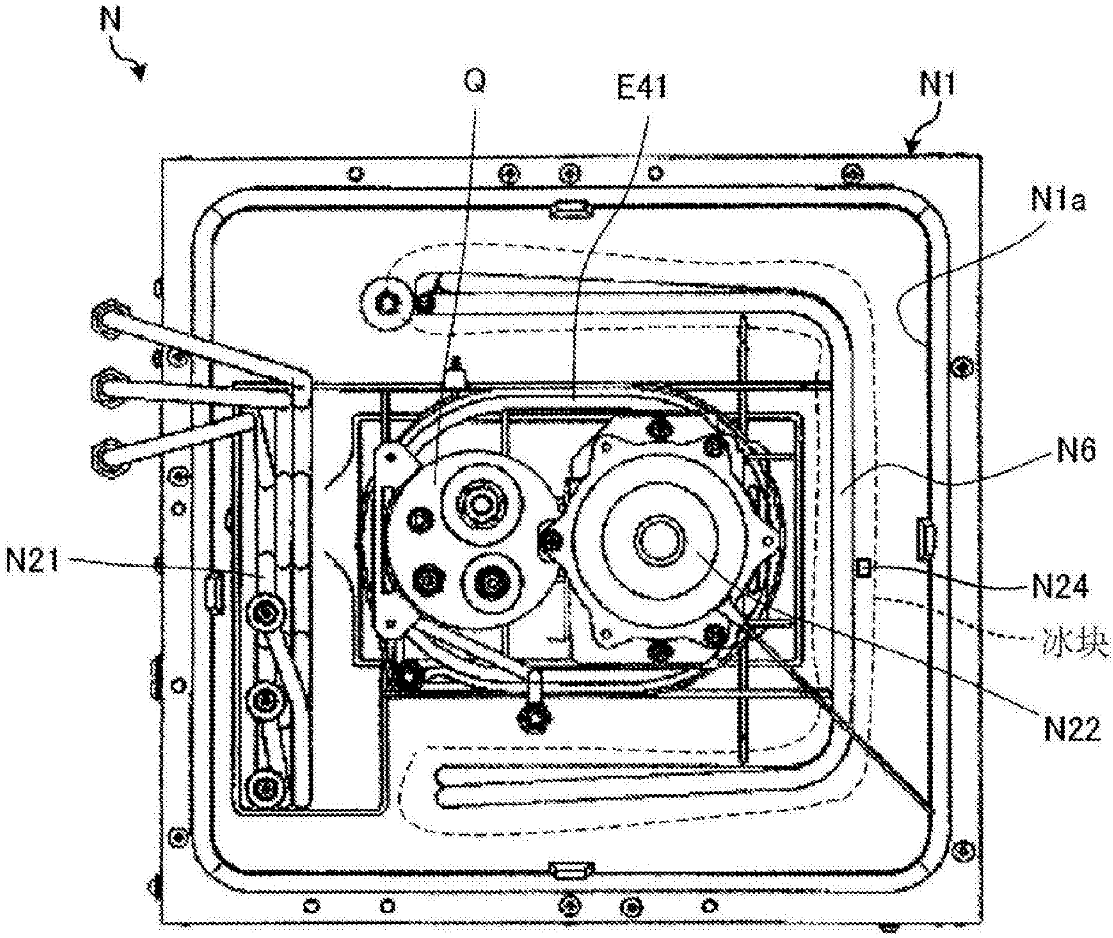


图180

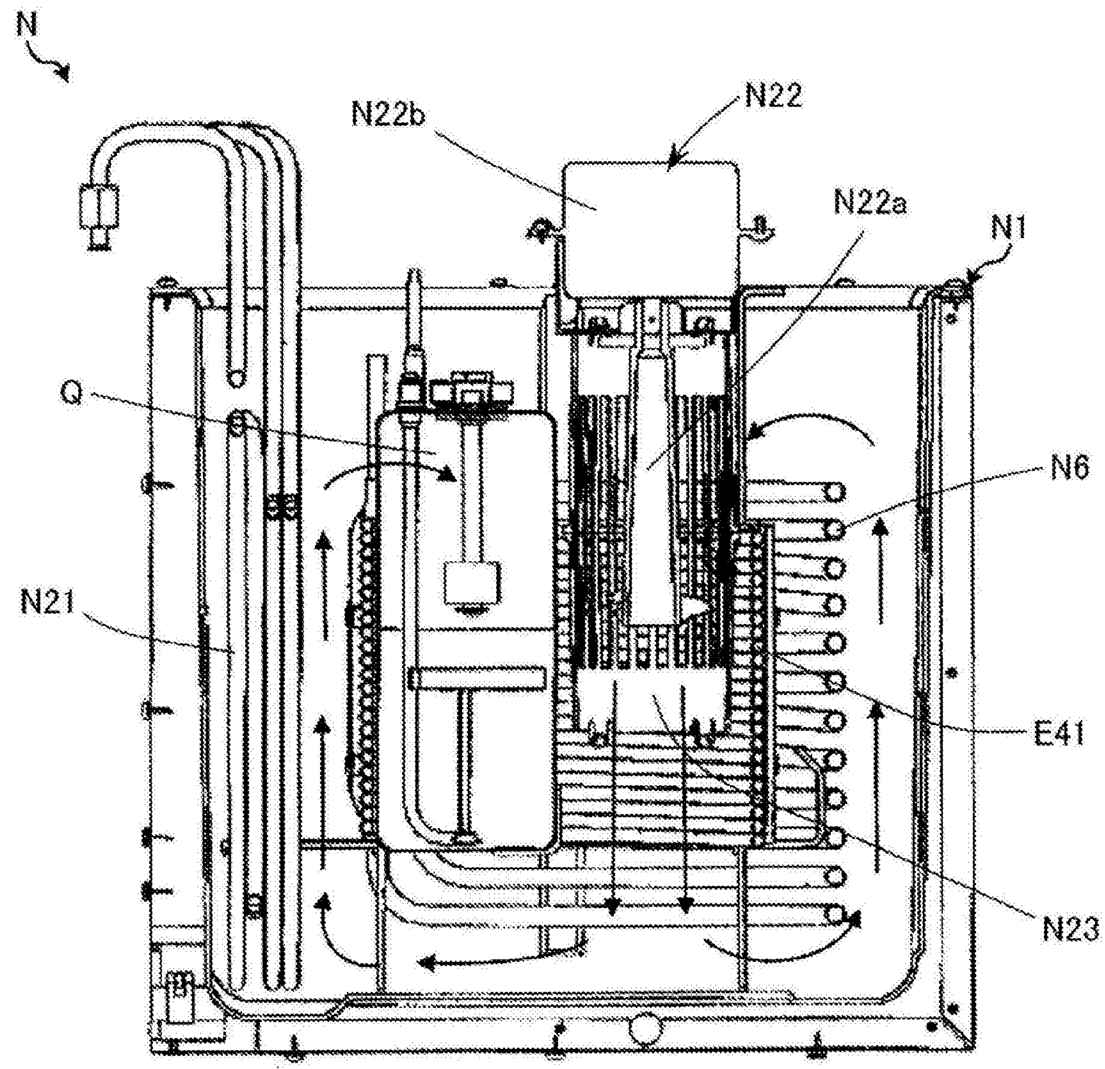


图181

Petitioner Exhibit 1002-2255

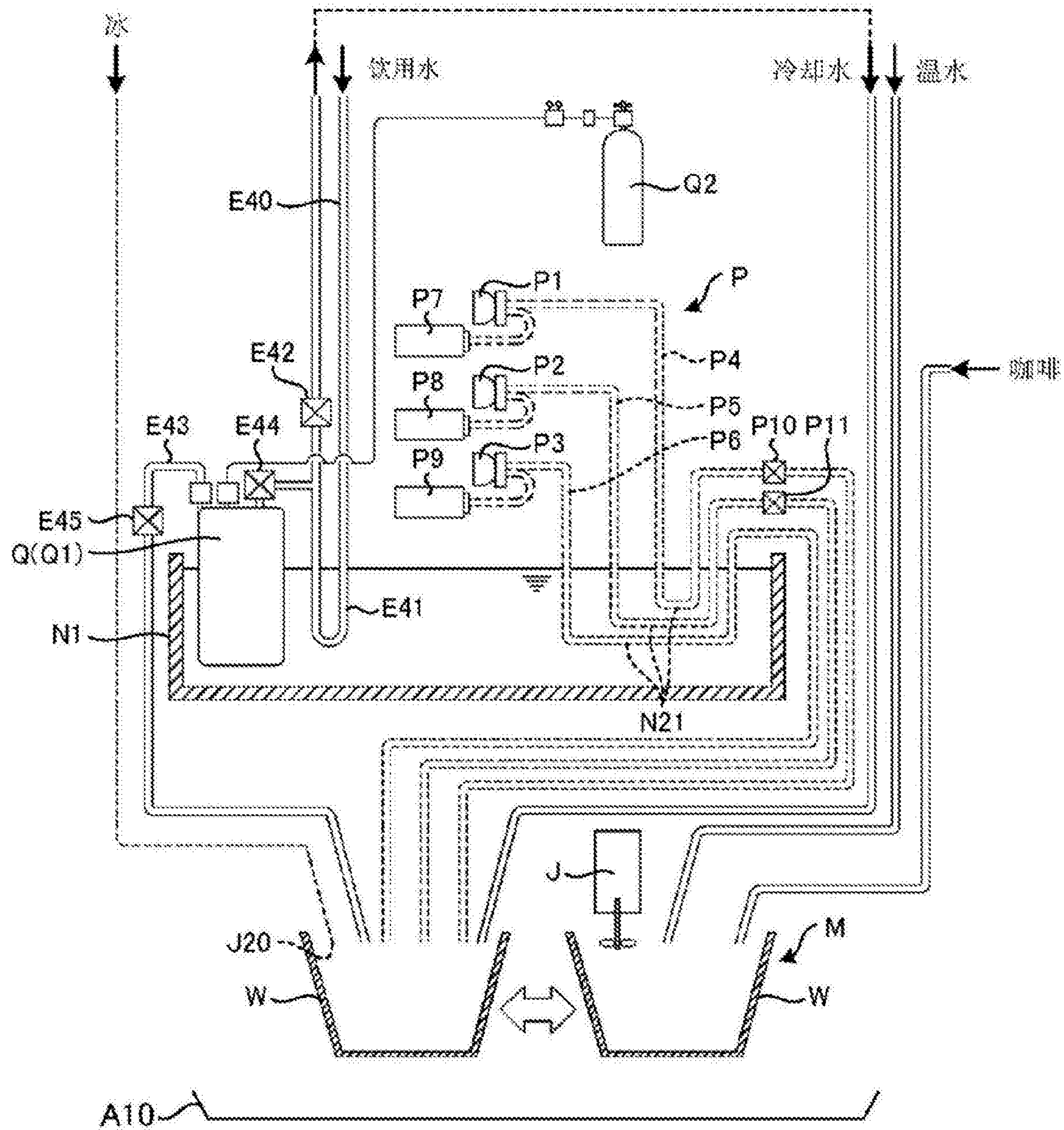


图182

Petitioner Exhibit 1002-2256

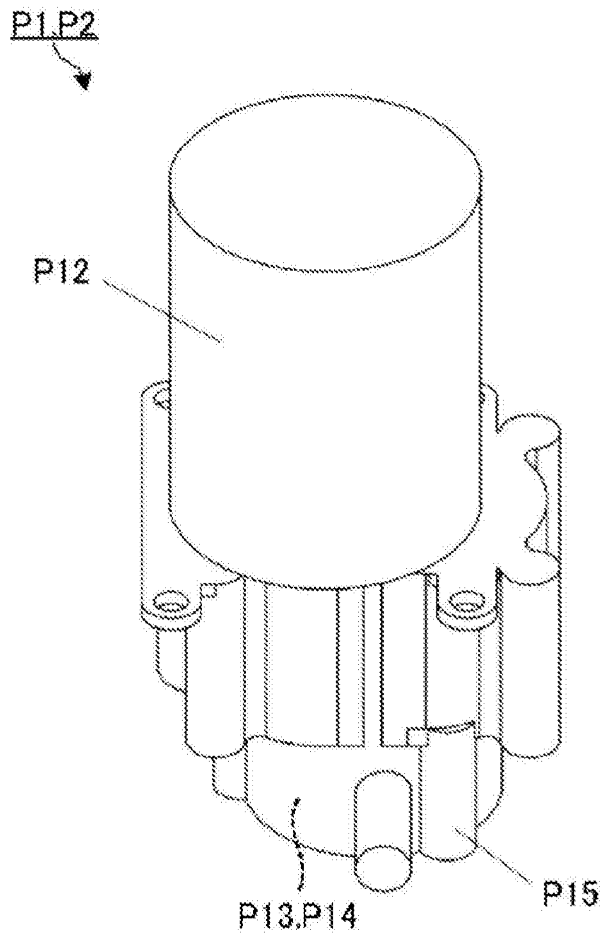


图183

Petitioner Exhibit 1002-2257

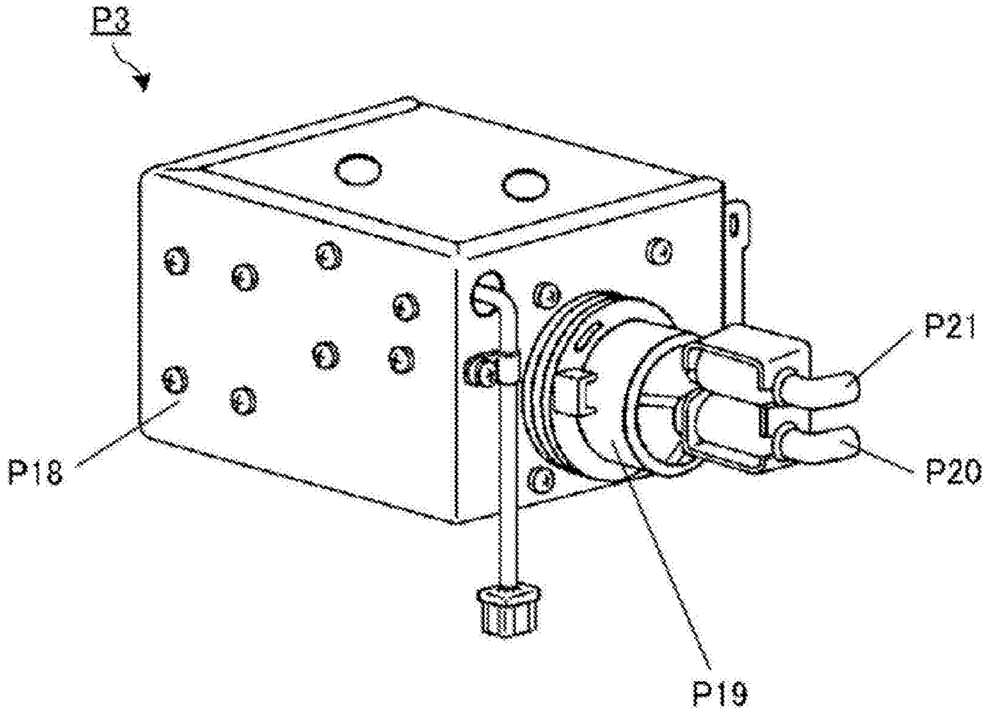


图184

Petitioner Exhibit 1002-2258

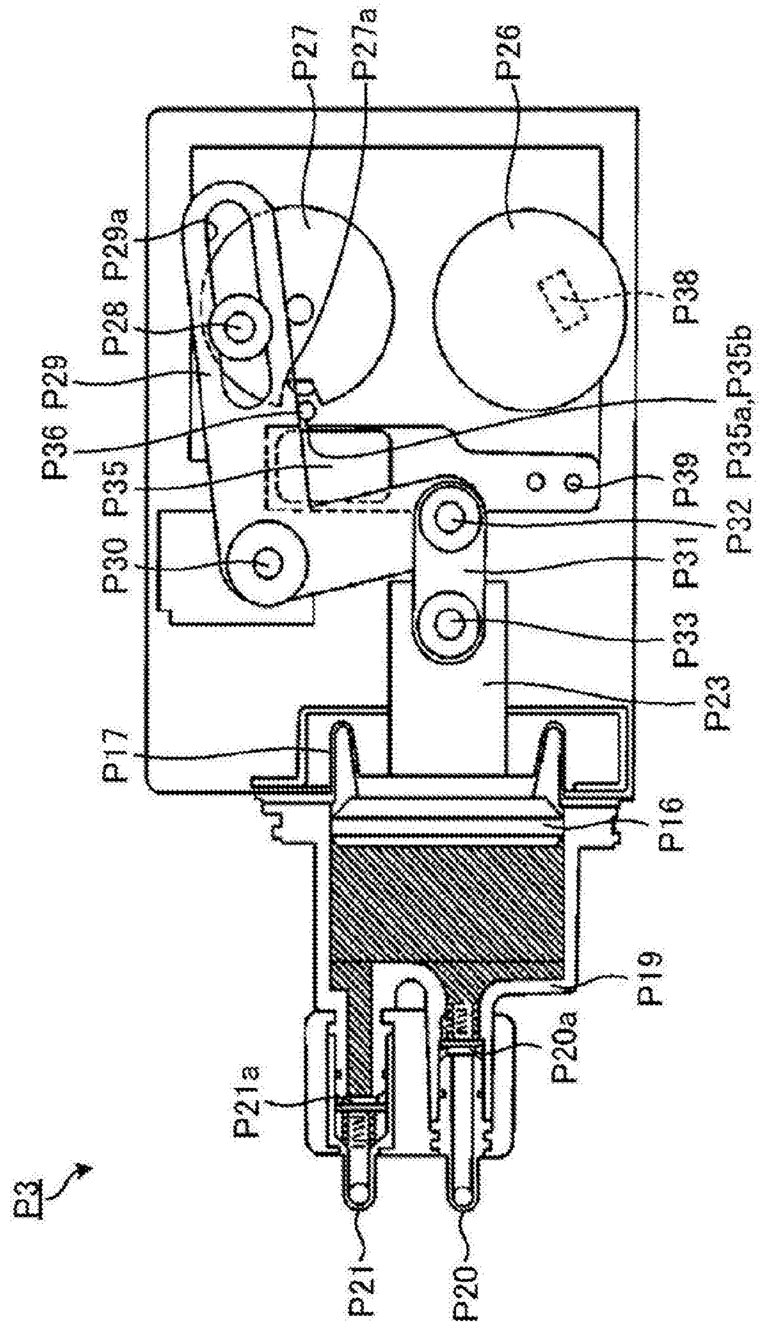

P27
P27a
P26
P29a
P28 P29a
P28
P38
P36 P29
P35a,P35b
P35
P39
P30
P32
P31
P33
P23
P17
P16
P19
P20a
P21a
P3
P21
P20

图185

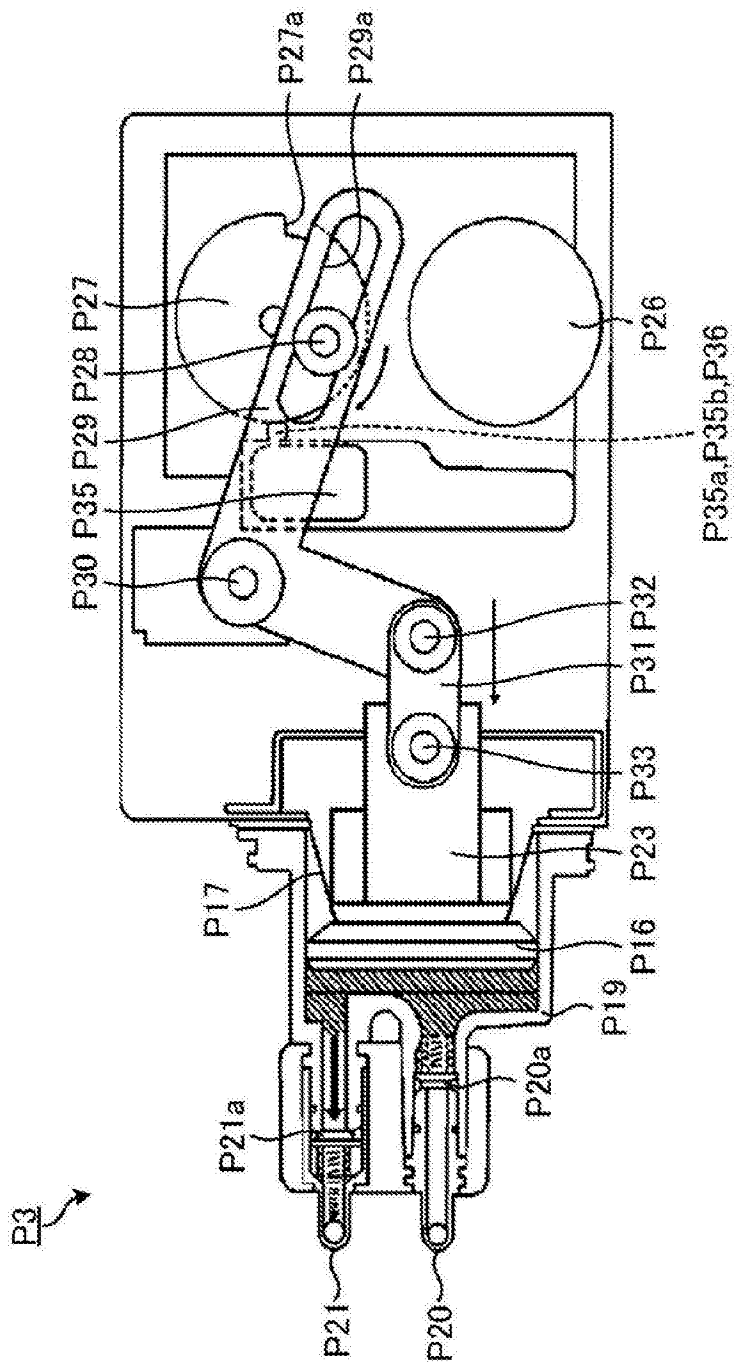


图186

Petitioner Exhibit 1002-2260

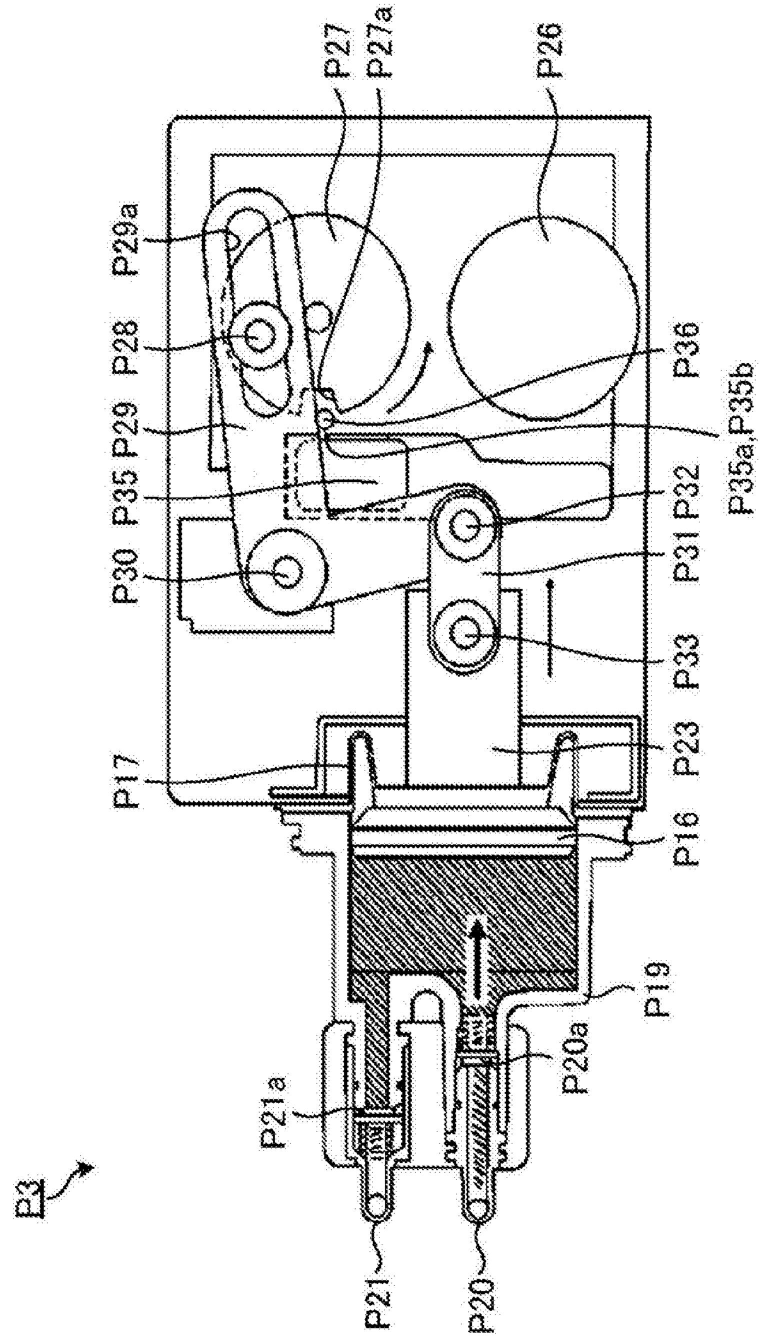


图187

Petitioner Exhibit 1002-2261

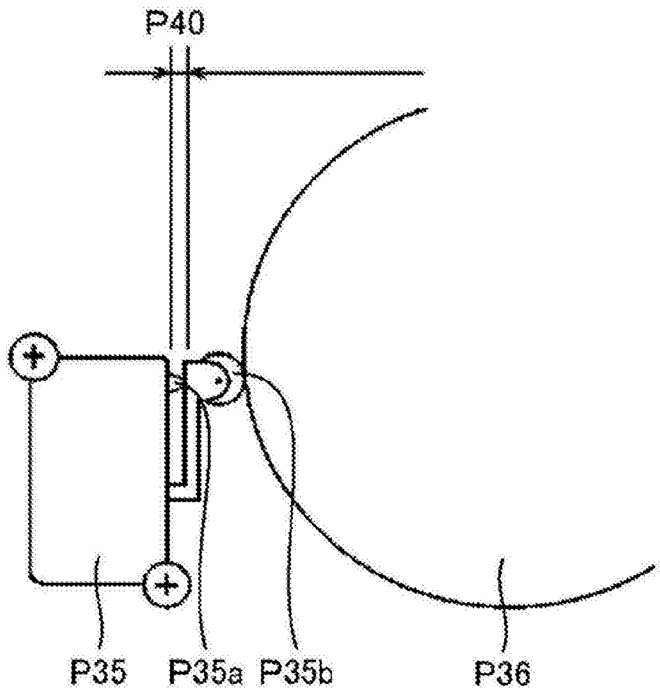


图188

Petitioner Exhibit 1002-2262

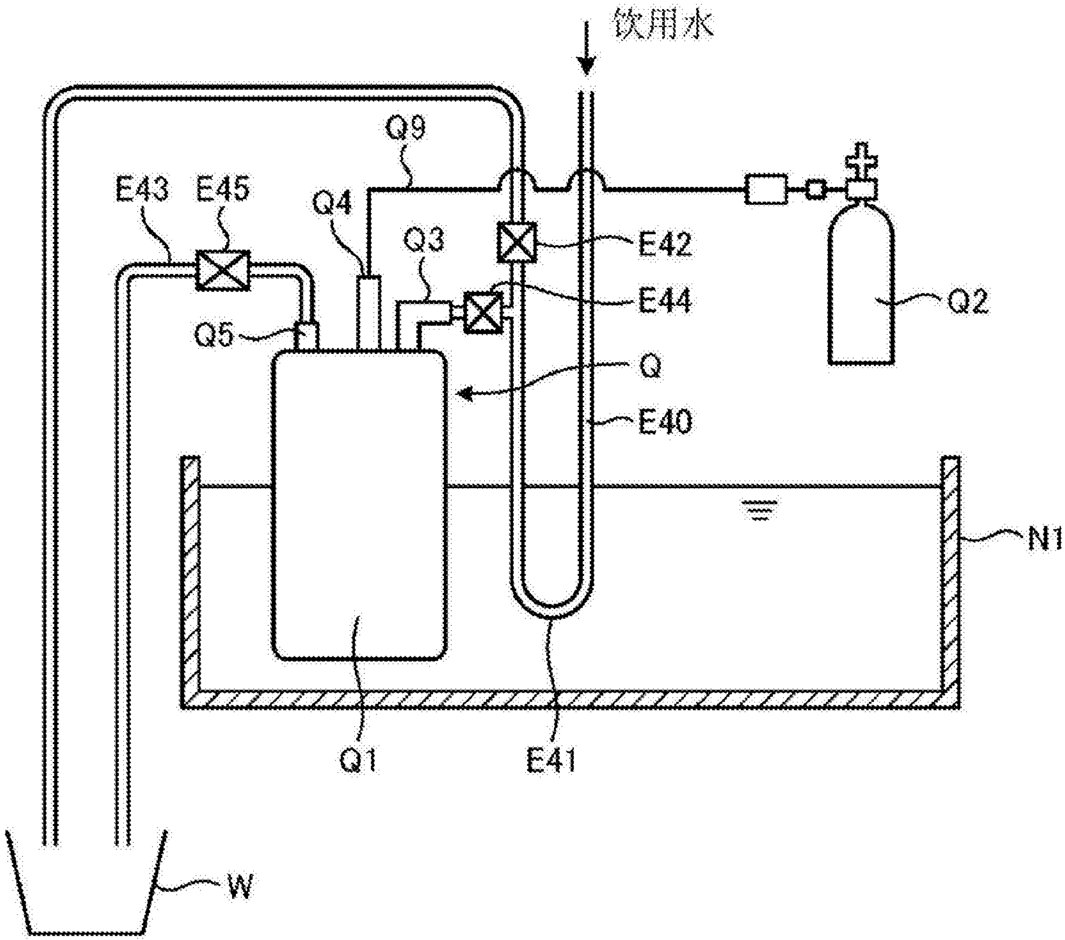


图189

Petitioner Exhibit 1002-2263

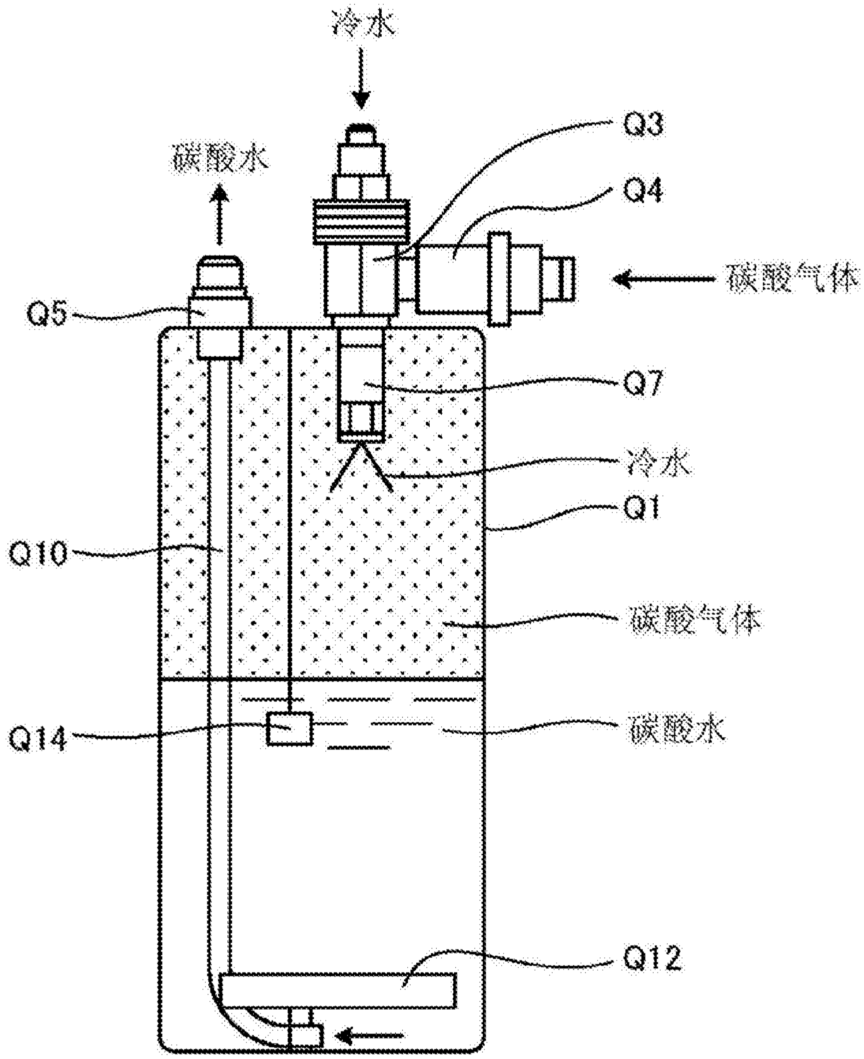


图190

Petitioner Exhibit 1002-2264

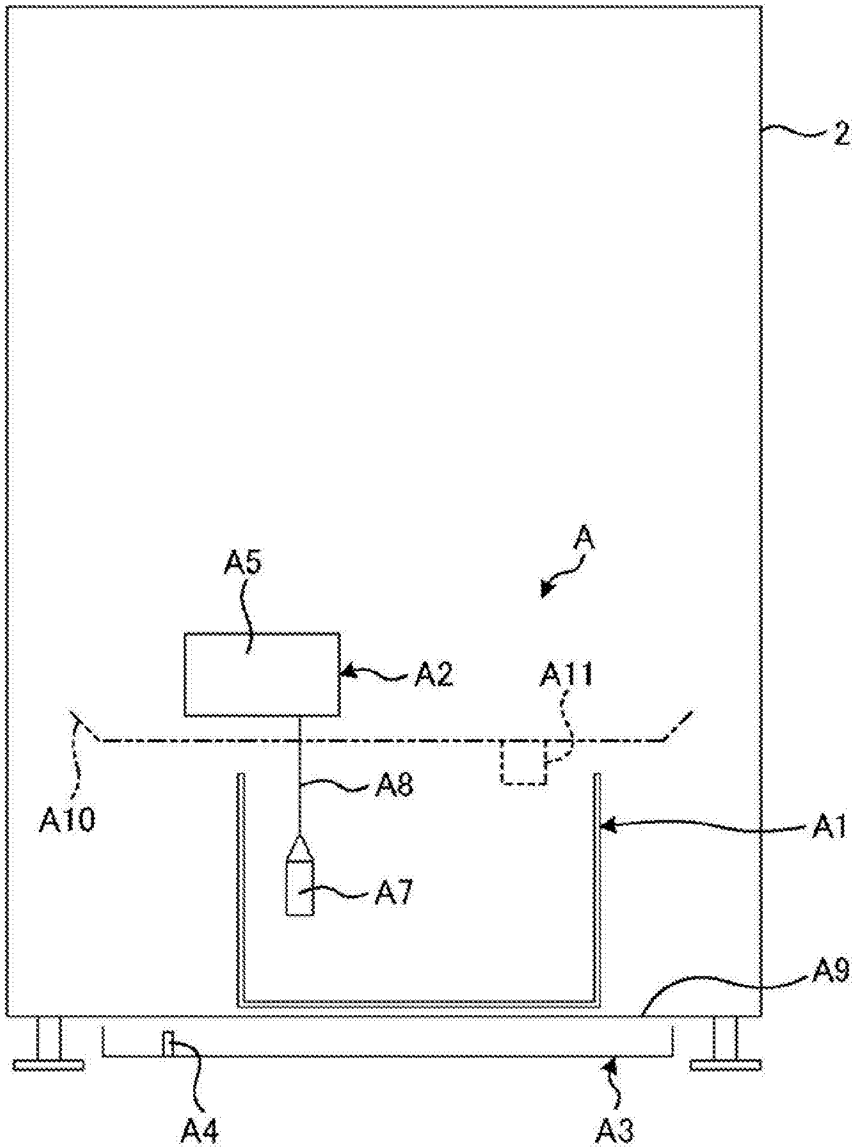


图191

Petitioner Exhibit 1002-2265

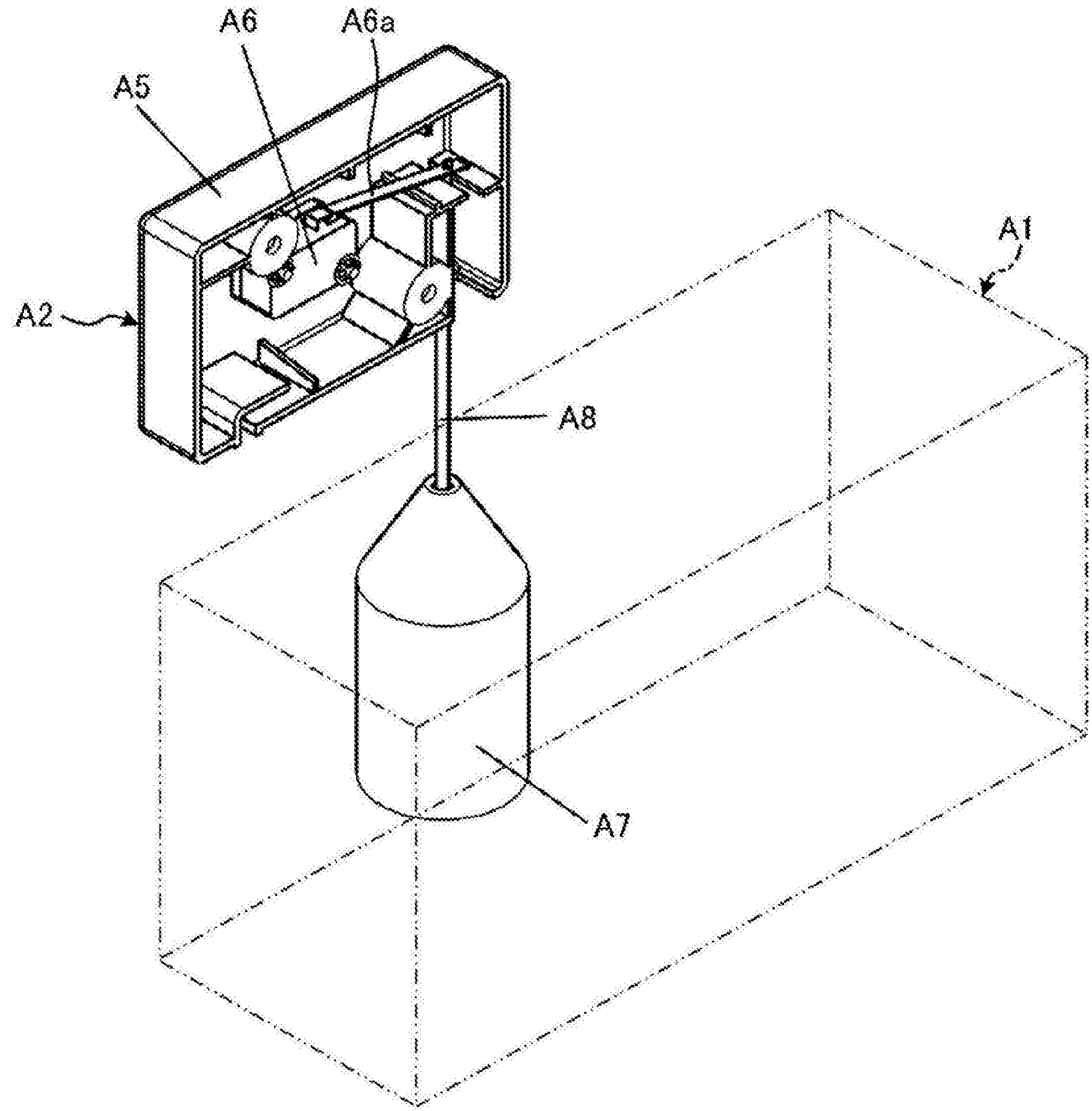


图192

Petitioner Exhibit 1002-2266

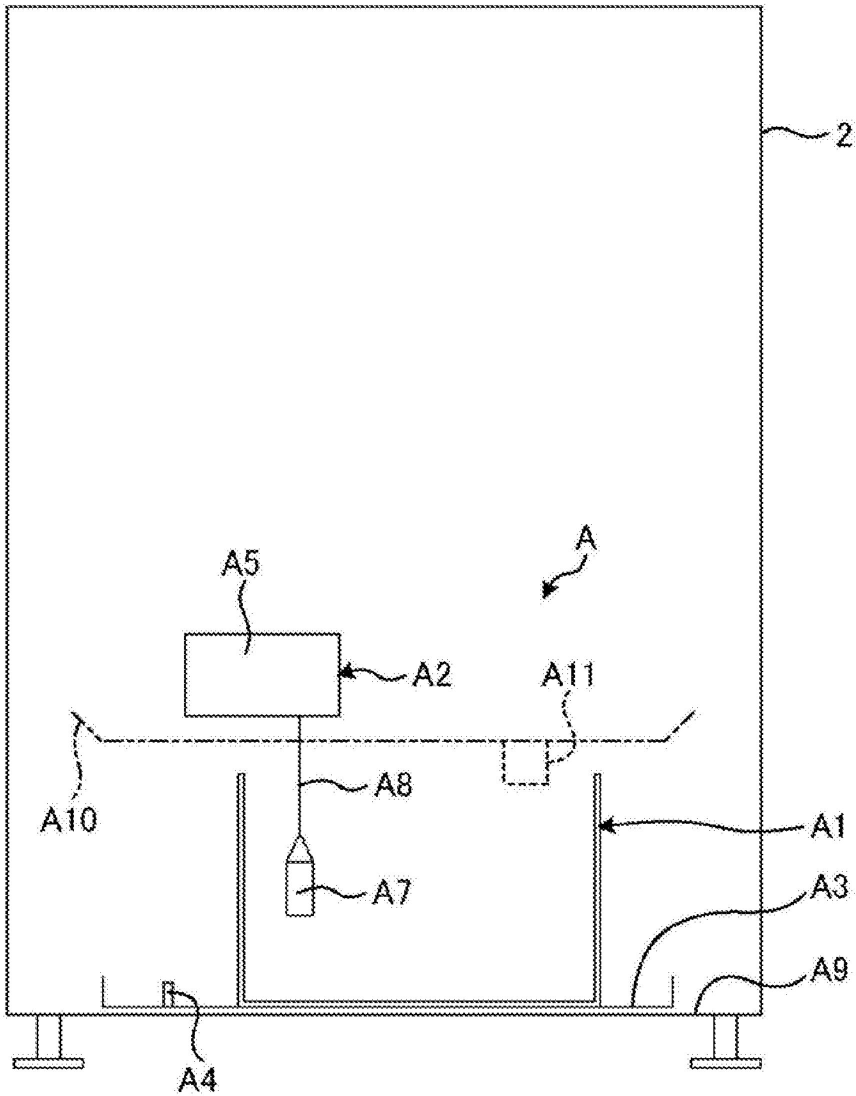


图193

Petitioner Exhibit 1002-2267

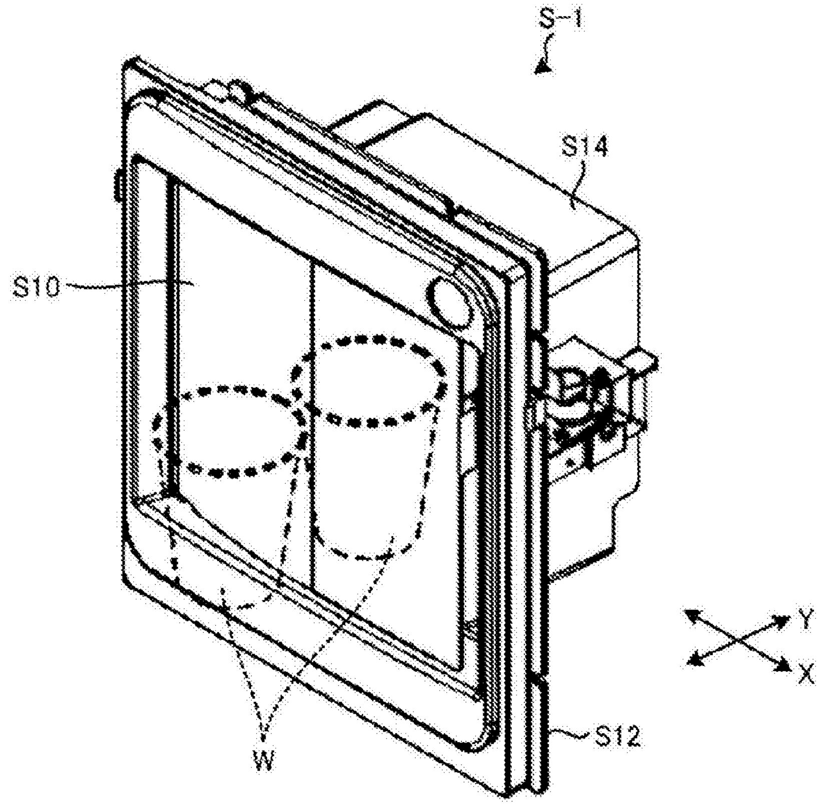


图194

Petitioner Exhibit 1002-2268

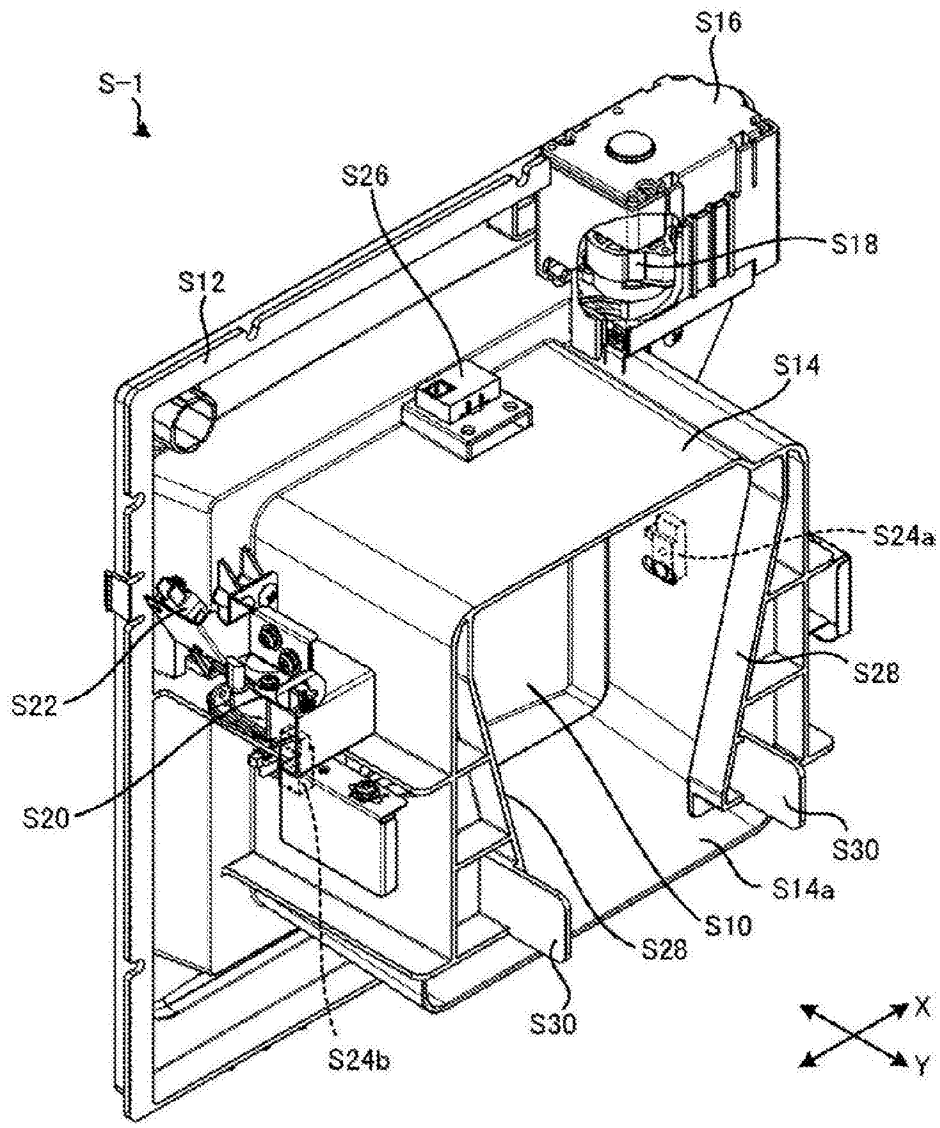


图195

Petitioner Exhibit 1002-2269

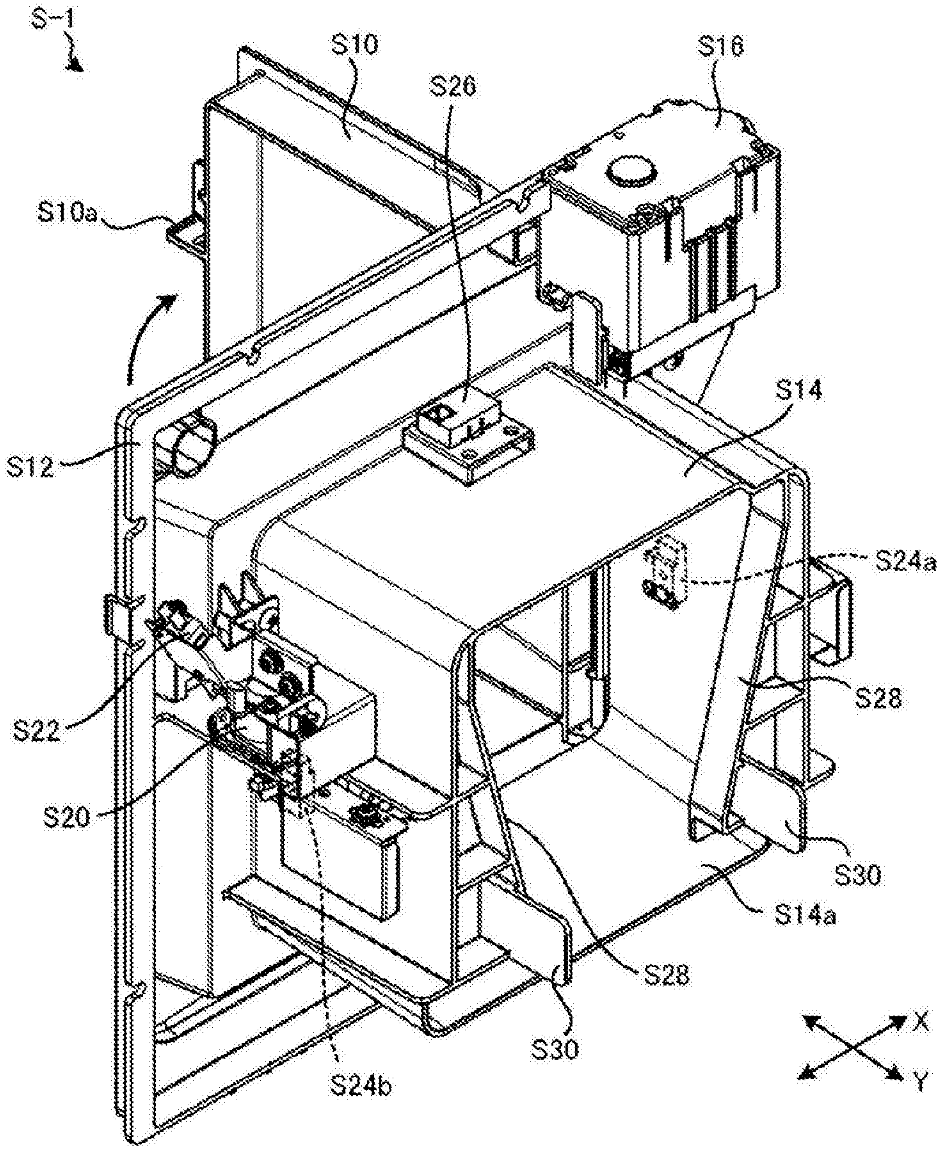


图196

Petitioner Exhibit 1002-2270

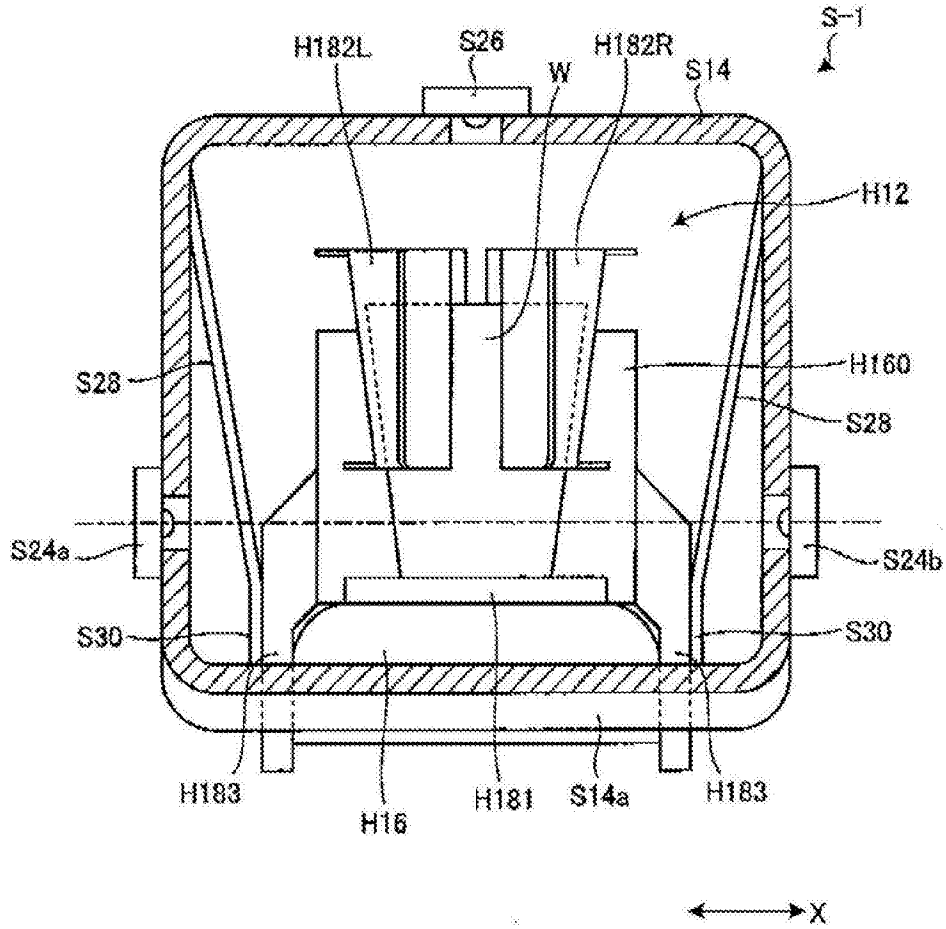


图197

Petitioner Exhibit 1002-2271

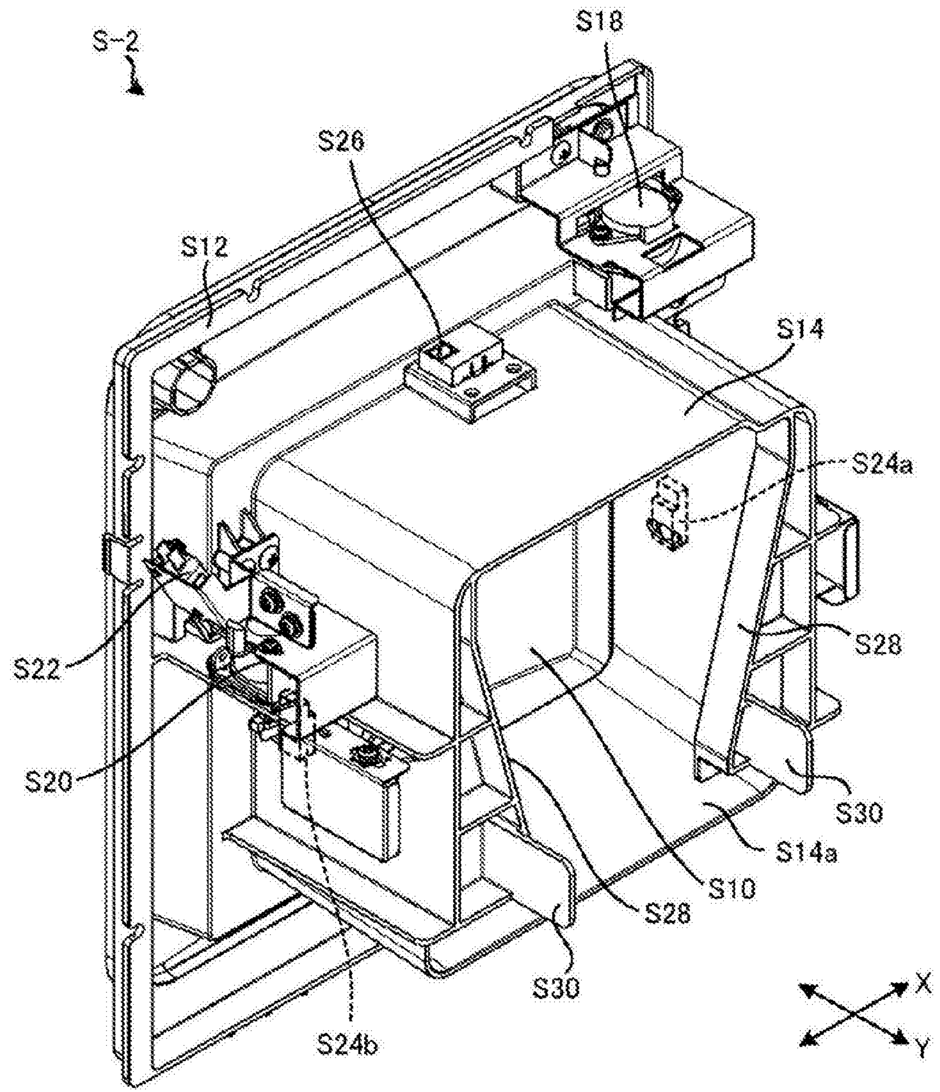


图198

Petitioner Exhibit 1002-2272

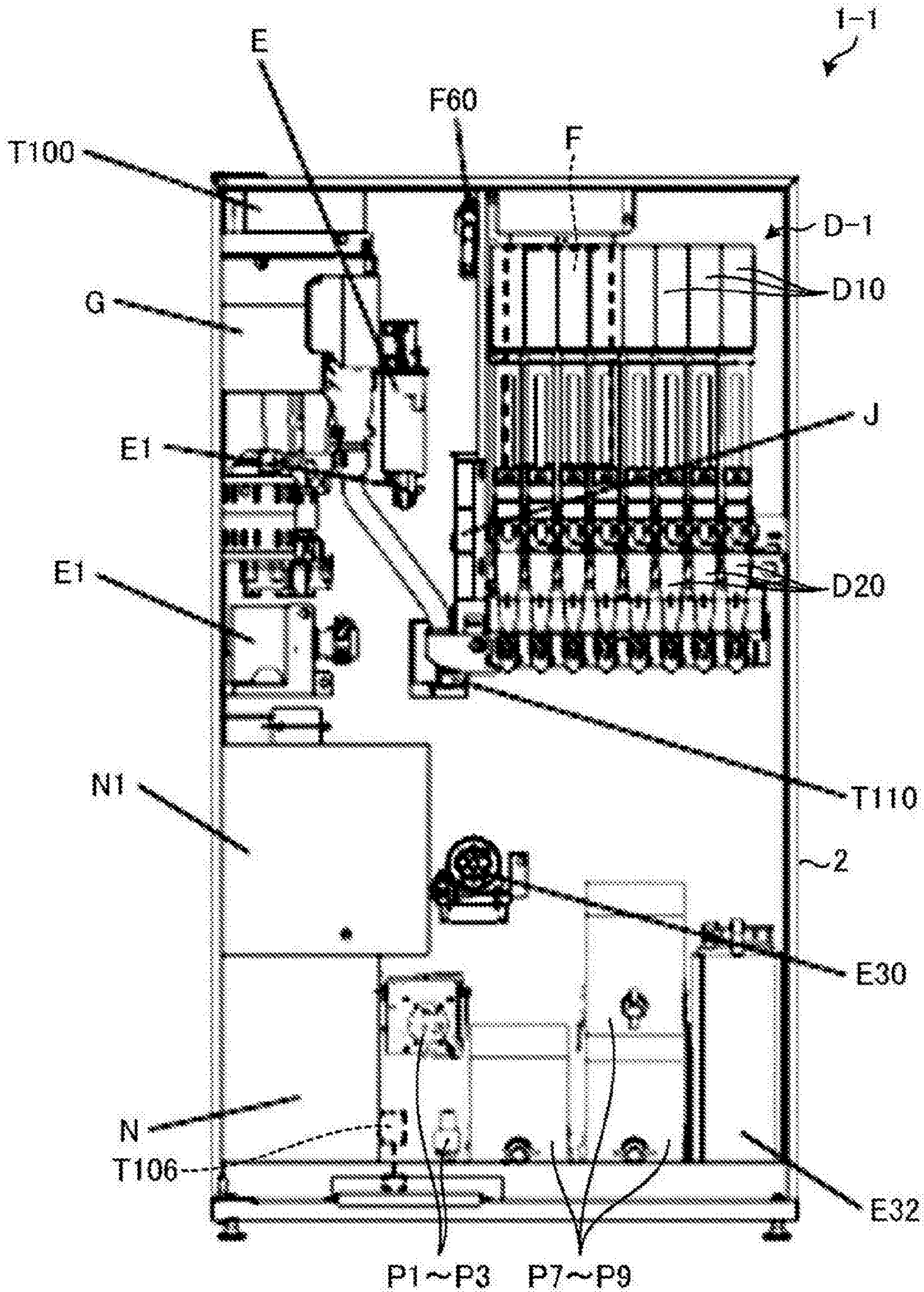


图199

Petitioner Exhibit 1002-2273

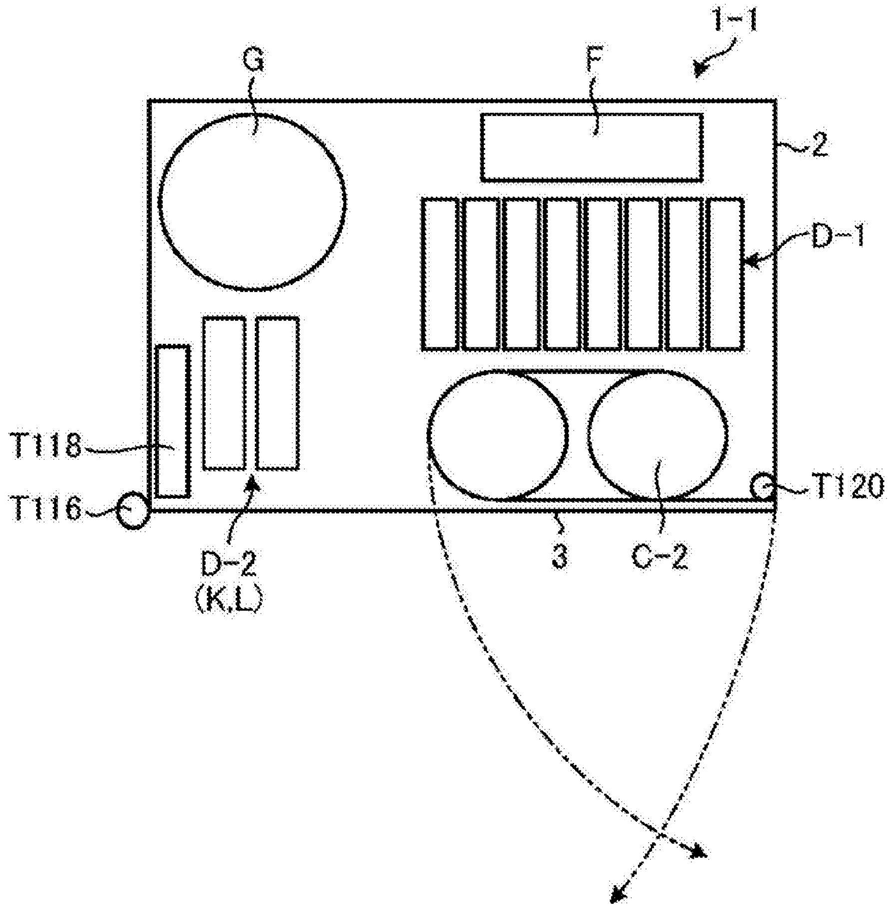


图200

Petitioner Exhibit 1002-2274

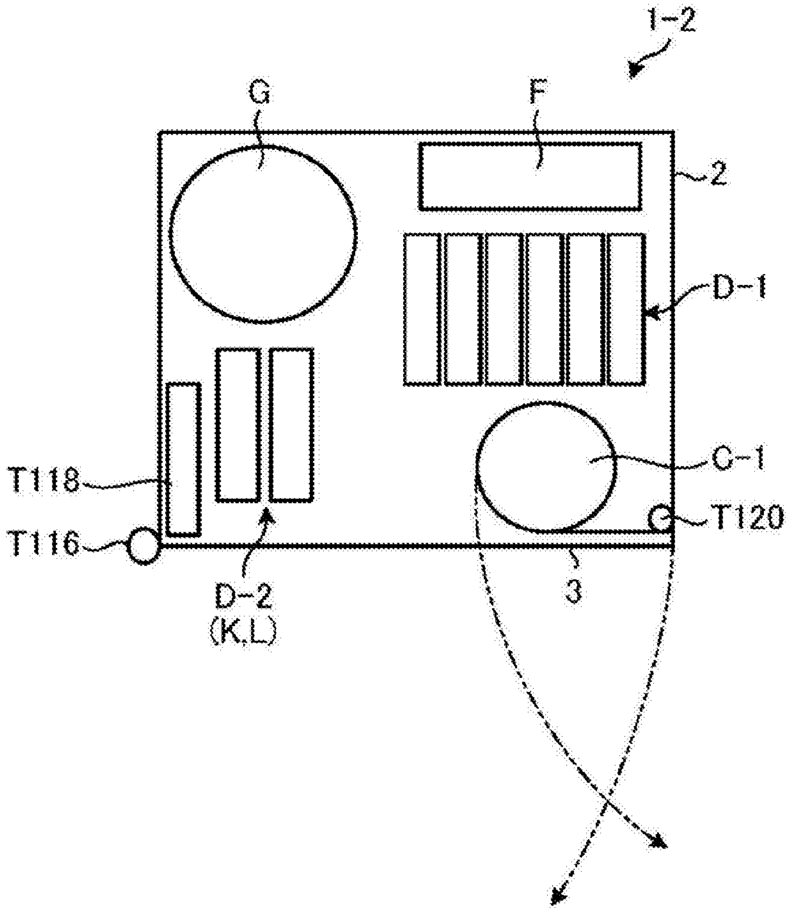


图201

Petitioner Exhibit 1002-2275

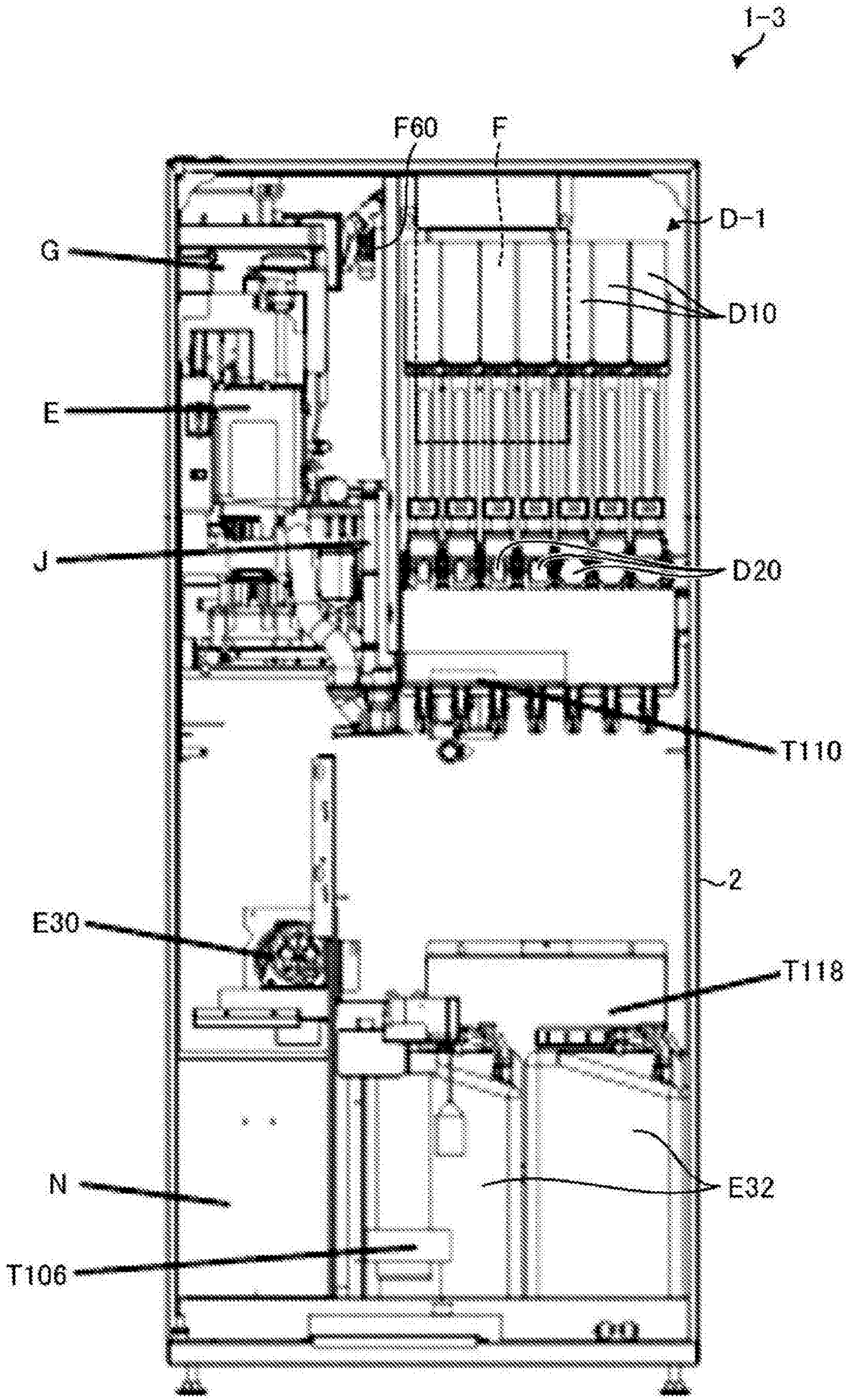


图202

Petitioner Exhibit 1002-2276

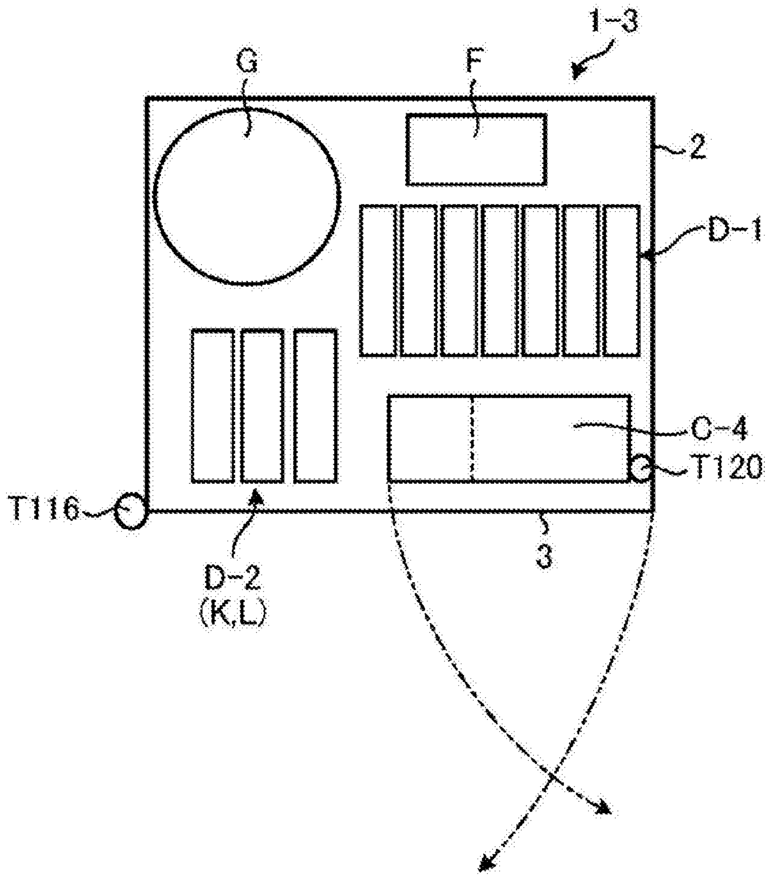
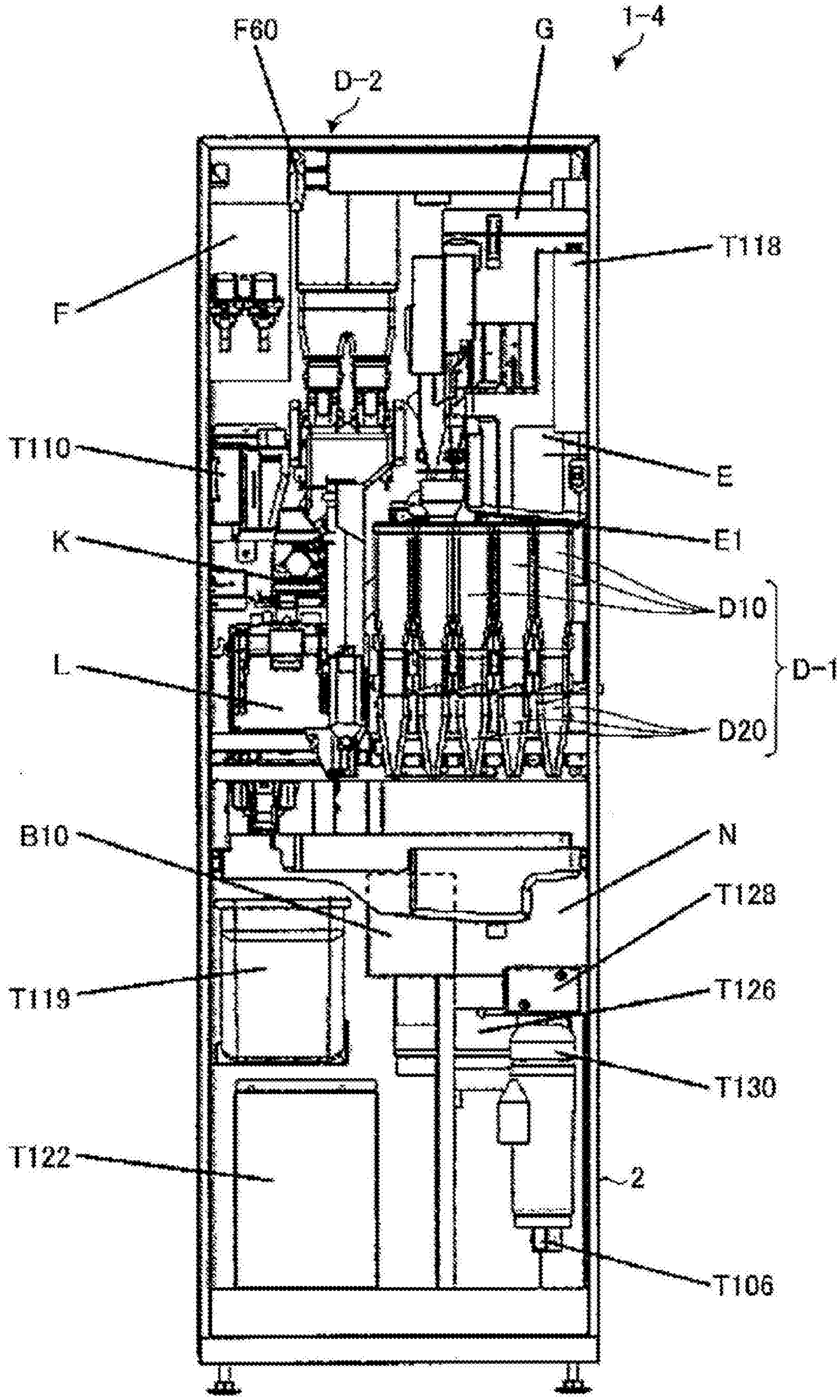


图203

Petitioner Exhibit 1002-2277


F60
G
1-4
D-2
T118
F
T110
E
K
E1
D10
D-1
L
D20
B10
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T128
T126
T119
T130
T122
2
T106

图204

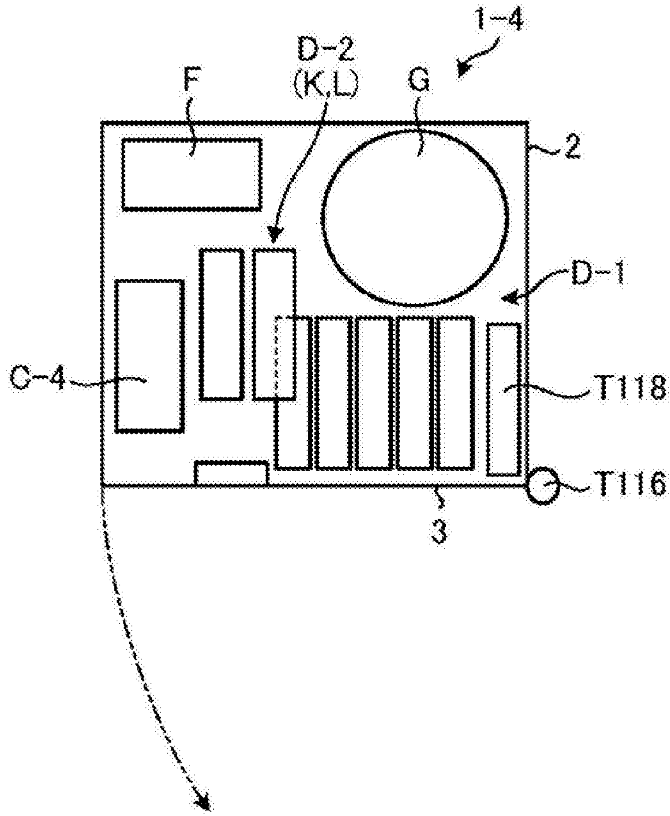

图205

Petitioner Exhibit 1002-2279

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

24341 7590 11/08/2023
Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

EXAMINER	
OUSSIR, EL MEHDI	
ART UNIT	PAPER NUMBER
3685	

DATE MAILED: 11/08/2023

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/893,514	02/09/2018	Paresh K. Patel	104402-5026-US	4668

TITLE OF INVENTION: REFUND CENTERS FOR PROCESSING AND DISPENSING VENDING MACHINE REFUNDS VIA AN MDB ROUTER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	02/08/2024

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 40% the amount of undiscounted fees, and micro entity fees are 20% the amount of undiscounted fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications. **Because electronic patent issuance may occur shortly after issue fee payment, any desired continuing application should preferably be filed prior to payment of this issue fee in order not to jeopardize copendency.**

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

24341 7590 11/08/2023

Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)

(Signature)

(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/893,514	02/09/2018	Paresh K. Patel	104402-5026-US	4668

TITLE OF INVENTION: REFUND CENTERS FOR PROCESSING AND DISPENSING VENDING MACHINE REFUNDS VIA AN MDB ROUTER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	02/08/2024

EXAMINER	ART UNIT	CLASS-SUBCLASS
OUSSIR, EL MEHDI	3685	705-050000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1____________________

2____________________

3____________________

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑Issue Fee ❑Publication Fee (if required)

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via Patent Center or EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. __________

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

❑ Applicant asserting small entity status. See 37 CFR 1.27

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

❑ Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature ____________________ Date ____________________

Typed or printed name ____________________ Registration No. ____________________

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/893,514	02/09/2018	Paresh K. Patel	104402-5026-US	4668

24341 7590 11/08/2023

Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

EXAMINER	
OUSSIR, EL MEHDI	

ART UNIT	PAPER NUMBER
3685	

DATE MAILED: 11/08/2023

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. 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 1.14. This collection is estimated to take 30 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, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. 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.

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.

Petitioner Exhibit 1002-2283

Notice of Allowability	**Application No.** 15/893,514	**Applicant(s)** Patel et al.	
	Examiner EL MEHDI OUSSIR	**Art Unit** 3685	**AIA (FITF) Status** Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1.☑ This communication is responsive to 10/02/2023.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on ______.

2.☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ______; the restriction requirement and election have been incorporated into this action.

3.☑ The allowed claim(s) is/are See Continuation Sheet . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4.☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a) ☐All b) ☐ Some* c) ☐ None of the:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ______ .
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: ______ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5.☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date ______ .

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6.☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1.☑ Notice of References Cited (PTO-892)
2.☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date ______.
3.☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material ______.
4.☐ Interview Summary (PTO-413), Paper No./Mail Date. ______.
5. ☐ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☐ Other ______.

/EL MEHDI OUSSIR/
Primary Examiner, Art Unit 3685

Continuation of 3. The allowed claim(s) is/are: 11,16,18-19 and 21-28

Detailed Action

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

This communication is in response to Applicant's response filed on October 2, 2023 requesting continued examination in response to Examiner's Notice of Allowance filed on July 12, 2023.

The information disclosure statement filed on October 02, 2023 has been considered.

Claims 11, 16, 18-19, and 21-28 are pending. All other claims are cancelled.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114.

Reasons for allowance

Claims 11, 16, 18-19, and 21-28 are allowed.

Applicant's submission an IDS on October 2, 2023 following the notice of allowance filed on July 12, 2023 has been considered. All references do not teach the claim limitations individually or as a whole.

All previous rejections and response to arguments are incorporated entirely herewith.

The claims overcome all objections and rejections.

The claims are novel over prior art because the claims are not obvious in light of the prior art. Although the claims capture different limitations that can be found in various references individually; the limitations as a whole would not be deemed obvious.

Some of the closest art related to the claims include U.S. Patent Application Publication 2015/0235202 to Zabala, U.S. Patent Application Publication 2015/0154579 to Teicher, U.S. Patent 9547859 to Patel et a., and U.S. Patent Application Publication 2016/0086145 to Tsutsui.

Zabala teaches a device in communication with a vending machine to perform cashless payments. A user can utilize a mobile device to establish a connection with the vending machine and purchase a product from the phone and have the vending machine dispense it.

Zabala teaches receiving a request for a cash payment; transmitting the request to an authorizing server distinct from the mobile device; receiving from the authorizing server an authorization message authorizing the cash payment; in response to receiving the authorization message, receiving a user selection of a payment accepting machine distinct from the mobile device; transmitting from the mobile device to the payment accepting machine an electronic command including one or more… payment accepting machine- dependent conditions, wherein a first of the one or more… payment accepting machine-dependent conditions comprises a… button or control at the payment accepting machine must be engaged; Abstract, at least Paragraphs 0004, 0042 and Figures 1, 8, 11, and 16.

Zabala does not explicitly disclose time dependent condition for the transaction; however, a transaction that is completed is understood that it is completed within a predetermined time otherwise the transaction is not processed. Zabala does not specifically disclose that the button must be activated within a predetermined time; however, because Zabala teaches a button is pressed in order to allow for the item to be dispensed, it is understood that said pressing is done within a predetermined time.

U.S. Patent 9,547,859 to Patel el al. is directed to a device with one or more processors, memory, and two or more communication capabilities obtains, from a payment module, an authorization request via a first communication capability (e.g., Bluetooth). The device sends, to a server, the authorization request via a second communication capability distinct from the first communication capability (e.g., cellular or WiFi technology). In response to sending the authorization request, the device obtains, from the server, authorization information via the second communication capability. After obtaining the authorization information, the device detects a trigger condition to perform a transaction with a payment accepting unit associated with the payment module. In response to detecting the trigger condition, the device sends, to the payment module, at least a portion of the authorization information via the first communication capability.

Patel does not teach transmitting from the mobile device to the payment accepting machine an electronic command including one or more time-dependent and payment accepting machine- dependent conditions, wherein a first of the one or more time-dependent and payment accepting machine-dependent conditions comprises a predefined time or time period by which a button or control at the payment accepting machine must be engaged; displaying the one or more time-dependent and payment accepting machine- dependent conditions on a display of the mobile device; at the payment accepting machine: receiving the electronic command and the one or more time-dependent and payment accepting machine-dependent conditions from the mobile device.

U.S. Patent Application Publication 2016/0086145 to Tsutsui teaches a voucher ticket system and method of use employing a bill validator installed into any suitable automated machine, including an Automated Teller Machine (ATM), a gaming machine, etc. The bill validator is integrated with a bill reader, a voucher ticket reader, a reader for acquisition of electronic voucher ticket information from a portable computing device, a printer, and other supporting peripheral devices. The voucher ticket system includes a secured communication link with a host account manager serving a plurality of electronic money accounts. The method includes steps of receiving a value of electronic money or identification information associated with the electronic voucher ticket with account information associated with the electronic money account and sending the received value of the electronic money or the identification information of the voucher ticket to an upper control section of the one of the gaming machine and the ATM for completion of a financial transaction.

Further searches including non-patent literature and foreign references have been carried out. However, the references found and those cited fail to disclose the claim limitations of claim 11 as a whole. The combination of references to teach the claimed limitations would not have been obvious to one of ordinary skill in the art before the effective filing date of the Application.

The references relied upon throughout prosecution, cited, and the newly cited references fail to disclose:

A method, comprising: at a mobile device:

receiving a request for a cash payment; transmitting the request to an authorizing server distinct from the mobile device;

receiving from the authorizing server an authorization message authorizing the cash payment;

in response to receiving the authorization message, receiving a user selection of a payment accepting machine distinct from the mobile device;

transmitting from the mobile device to the payment accepting machine an electronic command including one or more time-dependent and payment accepting machine- dependent conditions, wherein a first of the one or more time-dependent and payment accepting machine-dependent conditions comprises a predefined time or time period by which a button or control at the payment accepting machine must be engaged;

displaying the one or more time-dependent and payment accepting machine- dependent conditions on a display of the mobile device;

at the payment accepting machine: receiving the electronic command and the one or more time-dependent and payment accepting machine-dependent conditions from the mobile device;

determining that the one or more time-dependent and payment accepting machine-dependent conditions are met, including determining that the button or control at the payment accepting machine has been engaged within the predefined time or time period; and in response to the determination that the one or more time-dependent and payment accepting machine-dependent conditions are met, issuing the cash payment.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to EL MEHDI OUSSIR whose telephone number is (571)270-0191. The examiner can normally be reached on M-F 9AM - 5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Neha W. Patel can be reached on 571-270-1492. The fax phone number for the organization where this application or proceeding is assigned is 571-270-1191.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Sincerely,

/EL MEHDI OUSSIR/
Primary Examiner, Art Unit 3685
11/03/2023

Notice of References Cited	Application/Control No. 15/893,514	Applicant(s)/Patent Under Reexamination Patel et al.	
	Examiner EL MEHDI OUSSIR	Art Unit 3685	Page 1 of 1

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	R	CN-109389755-A	02-2019	CN	AZEYANAGI Y	
	S					
	T					

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	U	Kevin Werbach. Contracts Ex Machina. https://repository.law.umich.edu/cgi/viewcontent.cgi?article=2936&context=articles (Year: 2017)
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Espacenet

Bibliographic data: JPH1125320 (A) — 1999-01-29

AUTOMATIC TELLER MACHINE

Inventor(s): SHIODA TAKUJI; FUKAI MIDORI; ASAWA TAKEO; IWASAKI AKIHIRO; SUGIYAMA MUTSUKO ± (SHIODA TAKUJI, ; FUKAI MIDORI, ; ASAWA TAKEO, ; IWASAKI AKIHIRO, ; SUGIYAMA MUTSUKO)

Applicant(s): FUJITSU LTD ± (FUJITSU LTD)

Classification:
- **international:** *G06F3/048; G06F3/14; G06Q20/18; G06Q40/00; G06Q40/02; G07D9/00; G07F19/00;* (IPC1-7): G06F19/00; G06F3/14; G07D9/00
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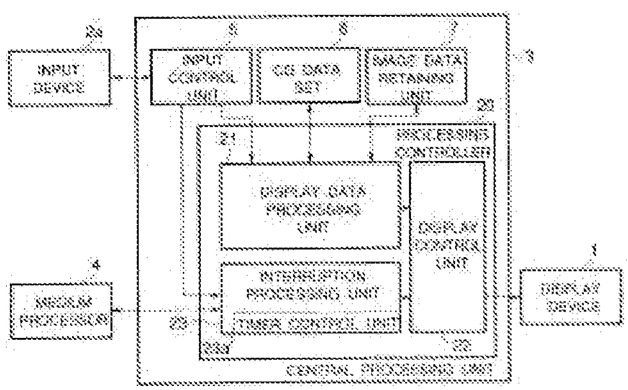
Priority number(s): JP19970182881 19970708

Also published as: JP3856910 (B2) US6073120 (A)

Abstract of JPH1125320 (A)



PROBLEM TO BE SOLVED: To improve operability independently of the skillness of user's operation by displaying a procedure formed by arranging plural input item columns in input order, and at the time of inputting plural information in the input order, displaying operation pictures corresponding to respective information in a state superposed to the display of the procedure. SOLUTION: A processing controller 20 controls the information display of a display device 1 and executes transaction processing based on information inputted from an input device 2a consisting of a transparent touch panel superposed on the display surface of the device 1. The controller 20 displays a procedure display formed by arranging plural input item columns respectively indicating plural information items inputted from the input device 2a in the input order

device 1. In the case of inputting plural information from the device 2a in the input order, operation pictures corresponding to respective information data are respectively displayed in a state superposed to the surface of the procedure display.

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DESCRIPTION JPH1125320A

[0001]

13 BACKGROUND OF THE INVENTION 1. Field of the Invention The present invention relates to an automatic teller's machine (ATM), an automatic teller's machine (CD: cash dispenser), an automatic teller machine, a transfer-only device, or a securities issuing device. It relates to an automatic transaction device called.

[0002]

20 2. Description of the Related Art In recent years, financial institutions such as banks have put into practical use automatic teller machines that enable transactions without the intervention of bank employees.

23 In such an automated teller machine, a desired transaction is performed by a customer interactively performing operations such as inputting information while looking at the screen display of the machine.

[0003]

29 That is, the display device of the automated teller machine displays a start screen displaying all items that can be traded as an initial screen.

31 Then, when the customer selects a desired transaction item on the start screen, processing by the automated teller machine is started. The display has a touch panel, and the customer presses buttons displayed on the display device to operate the automated teller machine and input data.

[0004]

38 When an arbitrary transaction is selected on the start screen (an arbitrary transaction type button displayed on the display device is pressed), the automated teller machine executes processing corresponding to the transaction.

41 That is, the automated teller machine sequentially displays a plurality of transaction screens showing the operation details of the automated teller machine on the display device in accordance with a predetermined operation procedure so that the transaction can be conducted with the customer. On the other hand, when the customer presses a button set in each transaction screen according to the display contents of the transaction screen, the operation procedure is advanced and the next transaction screen is displayed on the display device. When all operating procedures are completed, transaction processing by the automatic transaction device is completed, and the transaction is treated as having been executed between the customer and the financial institution.

[0005]

53 Transactions with financial institutions are indispensable in daily life, and according to certain data, about 80% of customers who visit financial institutions such as banks use automated teller machines to conduct transactions.

56 It can be said that the automated teller machines used by the majority of people are highly public devices.

[0006]

61 However, conventional automated teller machines have the following problems.

62 That is, the users of automatic teller machines span a wide range of age groups, from the young to the elderly. In addition, the knowledge of how to operate automatic teller machines, knowledge of transactions with financial institutions, etc., varies widely from one user to another. In other words, the degree of proficiency in operating an automated teller machine varies greatly depending on the user. In order to cope with this, it is desired that automatic transaction machines are configured to provide an equal operating environment to all users regardless of their proficiency level.

[0007]

72 However, in the conventional automatic transaction machine, the operation of the automatic transaction machine is performed according to the instructions displayed on each transaction screen, but each transaction screen only shows the operation contents at that time.

75 Each transaction screen was completely switched to the next transaction screen each time the operation procedure progressed (see FIGS. 32 and 33). Therefore, the user can grasp the operation that has already been performed, the content of the data that has already been input, the content of the operation to be performed from now on, or the overall flow of the operation procedure from the display content of the transaction screen that is currently

displayed on the display. I couldn't. As a result, the user cannot grasp the current operation and the progress of the operation procedure, and there are cases where the user erroneously inputs data or erroneously operates the device.

[0008]

86 In addition, in the conventional automatic transaction machine, only one operation procedure is set for each of a plurality of transactions that can be executed using the automatic transaction machine, and a plurality of transaction screens according to this operation procedure are sequentially displayed on the display. It was only displayed (see FIGS. 31, 32, and 33).

91 For this reason, the users of the automated teller machine have had to operate the automated teller machine according to the same operating procedures regardless of their level of proficiency. Here, the operation procedure of the automated teller machine has been set according to users having an average degree of proficiency in operation, in order to accommodate as wide a range of users as possible.

[0009]

99 Therefore, the operation procedure is simple for users with low proficiency, and redundant for users with high proficiency.

101 Therefore, a user with a low proficiency may not grasp or predict the sequence of operation procedures or the operation method of the automatic teller machine, and may perform an erroneous operation. On the other hand, users with a high level of proficiency find it troublesome to operate automatic teller machines according to redundant operating procedures. Incorrect data entry or incorrect operation may occur.

[0010]

109 SUMMARY OF THE INVENTION An object of the present invention is to provide an automated teller machine capable of improving operability regardless of the user's proficiency in operation.

[0011]

115 SUMMARY OF THE INVENTION The present invention employs the following configurations to solve the above-described problems.

117 That is, the invention of claim 1 comprises a display device for displaying information, an input device for inputting information relating to transactions, and a display device for controlling the display of information on the display device and controlling the information displayed on the display device according to the information displayed on the display device. and a control unit that performs transaction processing based on information input from an

input device.

123 In this automatic teller machine, the control unit displays, on the display device, a procedure display formed by arranging a plurality of input item fields each showing a plurality of information items to be input from the input device in order of input. Further, when each of the plurality of information is input from the input device according to the input order, an operation screen corresponding to each information is displayed in a state superimposed on the procedure display.

[0012]

132 According to the first aspect of the invention, the control unit causes the display device to display the procedure display.

134 Then, when each of a plurality of pieces of information is input, the control unit causes the operation screen corresponding to each piece of information to be displayed in a state of being superimposed on the procedure display. Therefore, the user of the automated teller machine can understand information such as multiple input items, the number of input items, the order of input, etc. from the procedure display, and operate using the operation screen displayed superimposed on the procedure screen. becomes possible.

[0013]

143 The invention of claim 2 specifies that the procedure display of claim 1 is always displayed on the display device.

145 The invention according to claim 3 comprises a display device for displaying information, an input device for inputting information related to transactions, and the input device for controlling information display of the display device and according to the information displayed on the display device. and a control unit that performs transaction processing based on information input from. In this automated teller machine, a specific area is set on the screen of the display device, and the control section displays a plurality of information items input from the input device on the display device. Displaying a procedure display formed by arranging a plurality of input item fields in order of input, and moving the procedure display in a direction substantially perpendicular to the longitudinal direction of each of the input item fields according to the progress of the operation procedure of the transaction. to display an input item column corresponding to an operation currently being performed among the plurality of input item columns in the specific area.

[0014]

160 According to the invention of claim 4, the operation screen is arranged below the specific area of claim 2, an explanation display showing explanation of the operation screen is arranged above the specific area, and the explanation display is above the explanation display. It is specified by arranging a transaction type display field in which the transaction

type is indicated in the .

[0015]

168 In the invention of claim 5, each of the input item fields of claim 2 is formed with an input information display area in which information corresponding to the input item is displayed, and the control unit receives input from the input device. In response to a request from a user, the content displayed on the display device is returned to the state at the time when the information held in the holding means was input, and the corresponding information is read out from the holding means. is specified by displaying it in the input information display area.

[0016]

178 According to the invention of claim 6, the control unit of claim 5 excludes at least the operation screen in the range overlapping with the procedure display from the display contents of the display in response to a request from the user, and the information held in the holding means is specified by displaying in the input information display area of the corresponding input item column.

[0017]

186 The invention of claim 7 is specified by the control unit of claim 1 changing the change speed of the display content of the display device according to a request from the user.

188 According to an eighth aspect of the invention, the control unit according to claim 1 has information presenting means for displaying operation information related to the input of information on the display device when information is input from the input device, and the information is displayed on the display device. This is specified by changing the number of times the operation information is displayed on the display device by the presentation means according to a request from the user.

[0018]

197 According to the ninth aspect of the invention, when the control unit according to the second aspect displays the procedure display on the display device, the number of input item columns constituting the procedure display and the procedure display are fixed or not. When the number of input item fields is less than the fixed threshold, the procedure display is fixed and displayed on the display device, thereby specifying the is.

[0019]

205 According to the invention of claim 10, the control unit of claim 3 enlarges and displays the

input information display area of the input item column displayed in the specific area and the information displayed in this input information display area. It is specified.

[0020]

211 The invention of claim 11 is specified by displaying a part of the operation screen of claim 1 translucently.

213 The invention of claim 12 is specified by providing the transaction type display column of claim 4 with a cancel button for forcibly terminating the processing related to the transaction.

[0021]

219 According to the invention of claim 13, the input information display area in each of the plurality of input item fields of claim 5 is provided with a button for correcting the information displayed in the input information display area. It is specified.

[0022]

225 In the invention of claim 14, when all the information in the transaction is input, the control unit of claim 5 displays the procedure display on the display as a confirmation screen for each input information, and displays all the information. Each piece of information is specified by displaying it in the corresponding input information display area.

[0023]

232 According to the invention of claim 15, the plurality of input item fields of claim 3 are classified into a plurality of operation sets according to the attributes of the information input from the input device, and each set is displayed in a different color. It is specified by the presence of

[0024]

239 The invention of claim 16 specifies that the plurality of input item fields constituting the operation set of claim 15 are color-coded in a state of drawing a gradation according to the order of information input.

[0025]

245 The invention of claim 17 is specified by changing the basic color of the background of the screen forming the display content of the display device of claim 15 according to the color of the input item column displayed in the specific area. is.

[0026]

251 According to the invention of claim 18, the control unit of claim 1 detects the input time that is the time required for the user to input specific information, and determines the detected input time and the user's operation proficiency. If the input time is less than the proficiency threshold, the change speed of the display content of the display device is increased to specify the input time.

[0027]

259 According to a nineteenth aspect of the invention, the control unit according to the eighteenth aspect of the invention has information presenting means for causing the display device to display operation information related to the input of information when information is input from the input device, When the time is less than the proficiency level threshold, it is specified by reducing the number of times the operation information is displayed on the display device by the information presenting means.

[0028]

268 The invention according to claim 20 comprises a display device for displaying information, an input device for inputting information related to transactions, and a display device for controlling information display on the display device and controlling the information displayed on the display device according to the information displayed on the display device. and a control unit that performs transaction processing based on information input from.

273 In this automated teller machine, the control unit selects either one of a procedure consisting of a plurality of operations and a plurality of procedures corresponding to the plurality of operations included in the one procedure in accordance with a user's request. characterized by providing

[0029]

280 According to the invention of claim 21, when the control unit of claim 1 or 20 does not input information from the input device for a predetermined time, the display device displays a caution display for prompting the input of information, It is specified.

[0030]

286 The invention of claim 22 is specified by causing the control unit of claim 1 or 20 to display information input operation guidance on the display device when there is no information input from the input device for a predetermined time. be.

[0031]

292 23. The invention according to claim 1 or 20, wherein the screen displayed on the display when information is input from the input device is generated by synthesizing a plurality of image data by the control unit. , the image corresponding to each image data is specified by being displayed in a predetermined area set on the screen of the display device.

[0032]

299 In the twenty-fourth aspect of the present invention, the control unit of the fourth aspect possesses a plurality of types of image data for the explanation display and image data for the operation screen, and generates image data for the procedure display according to the type of transaction. Identify any of a plurality of input item fields that form a procedure display according to the order of inputting information, obtain image data of the explanation display and image data of the operation screen corresponding to the items in the identified input item field, and obtain the obtained procedure. This is specified by generating image data to be displayed on the display device using display image data, operation screen image data, and created procedure display image data.

[0033]

311 The invention of claim 25 is characterized in that the automated teller machine of claim 1 or 20 further comprises voice output means for outputting a voice when the control unit becomes capable of receiving information from the input device. It is what I did.

[0034]

317 According to the invention of claim 26, the automated teller machine of claim 3 comprises voice output means for outputting a voice when said control unit moves said procedure display in a direction substantially perpendicular to the longitudinal direction of each of said input item fields. It is specified by further comprising

[0035]

324 A twenty-seventh aspect of the invention is characterized in that the input device according to the first aspect or the twenty-first aspect is a touch panel, and position detecting means for detecting position information of an object in contact with the touch panel; determining means for determining whether or not the object changes its position while in contact with the touch panel; and outputting a warning sound when the determining means determines that the object changes its position while in contact with the touch panel. It is specified by having an audio output means.

[0036]

334 BEST MODE FOR CARRYING OUT THE INVENTION Embodiments of the present invention will now be described with reference to the drawings.

336 [Embodiment 1] First, Embodiment 1 according to the present invention will be described.

337 [Construction of Automatic Transaction Machine] FIG. 1 is a block diagram showing the main construction of an automatic teller machine (hereinafter referred to as "ATM", corresponding to an automatic transaction machine) according to the first embodiment.

340 In FIG. 1, the ATM comprises a display device 1, an input device 2a, a central processing section 3 and a media processing device 4. FIG.

[0037]

345 The display device 1 uses, for example, a CRT display or a liquid crystal display panel to display ATM operation information and the like.

347 The input device 2 a is a transparent plate-shaped switch (touch panel) superimposed on the display surface of the display device 1 .

349 The input device 2a detects the position where the user touches the touch panel, and inputs information corresponding to this position to the central processing unit 3. FIG.

351 The media processing device 4 handles media including magnetic cards, passbooks, slips, cash, and the like.

[0038]

356 The central processing unit 3 includes an input control unit 5 , a CG (Character Generator) unit 6 , an image data holding unit 7 and a processing control device 20 .

358 The input control unit 5 controls the input device 2a.

359 The CG section 6 has a character generator consisting of data sets for storing character patterns (character codes, font data) required for display, for example, and generates character data constituting display information such as messages displayed on the display device 1. Generate.

363 Image data holding unit 7 stores in advance a plurality of image data for forming a display screen to be displayed on display device 1 .

365 Each of the plurality of image data is read out from the image data holding unit 7 and used for display as required.

367 Further, each image data is synthesized with a character pattern generated by the CG section 6 as necessary and used for display.

[0039]

372 The image data stored in the image data holding unit 7 may be drawing data of an ATM, for example, and is image data obtained by taking an image of an actual ATM with an imaging

device such as a video camera and extracting only a necessary portion. It can be.

[0040]

378 The processing control device 20 has a display data processing section 21 , a display control section 22 and an interrupt control section 23 .

380 The processing control device 20 controls information display by the display device 1 and performs transaction processing based on information input from the input device 2 a via the input control section 5 .

383 The processing control device 20 is a device that performs main processing control by functioning, for example, software-led control of the central processing unit 3, and is configured by, for example, a microprocessor unit.

[0041]

389 The display data processing unit 21 controls the display based on information such as input information, display character data, image data, and interrupts obtained from the input control unit 5, the CG unit 6, the image data holding unit 7, and the interrupt processing unit 23. Display data to be displayed on the device 1 is generated and supplied to the display control unit 22 .

[0042]

397 The display control unit 22 controls the display device 1 based on the display data received from the display data processing unit 21 to perform screen display according to this display data.

400 The interrupt processing unit 23 has a timer control unit 23 a for timer interrupt, and performs interrupt control for the display data processing unit 21 according to information from the input control unit 5 and the media processing device 4 .

[0043]

406 FIG. 2 is a perspective view showing the external configuration of an ATM in which the configuration shown in FIG. 3 is incorporated.

408 FIG. 2 shows an ATM housing, a display input unit 31 consisting of the display device 1 and the input device 2a shown in FIG. A card insertion/extraction opening 33 for withdrawal, a coin insertion/extraction opening 34 for inserting/extracting coins, and a bill insertion/extraction opening 35 for inserting/extracting bills are shown.

[0044]

415 FIG. 3 is a block diagram showing a specific internal configuration of ATM.

416 In FIG. 3, the ATM has a certificate output/card reading/writing unit DOC, a banknote recycling unit BRU, a coin recycling unit CRU, a customer operation unit UOP, a management operation unit MOP, a control unit CPU, and a power supply unit PSU. ing.

[0045]

422 The control unit CPU corresponds to the central processing unit 3 described above (see FIG. 1).
424 The control unit CPU is connected to a host computer in the center via a transmission line such as a communication line.
426 Alternatively, the control unit CPU is connected to a terminal controller (a plurality of terminal devices such as ATMs are connected to the terminal controller) from a transmission line such as a communication line, and is coupled to the host computer of the center via this terminal controller. ing.
430 The ATM communicates with the center to proceed with the transaction while updating the center's ledger, ie, the file in which the individual's balance, transaction history, etc. are stored.

[0046]

436 In addition, the control unit CPU includes a remote monitoring unit RSU for remotely monitoring the status of ATMs installed in branch offices and unmanned stores (stores where only ATM devices are installed). are coupled via transmission lines.
439 The remote monitoring unit RSU monitors a plurality of ATMs and performs failure prevention, failure detection, failure countermeasures, maintenance, or the like.

[0047]

444 The certificate output/card read/write unit DOC, bill recycling unit BRU, and coin recycling unit CRU correspond to the above-described medium processing device 4 (see FIG. 1).
446 The certificate output/card reading/writing unit DOC comprises a card reading/writing/image reading/printer unit CIP and a passbook printer unit PPR.
448 The card reading/writing/image reading/printing section CIP comprises a card reader/writer section 41, a card embossing reading section 42, a printer section 43, and a transfer card issuing section 44. FIG.

[0048]

454 The card reader/writer unit 41 reads information such as an account number, a branch number, etc., from the magnetic stripe of the card inserted into the card insertion/extraction port 33 for conducting transactions, and writes to the magnetic stripe as necessary. .
457 The card emboss reading unit 42 reads the name of the embossed portion of the card inserted

into the card insertion/extraction port 33, the account number, and the like.
459 The printer unit 43 prints the account number, transaction amount, etc. read from the card on a receipt (statement slip) and outputs it from the card insertion/extraction port 33, and stores the same data printed on the receipt as a copy of the printed information, i.e., a journal. Leave as
463 The transfer card issuing unit 44 writes the transfer information such as the transfer destination on the magnetic stripe on the back side of the transfer card used for the transfer transaction, prints necessary information on the blank portion on the front side, and issues the transfer card.
467 This transfer card is also output from the card insertion/extraction port 33 .

[0049]
471 The passbook printer PPR has a passbook magnetic stripe reader/writer section 45 and a passbook printer section 46 .
473 The passbook magnetic stripe reader/writer unit 45 reads and writes the magnetic stripe of the passbook inserted into the passbook insertion/extraction port 32, for example.
475 The passbook printer unit 46 prints the transaction history on the passbook.
476 The banknote recycle unit BRU has, for example, three stackers 47, 48, 49 and an attendant safe 50, and handles banknotes.

[0050]
481 The three stackers 47 to 49 are, for example, one stacker 47 for storing 1,000 yen bills and two stackers 48 and 49 for storing 10,000 yen bills.
483 When a payment transaction is performed, only the designated amount is paid out from the respective stackers 47 to 49 to the banknote insertion/extraction port 35, and when a deposit transaction is performed, the banknotes inserted in the banknote insertion/removal port 35 are sorted by denomination. are stored in respective stackers 47-49.
487 Note that the 5,000-yen bills are stored in a collection-only stacker (not shown).
488 Furthermore, the three stackers 47 to 49 exchange bills with a detachable attendant safe 50 as necessary.
490 That is, when the number of banknotes in any of the three stackers 47 to 49 decreases as a result of continuous withdrawal transactions, the stacker whose banknotes have decreased is replenished with banknotes from the attendant safe 50, and deposit transactions continue. is done.
494 On the other hand, when any one of the stackers 47 to 49 is full of banknotes, the banknotes are collected from the full stacker and transported to the clerk's safe 50 .

[0051]
499 The coin recycling unit CRU consists of stackers 51, 52, 53, 54, 55, 56 for each coin, an

overflow stacker 57, and a coin cassette 58, and handles coins.

501 When it becomes necessary to pay out coins due to a transaction such as a payment transaction or a transfer transaction that requires change, the required number of coins and the required amount of coins are delivered from the stackers 51 to 56 to the coin insertion/extraction port. 34 pays out. Also, when coins are inserted into the coin insertion/extraction opening 34, the inserted coins are stored in the respective stackers 51 to 56 by denomination. Furthermore, when coins are continuously dispensed and the coins in the stackers 51-56 run short, coins are replenished from the coin cassette 58 to the stackers 51-56. Furthermore, coins overflowing from the stackers 51 to 56 are stored in the overflow stacker 57 as the coins are continuously stored. The overflow stacker 57 and the coin cassette 58 are detachable and used for refilling and taking out coins.

[0052]

514 The customer operation unit UOP has a color display device 59 as the display device 1 and a touch keyboard 60 composed of a touch panel as the input device 2a overlaid on the display screen.

517 That is, the display surface of color display device 59 and touch keyboard 60 constitute display input section 31 shown in FIG.

[0053]

522 The management operation unit MOP has a liquid crystal display 61 and a keyboard 62, and, like the remote monitoring unit RSU, grasps the internal state of the ATM and enables necessary maintenance operations.

[0054]

528 The audio output unit 60 is composed of an audio processor, an amplifier circuit, a speaker, and the like.

530 This audio output unit 60 outputs audio to the outside according to a command from the control unit CPU.

532 [Processing by ATM] Next, processing for the customer operation unit UOP by the control unit CPU will be described as processing by the above-mentioned ATM. In FIG. 1, when the power supply unit PSU shown in FIG. The program is loaded into the RAM 9, the control program loaded into the RAM 9 is executed, and screen display processing for the display device 1 is started.

[0055]

540 FIG. 4 is a flow chart showing screen display processing for the display device 1 .

541 In FIG. 4, when the process starts, the display data processing unit 21 determines whether

position information has been transferred from the touch panel, which is the input device 2a, via the input control unit 5 (step S01). At this time, if the display data processing unit 21 determines that the position information has not been received, the process proceeds to step S04. On the other hand, when the display data processing unit 21 determines that the position information has arrived, it acquires the position information (step S02).

[0056]

550 Subsequently, based on the acquired position information, the display data processing unit 21 determines whether or not the user has pressed an ATM operation button such as "cancel" or "correction" displayed on the display device 1..

553 At this time, if the display data processing unit 21 determines that the operation button has been pressed (step S03; YES), the process proceeds to step S05. On the other hand, when the display data processing unit 21 determines that the operation button has not been pressed (step S03; NO), it is assumed that the data input key has been pressed, and the process proceeds to step S04.

[0057]

561 When the process proceeds to step S04, the display data processing unit 21 outputs character data corresponding to the position information acquired in step S02 (character data corresponding to the pressed key (button)) from the CG unit 6. After reading, the process proceeds to step S05.

[0058]

568 When the process proceeds to step S05, the display data processing section 21 reads character data from the CG section 6 and reads image data (texture data) from the image data holding section 7 according to the control program.

571 Subsequently, the display data processing unit 21 generates screen data by synthesizing the character data and the image data on its own VRAM (Video RAM) (not shown) (step S06).

573 Subsequently, the display data processing unit 21 transfers the storage contents of the VRAM (not shown) to the display control unit 22 (step S07).

[0059]

578 Then, the display control unit 22 converts the storage contents of the VRAM (not shown) into a video signal (step S08) and transfers it to the display device 1 (step S09).

580 As a result, the ATM transaction screen 70 (see FIG. 5) is displayed on the display device 1, and the information input from the input device 2a is also displayed. In addition, when the process of step S09 ends, the process returns to step S01. [Contents displayed on the display device] Next, the contents displayed on the display device 1 will be described. <Transaction

Screen> FIG. 5 is an explanatory view of a transaction screen 70 displayed on the display device 1. As shown in FIG. A user of the ATM operates the ATM according to the display contents of the transaction screen 70 displayed on the display device 1 to carry out transactions. A plurality of transaction screens 70 are displayed on the display device 1 according to the operation procedure preset in the ATM. At this time, even if the transaction screen 70 is switched to another transaction screen 70, the transaction screen 70 is configured as follows so that the user can properly grasp the display contents of the transaction screen 70.

[0060]

595 5, the transaction screen 70 is set in a rectangular shape, and consists of a transaction type display area 71, an operation explanation area 72, an input object display area 73, an input data display area 74, and an operation area 75.

[0061]

601 The transaction type display area 71 is a belt-like area set at the top of the transaction screen 70, and displays the transaction type (for example, "transfer", "withdrawal", "deposit", etc.).
603 The operation explanation area 72 is a band-shaped area set immediately below the transaction type display area 71, and displays a character string indicating an ATM operation explanation for the user.

[0062]

609 The input object display area 73 and the input data display area 74 are belt-shaped areas set immediately below the operation explanation area 72 .
611 The input object display area 73 is arranged on the left side of the transaction screen 70 , and the input data display area 74 is arranged on the right side of the transaction screen 70 .
613 The input object display area 73 displays a character string indicating an input object (for example, "client name", "deposit amount", "account number", etc.). The input data display area 74 displays a character string indicating data input by the user of the ATM via the input device 2a.

[0063]

620 The operation area 75 is a rectangular area set at the bottom of the transaction screen 70 .
621 In this operation area 75, keys for the user to input data to the ATM and operation buttons of the ATM are displayed.

[0064]

626 The positions of the regions 72 to 75 described above are fixed regardless of changes in the display content of the display device 1 .

628 Therefore, the user of the ATM can grasp or predict which information will be displayed at which position while proceeding with the operation of the ATM. Therefore, even when the transaction screen 70 is switched to another transaction screen 70, the user can properly grasp the contents displayed on the transaction screen 70, so that the user can smoothly operate the ATM and carry out transactions. can. <Screen Elements of Transaction Screen> FIG. FIG. 6 shows screen elements of the transaction screen 70 in the case of "transfer". As shown in FIG. 6, the transaction screen 70 is configured by superimposing each screen element of a background 81, a procedure display 82, an input panel display 83, and an explanation display 84 according to the ATM operation procedure. These screen elements are stored as texture data in the image data holding unit 7 shown in FIG. The image data holding unit 7 also has color palette data corresponding to these texture data. Then, the transaction screen 70 is displayed on the display device 1 by performing the above-described screen display processing (see FIG. 4). <Background> In FIG. 6, the background 81 is set in a rectangular shape and arranged over the entire transaction screen 70 . A strip-shaped transaction type display field 81a is provided above the background 81, and is arranged in the transaction type display area 71 shown in FIG. A character string indicating the transaction type is displayed in the transaction type display field 81a (in FIG. 6, the character string "transfer" is shown as an example). <Procedure display> The procedure display 82 is superimposed on the background 81 and displayed. This procedure display 81 is arranged over the operation explanation area 72, the input object display area 73, the input data display area 74, and the operation area 75 shown in FIG. This procedure display 82 shows the operation procedure to be performed by the ATM user at the time of transaction. That is, the procedure display 72 consists of a plurality of strip-shaped input data fields 87 (input data fields 87a to 87g are shown as examples in FIG. 6). Each input data column 87 is a column for displaying data or the like to be input to the ATM according to the operating procedure of the ATM. there is

[0065]

657 On the leftmost side of each of the plurality of input data fields 87, a number indicating the procedure number, which is the order of the operation procedure, is displayed, and on the right side, an input object name (operation item name) is displayed.

660 A character string indicating the data input via the input device 2a is displayed on the right side of the input object name.

[0066]

665 FIG. 7 is a diagram showing a screen display example of a transaction screen 70 in which a procedure display 82 is superimposed on a background 81. As shown in FIG.

667 In the example shown in FIG. 7, in each of the input data fields 87a to 87g, a number

indicating the procedure number is displayed on the leftmost side thereof, and on the right side thereof, as input object names, "payee financial institution", "payee Item names such as branch name, account number, recipient name, transfer amount, client name, and telephone number are displayed. Input data corresponding to each input object name is displayed on the right side of each input object name.

[0067]

676 By the way, an operation procedure is composed of a plurality of operation sets consisting of procedures that can be associated.

678 Correspondingly, in each input data field 87, a plurality of input data fields 87 constituting an operation set are arranged in a lump, and the input data fields 87 constituting mutually different operation sets are arranged at intervals. It is

[0068]

684 For example, in the example shown in FIG. 7, the operation procedure for "transfer" consists of an operation set related to the payee, an operation set related to the amount, and an operation set related to the client.

687 According to the configuration of such operation sets, the input data fields 87a to 87d corresponding to the operation set related to the payee and the input data fields 87f and 87g corresponding to the operation set related to the client each form one block. It is arranged in a state of eggplant. A space (blank) is provided between the input data column 87d and the input data column 87e, and between the input data column 87e and the input data column 87f.

[0069]

696 Therefore, by looking at the procedure display 82, the user of the ATM can easily grasp the number of operation procedures, the number of operation sets, the order of the operation procedures, and the input objects.

699 <Background Color of Procedure Number> Although not shown in FIG. 7, the background color of each procedure number is displayed in a different color depending on the operation set. Specifically, the background color of each procedure number in the input data fields 87a to 87d is set in red gradation according to the numerical order, and the background color of the procedure number in the input data field 87e is set in green. The background color of the procedure number in the input data fields 87f and 87g is set with a blue gradation in numerical order.

[0070]

709 This allows the ATM user to grasp the operation set without understanding the meaning of

the operation set.

711 Further, as the operation procedure progresses, the background color of the procedure number changes from the long wavelength color to the short wavelength color, so that the user can grasp or predict the progress of the operation procedure from the background color of the procedure number.

[0071]

718 Also, the basic color of the background 81 of the transaction screen 70 changes according to the background color of the procedure number.

720 For example, if the background color of the procedure number corresponding to the operation procedure currently being performed is red, the base color of the background 81 is red. This allows the user to easily grasp which operation set the operation currently being performed belongs to. <Attention Area> In FIG. 7, a band-shaped range from about three-tenths to about four-tenths from the upper edge of the transaction screen 70 is set as an attention area 80 . This gaze area 80 is a range where information can be received with high accuracy in ergonomics. The input target display area 73 and the input data display area 74 described above are arranged in this gaze area 80 . In this manner, the oblong gaze area 80 is set, the operation explanation area 72 is set above the gaze area 80, and the operation area 75 is set below the gaze area 80, thereby suppressing unnecessary movement of the line of sight. be done. Therefore, the visibility of the transaction screen 70 can be improved, and the difficulty of understanding the transaction screen 70 and the difficulty of operation can be improved.

[0072]

736 Each of the plurality of input data fields 87 described above is displayed in the gaze area 80 (the input object display area 73 and the input data display area 74) according to the operation procedure.

739 For example, as shown in FIG. 7, if the transaction is "transfer", first, an input data column 87 (input data column 87a) displaying the procedure number "1" is displayed in the attention area 80. FIG. After that, when the data input is completed and the operation procedure proceeds to the next step, as shown in FIG. A column 87 b) is displayed in the gaze area 80 .

[0073]

746 That is, the procedure display 82 is scrolled to the upper side of the screen each time the operation procedure progresses, and an input data field 87 displaying the next procedure number is displayed in the gaze area 80 .

749 Among the data displayed in the input data field 87 in the gaze area 80, the procedure number and the input object name are displayed in the input object display area 73 in the gaze area 80, and the character string indicating the input data is displayed in the gaze area.

80 is displayed in the input data display area 74 .

[0074]

756 In this manner, an input data field 87 indicating the operating procedure currently in progress is displayed in the gaze area 80. FIG.

758 Therefore, if the user of the ATM is looking at the attention area 80, which is the most visible part of the transaction screen 70, he/she can read the procedure number displayed in the attention area 80 and the character string indicating the input object. It is possible to easily grasp the operating procedure that is currently being performed and the progress of the operating procedure. In addition, by scrolling the procedure display 82, the user can intuitively understand that the operation procedure is progressing.

[0075]

767 Also, when the procedure display 82 is scrolled, the ATM emits a signal sound.

768 This function is such that when the process of scrolling the procedure display 82 is being performed, an operation command is given from the control unit CPU to the audio output unit 60 (see FIG. 3), and the audio output unit 60 outputs a signal sound. can be realized by With this signal sound, the user can be made to pay attention to the transaction screen 70, and the user can appropriately understand that the operation procedure has progressed. Therefore, it is possible to eliminate the time loss that occurs when the user does not notice the progress of the operation procedure, and to shorten the operation time of the ATM.

[0076]

778 As in the example shown in FIG. 7, when the number of transaction operation procedures is small, all of the plurality of input data fields 87 forming the procedure display 82 are displayed on the display device 1 at the start of the transaction.

781 On the other hand, when the number of operation procedures in a transaction is large and all of the plurality of input data fields 87 cannot be displayed on the display device 1 at the start of the transaction, the screen display example shown in FIG. , only the displayable input data field 87 is displayed on the display device 1 .

[0077]

788 The functions described above are realized, for example, as follows.

789 That is, the display data processing unit 21 shown in FIG. 1 has the number (threshold value) of the input data fields 87 that can be displayed on the display device 1 at one time. At the start of the transaction, the display data processing unit 21 receives the data of the corresponding procedure display 82 from the image data holding unit 7, and compares the number of input data columns 87 forming the procedure display 82 with the above

threshold. At this time, if the number of input data columns 87 is less than the threshold, the display data processing unit 21 causes the display device 1 to display all of the input data columns 87 forming the procedure display 82 . On the other hand, when the number of input data columns 87 is below the threshold, the display data processing section 21 causes the display device 1 to display a part of the input data columns 87 forming the procedure display 82 .

[0078]

803 As shown in the screen display example of FIG. 9(b), each time one operation procedure is completed and the procedure display 82 is scrolled to the upper side of the screen, any of the input data fields 87 that could not be displayed at the start of the transaction are displayed. is displayed on the screen.

807 At this time, when the procedure display 82 is scrolled to the upper side of the screen so that a part of the procedure display 82 overlaps the transaction type display column 81a, the procedure in the range overlapping the transaction type display column 71a is displayed. Display 82 disappears from trading screen 70 .

[0079]

814 By the way, if the number of operating steps for a transaction is small (for example, if the operating procedure is completed by entering the "PIN" and "Refund Amount", as in a "refund" transaction), the operating procedure is as follows. The procedure display 82 does not scroll even if it advances.

818 In this case, as shown in FIG. 16, the explanation display 83 and the input panel display 84 are arranged in the lower part of the transaction screen 70 in contact with each other.

[0080]

823 This function can be realized by configuring the processing control device 20 shown in FIG. 1 as follows.

825 That is, as described above, the display data processing unit 21 compares the number of input data columns 87 of the procedure display 82 to be displayed with the threshold, and if the number of input data columns 87 exceeds the threshold, the operation is performed. When the procedure proceeds to the next step, the procedure display 82 is scrolled, and if the number of input data fields 87 is less than the threshold value, the transaction screen 70 shown in FIG. The scrolling process of the procedure display 82 is not performed even if the process proceeds to the next step. <Description Display and Input Panel Display> Returning to FIG. 6, the description display 83 is set in a strip shape, and displays a character string indicating an operation explanation in each operation procedure (in FIG. Please press confirm" string). This explanation display 83 is arranged in the operation explanation area 72 shown in FIG.

[0081]

839 The input panel display 84 is set in a rectangular shape, and displays keys and buttons for inputting the input objects displayed in the input object display area 73 in each operation procedure.

842 This input panel display 84 is arranged in the operation area 75 shown in FIG.

[0082]

846 10 to 12 are explanatory diagrams showing screen display examples of the explanation display 83 and the input panel display 84. FIG.

848 As shown in FIGS. 10 to 12, a plurality of types of explanation display 83 and input panel display 84 are prepared according to the input target of the user. For example, an explanation display 83a and an input panel display 84a (see FIG. 10) for entering an account number, an explanation display 83b and an input panel 84b (see FIG. 11) for entering an amount, and an explanation display for entering characters. 83c and an input panel display 84c (see FIG. 12) are prepared.

[0083]

857 As shown in FIG. 10, the input panel display 84a is provided with a numeric keypad 91 for inputting an account number and a first confirmation button 92 for temporarily confirming the input account number.

860 Further, as shown in FIG. 11, the input panel display 84b has a numeric keypad 91 for inputting an amount, a digit button 93 for inputting a digit (10,000,000), and a A first confirmation button (circular button) 92 and the like are provided. Further, as shown in FIG. 12, the input panel display 84c includes a Japanese syllabary key group 94 for inputting characters, and word keys for inputting specific words (corporation, limited company, sales office, branch). A group 95, a first confirmation button 92, etc. are provided.

[0084]

869 In this way, since the input panel display 84 arranged in the operation area 75 is a separate screen element from the procedure display 82, the input panel display 84 (operation area 75) can occupy a large proportion of the transaction screen 70. .

872 Therefore, it is possible to optimize the size of the keys and buttons displayed on the input panel display 83, their arrangement, and the like. Therefore, it is possible to reduce the possibility of erroneous input and erroneous operation due to erroneous pressing of keys or buttons. This is particularly effective for users with low proficiency in operating ATMs, or for users with diminished visual or manual dexterity.

[0085]

880 Note that icons may be provided instead of the keys and buttons displayed on the input panel display 84 .

882 <Switching of Transaction Screens> Incidentally, the background 81 and the procedure display 82 described above are displayed on the display device 1 from the start of the operation of the ATM by the user until the end of the operation. Therefore, the user can grasp the overall picture of the input operation to be performed from now on, and understand the relationship between the preceding and succeeding items. Therefore, it is possible to mentally prepare for each input object (each operation procedure) in advance. In addition, in each operation procedure, the user does not feel uneasiness or frustration due to not being able to grasp the entire operation procedure. Furthermore, it is possible to avoid the danger of erroneously interpreting the content of the input request and making an erroneous input.

[0086]

895 On the other hand, the explanation display 83 and the input panel display 84 are displayed on the display device 1 at the start of each operation procedure, depending on the operation procedure.

898 In the ATM according to Embodiment 1, the transaction screen 70 is switched by switching the explanation display 83 and the input panel display 84 according to the operation procedure. When each operation procedure is started, as shown in the screen display example of FIG. 13, an explanation display 83 appears from the lower edge of the screen and moves toward the upper edge of the screen until it fits within the operation explanation area 72 described above. Moving. Simultaneously with the appearance of the explanation display 83 or following the appearance of the explanation display 83, the input panel display 84 appears from the lower edge of the screen and moves toward the upper edge of the screen until it fits within the operation area 75 described above. .

[0087]

910 Then, when the explanation display 83 fits in the operation explanation area 72 and the input panel display 84 fits in the operation area 75 , the part of the procedure display 82 that exists in the operation explanation area 72 and the part that exists in the operation area 75 (explanation display) 83 or the portion overlapping with the input panel display 84) is hidden by the explanation display 83 or the input panel display 84 .

915 As a result, the ATM user can see only the input object name displayed in the gaze area 80 among the input object names shown in the procedure display 72 . Therefore, the user can clearly grasp the operating procedure currently being performed.

[0088]

921 However, the explanation display 83 and the input panel display 84 are set so as not to overlap the numbers indicating each procedure number in the procedure display 82 .

923 Therefore, the user of the ATM can grasp the number of operation procedures even while data is being input, and can grasp how far the current operation procedure has progressed.

[0089]

928 Thereafter, data is entered using the input panel display 84, and when the operating procedure is completed, the explanation display 83 and the input panel display 84 move toward the lower edge of the screen and disappear from the display device 1. FIG.

931 Then, when the operation procedure proceeds to the next step, the explanation display 83 and the input panel display 84 corresponding to the operation procedure appear in the display device 1 by the method described above. Also, the procedure display 82 scrolls to the upper side of the screen, and an input data field 87 showing the next procedure number is displayed in the gaze area 80 .

[0090]

939 Hereinafter, the switching between the explanation display 83 and the input panel display 84 and the scrolling of the procedure display 82 performed when the operation procedure proceeds will be collectively referred to as "screen transition".

942 <Enlarged display in gaze area> As shown in FIGS. 10 to 12, when each input data column 87 is displayed in the gaze area 80, the range in the input data display area 74 is enlarged and displayed. At the same time, the characters representing the input data are displayed larger than the characters representing the input data in the other input data column 87 . This is because the display data processing unit 21 shown in FIG. This is achieved by performing processing for enlarging the font.

[0091]

951 By enlarging and displaying the input data in this manner, the ATM user with poor eyesight can easily read the input data, and the user's visual burden can be reduced.

953 Therefore, it is possible to reduce the possibility of erroneous data input and erroneous operation of the ATM. In addition, since the burden on the eyesight is reduced, it becomes possible to add elderly people or people with mild visual impairments such as amblyopia as users of ATMs, thereby expanding the range of users of ATMs.

[0092]

960 Also, since the characters displayed in the input data display area 74 of the gaze area 80 are displayed larger than the characters of the input data in the other input data fields 87, they

are emphasized more than the other input data.

963 Therefore, it is possible to easily distinguish between the characters in the other input data area 87, thereby improving the information recognition accuracy of the user. <Correction Button> As shown in FIG. 6, a correction button 101 is provided on the rightmost side of each of the plurality of input data fields 87, respectively. Each correction button 101 is a button for correcting data when an ATM user makes a mistake in data input. When any of the correction buttons 101 is pressed, characters indicating already-input data in the input data column 87 to which the correction button 101 belongs are cleared, and the user can enter new data.

[0093]

974 In this way, the correction button 101 is provided for each input data, and the correction button 101 is arranged next to the input data, so that the user can properly grasp the meaning of the correction button 101, When a user makes a mistake in data input, the correction button 101 can be found without hesitation.

978 In addition, it is possible to prevent data that does not require correction from disappearing due to the user pressing another correction button by mistake. In addition, it is possible to prevent the user from mistakenly recognizing the correction button 101 and pressing the cancel button 81b. Therefore, it is possible to improve the accuracy and speed of ATM operation by the user. <Confirmation Button> As shown in FIGS. 10 to 12, a first confirmation button 92 is provided at the lower right corner of each input panel display 84 (for example, 84a to 84c). When the first confirmation button 92 is pushed, a confirmation signal is given from the input device 2a to the interrupt processing section 23, and the interrupt processing section 23 gives a confirmation processing command to the display data processing section 21. FIG.

[0094]

991 Then, the display data processing unit 21 performs confirmation processing and changes the contents stored in the VRAM.

993 As a result, as shown in FIG. 14, the explanation display 83 and the input panel display 84 disappear from the transaction screen 70, and the procedure display 82 scrolls to the bottom of the screen to display the data that has been input so far. Become. By pressing one of the correction buttons 101 provided in each input data area 87, the user can correct the corresponding input data.

[0095]

1001 Furthermore, a rectangular confirmation display 104 is displayed below the procedure display 82 .

1003 The confirmation display 104 displays an instruction prompting confirmation of the input data on its left side, and displays a second confirmation button 105 on its right side. Then, when the user of the ATM presses the second confirmation button 105, the operation procedure proceeds to the next assuming that the operation procedure has been completed.

[0096]

1010 In this way, since the procedure display 82 is used as a screen for confirming the input data, the ATM user can collectively confirm and correct the data that has been input up to now. Can understand relationships between input data.

1013 <Cancel Button> As shown in FIG. 6, a cancel button 81b is provided on the right side of the transaction type display field 81a. This cancel button 81b is a button for canceling the transaction (forcibly terminating the operation of the ATM). When the cancel button 81b is pushed, a reset signal is given to the interrupt processing section 23 from the input device 2a. Then, the interrupt processing section 23 gives a forced termination command to the display data processing section 21 based on the reset signal. As a result, the display data processing unit 21 forcibly terminates the transaction. After that, the display data processing unit 21 causes the display device 1 to display a transaction type selection screen (not shown).

[0097]

1025 In this way, the transaction type name and the cancel button 81b are arranged in the same column, so that the ATM user can properly understand the meaning of the characters "Cancel" displayed on the cancel button 81b. can.

1028 Therefore, it is possible to prevent the ATM user from accidentally pressing the cancel button 81b and wasting the operation that has been performed up to that point. <Return Button> In the conventional automated teller machine, the user could not see the data that had already been input before all the data to be input was input. In addition, even if the user wants to correct part of the data that has already been input, the conventional automated teller machine does not have a function to respond to the request. Therefore, if the user wants to repeat the operation procedure that has already been performed, the user has no choice but to press the "Cancel" button.

[0098]

1039 However, when the user presses the "Cancel" button, the operation procedure returns to the very beginning and the data that has already been input is erased.

1041 For this reason, the user had to redo the operation from the beginning. That is, for example, when the user notices an error in the data that has already been input, the user has no choice but to press the "cancel" button and redo the operation. I could be wrong.

[0099]

1047 In view of this problem, the ATM according to Embodiment 1 is provided with a return button 102 on the input panel display 84 as shown in FIGS.

1049 When the return button 102 is pushed, the ATM operating procedure returns to the previous operating procedure. For example, as shown in FIG. 15A, assume that the return button 102 is pressed when the operation procedure has progressed to procedure number "2" and the input data field 87b is displayed in the gaze area 80. FIG.

[0100]

1056 Then, the procedure display 82 scrolls to the lower side of the screen, and as shown in FIG. is displayed.

1058 At this time, the already input data is displayed in the input data display area 74 of the input data column 87a.

[0101]

1063 The functions described above are realized as follows.

1064 That is, data input in each operation procedure is held in a storage device (not shown) of the processing control device 20 shown in FIG. When the return button 102 is pressed, an interrupt signal is input to the interrupt processing section 23 from the input device 2a. The interrupt processing unit 23 gives the display data processing unit 21 a command (procedure return command) to return the operation procedure to the previous one according to the interrupt signal. The display data processing unit 21 returns the contents of the transaction screen 70 to the operation procedure one step before according to the procedure return command, reads the corresponding input data from the storage device (not shown), and causes the display device 1 to display it. The user's input data held in the storage device (not shown) is erased when the transaction (ATM operation) is completed.

[0102]

1077 Also, when the return button 102 is pressed, the explanation display 83 and the input panel display 84 are changed to those corresponding to the previous operation procedure.

1079 At this time, if the user presses the correction button 101, the already input data can be corrected using the changed input panel display 84. FIG. Further, when the return button 102 provided on the changed input panel display 84 is pressed, the operation procedure is further returned to the previous one. Therefore, the user can return the operation procedure to any of the operation procedures already performed.

[0103]

1087 Thus, according to the ATM of Embodiment 1, by providing the return button 102, the operation procedure can be returned to the operation procedure that has already been performed.

1090 Also, when the operation procedure is returned, the already input data is displayed in the gaze area 80 . Therefore, it is possible to confirm and redo the operation procedure that has already been performed for each operation procedure. Therefore, it is possible to improve the operability of the ATM for the user, thereby avoiding erroneous operation and erroneous input by the user. In that data input can be redone, a sense of security can be given especially to users with low proficiency.

[0104]

1099 Also, the return button 102 is provided at the same position (upper right corner of the input panel display 84) regardless of the type of the input panel display 84. FIG.

1101 Therefore, the ATM user can memorize the position of the return button 102 without being particularly conscious of it. Therefore, the user can appropriately press the return button 102 when he/she wants to return the operation procedure to the procedure that has already been performed. <Help Display> FIG. 16 is an explanatory diagram of a help display (commentary screen) 106 displayed on the transaction screen 70. As shown in FIG. As shown in FIG. 16, the help display 106 indicates operations to be performed by the ATM user, and is superimposed on the input panel display 84 . The help display 106 is displayed on the display device 1 by the same process as the screen elements of the transaction screen 70 .

[0105]

1113 In FIG. 16, as an example of the help display 106, an image explaining the card slot is displayed.

1115 This help display 106 is displayed for a predetermined period of time when screen transition is completed, and disappears from the transaction screen 70 after the predetermined period of time has elapsed. Although not shown, the help display 106 is also provided with a character string. <Fast display button and polite explanation button> As shown in FIGS. 10 to 12 and 16, at the lower left corner of the input panel display 84, a quick display button 107 and a polite explanation button 108 are provided. When the fast display button 107 is pressed, each operation procedure is changed from the normal mode to the fast mode. That is, the number of times the help display 106 is displayed in each operation procedure is reduced, and screen transitions are performed at high speed. Note that the change to the high-speed mode is performed by turning ON the expert flag held in the control unit CPU.

[0106]

1128 On the other hand, when the polite explanation button 108 is pressed, each operation procedure is changed from the normal mode to the detailed mode.

1130 That is, the screen transitions are displayed at a lower speed than in the normal mode, and the number and types of help displays 106 displayed in each operation procedure increase. Further, a character string of detailed explanation about the operation is appropriately displayed on the transaction screen 70 .

[0107]

1137 If the fast display button 107 is pressed in the fast mode, the fast mode returns to the normal mode.

1139 Further, when the high speed display button 107 is pressed in the detailed mode, the detailed mode is changed to the high speed mode. On the other hand, when the detailed display button 108 is pressed in the detailed mode, the detailed mode returns to the normal mode. Further, when the polite display button 108 is pressed in the high speed mode, the high speed mode is changed to the detailed mode.

[0108]

1147 Since the quick display button 107 and the polite explanation button 108 are provided in this way, the user can operate the ATM by selecting a mode according to the user's level of proficiency.

1150 The operation time can be shortened by operating in the high speed mode. Further, by performing operations in the detailed mode, operations can be performed reliably and accurately, and the occurrence of operation errors and data input errors can be avoided. [ATM Operation Procedure] FIG. 17 is a conceptual diagram of the above-described ATM operation procedure, and FIG. 18 is a diagram showing an example of the ATM operation procedure. As shown in FIG. 17, the ATM according to Embodiment 1 has a multi-layered operation procedure for each transaction. Specifically, the operating procedure consists of a main procedure layer (shortest sequence), a selection procedure layer (subsequence), and a detailed procedure layer (subsequence).

[0109]

1162 The main procedure layer consists of the shortest procedures (the minimum necessary procedures).

1164 The selection procedure layer consists of procedures that are added to the operating procedures by user selection. The detailed procedure layer consists of a plurality of procedures that further detail each procedure in the selection procedure layer, and is added to the operation procedure by user's selection. In this way, the operating procedures are multi-layered, and it is up to the user to decide whether or not to add the procedures belonging to the selected procedure layer and the detailed procedure layer to the operating procedures. ATM operations (transactions) can be performed according to appropriate procedures.

[0110]

1175 FIG. 18 shows the operating procedure for a "transfer" transaction.

1176 This operation procedure is provided to the user by causing the display 1 to display the transaction screen 70 generated by the screen generation process by the control unit CPU. In FIG. 18, if the user has a bank transfer card, the procedure for "input of transfer destination" (see FIG. 18) can be omitted because the contents of the bank transfer card are recorded.

[0111]

1184 This procedure of "entering the payee" consists of three procedures of "selecting a financial institution", "entering a branch name", and "entering an account number" of the payee.

1186 By the way, the procedure of "entering the transfer destination" can be processed as one procedure by a user accustomed to the transaction of "transfer".

[0112]

1191 Therefore, on the transaction screen 70 of the display device 1, the omitted procedures ("select financial institution", "input branch name" and "input account number") are displayed by the control unit CPU, and once As a procedure that can be processed, the procedure of "input of transfer destination" is displayed.

1195 Further, it is displayed that one of the procedure to be omitted and the procedure of "input bank transfer" is to be selected.

[0113]

1200 Here, if the procedure of "input bank transfer" is selected, after the user performs the operation in the "input bank transfer" procedure, the operation procedure should proceed to the next step "input transfer money". becomes.

1203 On the other hand, if the skipped procedure is selected, the user must go through the steps of "selecting a financial institution", "entering a branch name" and "entering an account number" (see Figure 18)., the operation procedure will proceed to the next "transfer money input".

[0114]

1210 Also, when the procedure of "Select financial institution" is completed, the next procedure will be instructed to select whether to perform the next procedure by the procedure of "Enter branch name" or "Enter initials of branch name" and "Select branch name". It is displayed on the display device 1 by the processing of the control unit CPU.

1214 On the other hand, the user selects one of them and proceeds with the operation procedure.

[0115]

1218 In this way, a complicated procedure consisting of multiple operations can be processed as multiple simple procedures.

1220 Therefore, it is possible to provide users with high proficiency with the shortest procedure, and users with low proficiency with detailed procedures to operate the ATM.

[0116]

1225 In addition, a help display 106 (see FIG. 18) of "explanation" indicating the meaning of operations and input objects in the procedure is prepared in association with each procedure. It is displayed on the display device 1 together with a procedure selection instruction.

1229 This allows the user to select procedures carefully and properly.

[0117]

1233 As described above, according to the ATM according to the first embodiment, the user of the ATM can operate the ATM according to the operation procedure according to his or her level of proficiency in operation, thereby improving the operability of the ATM.

1236 [Embodiment 2] Next, an automatic teller machine (ATM) according to Embodiment 2 will be described. However, since the ATM according to the second embodiment is substantially the same as the ATM according to the first embodiment, only different points will be explained.

[0118]

1243 FIG. 19 is an explanatory diagram showing part of a transaction screen 70 displayed on the ATM display device 1 according to the second embodiment.

1245 In addition, the same code|symbol is attached|subjected about the component same as the component in Embodiment 1. FIG. In FIG. 19, explanation display 183 and input panel display 184 are displayed above background 81 and procedure display 82 . The explanation display 183 is translucent except for the character string indicating the operation explanation. The input panel display 84 is translucent except for the Japanese syllabary key group 94 .

[0119]

1254 Therefore, the ATM user can see the display contents of the procedure display 82 behind them through the translucent explanation display 183 and the input panel display 184 .

1256 Therefore, it is possible to confirm the input result already displayed in each input data column 87 and to recognize the whole image of the input object to be input.

[0120]

1261 According to the second embodiment, the ATM user can see the display contents of the procedure display 82 through the explanation display 183 and the input panel display 184
.

1264 Therefore, the user can more properly grasp the display contents of the procedure display 82 as compared with the first embodiment. Further, by making the explanation display 183 and the input panel display 184 translucent, it becomes possible to display information that could not fit on one screen in the past, on one screen. It can be displayed on one screen. Therefore, the operating procedure can be shortened.

[0121]

1272 In the second embodiment, the description display 183 and the input panel display 184 are configured to be translucent. good.

1274 [Embodiment 3] Next, an ATM according to Embodiment 3 will be described. Since the ATM according to Embodiment 3 is substantially the same as the ATM according to Embodiment 1, the description of the common points will be omitted and the differences will be described.

[0122]

1281 FIG. 20 is a block diagram showing the configuration of an ATM according to Embodiment 3;

1282 However, the same reference numerals are given to the same components as in the first embodiment, and the description thereof is omitted. The control unit CPU has a timer A and a timer B for measuring time in addition to the configuration described in the first embodiment. The control unit CPU performs a process of determining a user's level of proficiency in ATM operation (familiarity level determination process).

[0123]

1290 The proficiency level determination process is performed by measuring the speed of data input by the user.

1292 For example, when a user inputs numbers (personal identification number, account number, etc.), the proficiency level is determined based on the time required for the user to input a four-digit number. Alternatively, the degree of proficiency is determined based on the time from the input of an arbitrary number to the pressing of a correction key for correcting the input of the number (proficiency level determination processing based on input of numbers).

[0124]

1301 In the case of inputting Japanese syllabary characters (recipient, client, etc.), the proficiency level is determined based on the character input time interval.

1303 Alternatively, the proficiency level is determined based on the time from the input of an arbitrary character until the correction key for correcting the character input is pressed (proficiency level determination processing by character input).

[0125]

1309 Also, the proficiency level determination process is performed by measuring the user's level of knowledge of financial terms.

1311 For example, the proficiency level is determined based on the time from when a specific financial term is displayed on the display device 1 to when any key on the input panel display 84 is pressed. Specific financial terms include, for example, financial terms such as "ordinary", "current account", "transfer card", "cash transfer", and "account transfer" (term proficiency level determination processing).

[0126]

1319 FIG. 21 is a flowchart showing proficiency level determination processing by the control unit CPU according to the third embodiment.

1321 In FIG. 21, the proficiency level determination process is started when the control unit CPU displays a transaction screen 70 on the display device 1 of the ATM. However, here, it is assumed that the above-described numerical input is used for determination processing, and as the transaction screen 70, a personal identification number input screen (not shown) (transaction screen 70 displayed in the operation procedure for inputting a personal identification number) is displayed on the display device 1. shall be displayed on

[0127]

1330 In step S101, the control unit CPU stops and resets (clears) the timers A and B, and then advances the process to step S102.

1332 In step S102, the control unit CPU waits until any one of the numeric keys displayed on the password input screen (not shown) is pressed. After that, when the control unit CPU determines that any one of the numeric keys has been pressed (step S012; YES), the process proceeds to step S103. When the process proceeds to step S103, the control unit CPU stops the timer B and then advances the process to step S104.

[0128]

1340 In step S104, the control unit CPU determines whether or not the first digit of the four-digit personal identification number has been input with the key pressed in step S102.

1342 At this time, if the control unit CPU determines that the first digit number has been input (step S104; YES), the process proceeds to step S105, and the timer A starts counting time. After that, the control unit CPU returns the process to step S102 and waits for the numeric keypad displayed on the personal identification number input screen (not shown) to be pressed again. On the other hand, if the control unit CPU determines that the first digit number has not been input (step S104; NO), the process proceeds to step S106.

[0129]

1351 When the process proceeds to step S106, the control unit CPU determines whether or not the fourth digit of the four-digit personal identification number has been input with the key pressed in step S102.

1354 At this time, if the control unit CPU determines that the fourth digit number has been input (step S106; YES), the process proceeds to step S111. On the other hand, if the control unit CPU determines that the fourth digit number has not been input (step S106; NO), the process proceeds to step S107.

[0130]

1361 When proceeding to step S107, the control unit CPU determines whether or not the correction key displayed on the password input screen (not shown) has been pressed.

1363 At this time, if the control unit CPU determines that the correction key has not been pressed (step S107; NO), the process proceeds to step S108, and the timer B starts counting time. After that, the control unit CPU returns the process to step S102 and waits for the numeric keypad displayed on the personal identification number input screen (not shown) to be pressed again. On the other hand, if the control unit CPU determines that the correction key has been pressed (step S107; YES), the process proceeds to step S109.

[0131]

1372 When the process proceeds to step S109, the control unit CPU refers to the time counted by the timer B stopped in step S103 (time from inputting a certain number to noticing an error and pressing a correction key). , determines whether or not the measured time is equal to or less than a specified value.

1376 At this time, if the control unit CPU determines that it is not equal to or less than the prescribed value (step 109; NO), the process proceeds to step S108. On the other hand, when the control unit CPU determines that it is equal to or less than the prescribed value (step S109; YES), the process proceeds to step S110.

[0132]

1383 When proceeding to step S110, the control unit CPU assumes that the user is an expert in operation and turns on the expert flag described in the first embodiment.

1385 After that, the control unit CPU advances the process to step S108. On the other hand, the control unit CPU makes a determination of YES in step S106, and when the process proceeds to step 111, the timer A stops counting time. After that, the control unit CPU advances the process to step S112.

[0133]

1392 In step S112, the control unit CPU refers to the time measured by the timer A stopped in step S111 (the time required to enter the 4-digit personal identification number), and determines whether or not the time is equal to or less than a specified value. judge.

1395 At this time, if the control unit CPU determines that the value is not equal to or less than the specified value (step 109; NO), it terminates the proficiency level determination process. On the other hand, if the control unit CPU determines that it is equal to or less than the specified value (step S109; YES), the process proceeds to step S113.

[0134]

1402 When the process proceeds to step S113, the control unit CPU assumes that the user is an expert in operation and turns on the expert flag described in the first embodiment.

1404 After that, the control unit CPU terminates the proficiency level determination process. When this proficiency level determination process ends, the control unit CPU (central processing unit 3) starts processing for displaying the next transaction screen 70 on the display device 1. FIG.

[0135]

1411 By turning on the expert flag, as described in the first embodiment, the same state as when the quick display button 107 is pressed, i.e., the screen transition is performed at high speed, and the help display 106 is displayed the number of times. is reduced.

[0136]

1417 Further, the proficiency level determination processing by character input is realized by the same processing as the flowchart shown in FIG.

1419 However, in the proficiency level determination process by character input, the process starts when the transaction screen 70 including the input panel display 84c of Japanese syllabary is displayed on the display device 1. FIG.

1422 Timer A counts the time until four characters of certain character data are input. Timer B counts the time from when the user enters arbitrary character data until he notices an error and presses the correction key 101 . The prescribed values used in each of the processes in steps S109 and S112 are set to values different from those in the proficiency level determination process based on numerical input.

[0137]

1430 FIG. 22 is a flowchart showing proficiency level determination processing using terms.

1431 This determination process is started by the display of a transaction screen 70 including an input panel display 84 on which keys for inputting specific terms are displayed on the display device.

[0138]

1437 When the process starts, the control unit CPU stops and resets (clears) the timer A (step S201), and then starts the timer A to measure time (step S202).

1439 Subsequently, the control unit CPU determines whether or not a key for inputting a specific term has been pressed (step S203). At this time, if the control unit CPU determines that the corresponding key has been pressed (step S203; YES), the process proceeds to step S204. On the other hand, if it is determined that the corresponding key has not been pressed (step S203; NO), the process of step S203 is repeated until YES is determined in step S203.

[0139]

1447 The control unit CPU stops the time measurement by the timer A when proceeding to step S204.

1449 Subsequently, the control unit CPU refers to the measured time of the timer A and determines whether or not the measured time is equal to or less than a specified value. At this time, if the control unit CPU determines that it is not equal to or less than the specified value (step 205; NO), it terminates this determination process. On the other hand, if the control unit CPU determines that it is equal to or less than the specified value (step S205; YES), the process proceeds to step S206.

[0140]

1458 When the process proceeds to step S206, the control unit CPU assumes that the user is an expert in operation and turns on the expert flag described in the first embodiment.

1460 After that, the control unit CPU terminates this determination process.

[0141]

1464 The effect of the third embodiment is almost the same as the effect of the first embodiment.

1465 However, the proficiency level of the ATM user's operation is determined, and if the proficiency level is high, the operating procedure is omitted. Therefore, a user with high proficiency can operate the ATM according to a simplified operating procedure, and a user with low proficiency can operate the ATM according to a detailed operating procedure. That is, according to the third embodiment, it is possible to automatically provide an operation procedure according to the proficiency level of the user. Therefore, many users can comfortably operate the ATM.

[0142]

1475 Each specified value used in each proficiency level determination process described above can be set as appropriate.

1477 Therefore, it is possible to absorb the difference in operating proficiency due to regional differences. For example, near a terminal station in an urban area, there are many users who are skilled in operating ATMs, so each specified value is set in a shorter time than in a local area. On the other hand, in local areas, there are fewer users skilled in ATM operation than in urban areas, so each prescribed value is set with a longer time than in urban areas. [Embodiment 4] Next, an ATM according to Embodiment 4 will be described. A conventional automatic transaction device defines a timeout period for canceling the entire transaction process if there is no input for a predetermined period of time after screen transition. An alarm was sounded before (for example, 5 seconds ago) to prompt for input. If there is no input after that, the automatic transaction device forcibly terminates the transaction at the same time as the time-out period is reached.

[0143]

1491 Such a handling method is effective when the user stops operating the automatic teller machine halfway and is absent, or when the user intentionally executes forced termination due to timeout.

1494 However, in some cases, such as when the user cannot understand what to do and cannot make an input, the prompting alarm only confuses the user. In this case, the user may be dissatisfied with being unable to do what he/she can do because he was panicked by the prompting alarm, or he/she may feel that he/she is being used by the machine.

[0144]

1501 The ATM according to Embodiment 4 is designed in view of the above problems.

1502 However, since the ATM according to the fourth embodiment has substantially the same configuration as the ATM according to the first embodiment, the description of the common points will be omitted and the differences will be described. FIG. 23 is a flowchart showing processing (timeout processing) by the control unit CPU in the fourth embodiment.

[0145]

1509 This timeout process starts when the screen transition of the transaction screen 70 is completed.
1511 First, the control unit CPU activates an input monitoring timer (not shown) held by itself (step S301). Subsequently, the control unit CPU determines whether or not there is a key input from the input device 2a (step S302). At this time, if the control unit CPU determines that there is a key input (step S302; YES), it ends the timeout process and starts the next process. On the other hand, if the control unit CPU determines that there is no key input (step S302; NO), the process proceeds to step S303.

[0146]

1520 When the control unit CPU proceeds to step S303, an input monitoring timer (not shown) counts a preset time-out period, and determines whether or not a time-out has occurred.
1522 At this time, if the control unit CPU determines that a timeout has occurred (step S303; YES), it forcibly terminates the transaction and ends this timeout process. On the other hand, when the control unit CPU determines that a timeout has not occurred (step S303; NO), the process proceeds to step S304.

[0147]

1529 When the process proceeds to step S304, the control unit CPU determines whether or not 10 seconds have elapsed since starting an input monitoring timer (not shown).
1531 At this time, if the control unit CPU determines that 10 seconds have not passed (step S304; YES), it gives an operation command to the audio output unit 60 (see FIG. 3) to generate a warning sound (step S305). After that, the control unit CPU returns the process to step S302. On the other hand, if the control unit CPU determines that 10 seconds have passed (step S304; NO), the process proceeds to step S306.

[0148]

1539 When the process proceeds to step S306, the control unit CPU determines whether or not 15 seconds have passed since the input monitoring timer (not shown) was activated.
1541 At this time, if the control unit CPU determines that 15 seconds have not elapsed (step S306; YES), the help display 106 is displayed on the transaction screen 70 of the display device 1 (step S307). After that, the control unit CPU returns the process to step S302. On the other hand, if the control unit CPU determines that 15 seconds have passed (step S306; NO), the process proceeds to step S308.

[0149]

1549 When the process proceeds to step S308, the control unit CPU determines whether or not 20

seconds have elapsed since starting an input monitoring timer (not shown).
1551 At this time, if the control unit CPU determines that 20 seconds have not elapsed (step S308; YES), the process proceeds to step S311. On the other hand, if the control unit CPU determines that 20 seconds have passed (step S308; NO), the process proceeds to step S309.

[0150]

1558 When proceeding to step S309, the control unit CPU determines whether or not it is 5 seconds before the input monitoring timer (not shown) counts the timeout time.
1560 At this time, if the control unit CPU determines that it is 5 seconds before (step S309; YES), it gives an operation command to the audio output unit 60 to generate a warning alarm. After that, the control unit CPU returns the process to step S302. On the other hand, if the control unit CPU determines that it is not 5 seconds before (step S308; NO), the process returns to step S302.

[0151]

1568 On the other hand, when proceeding to processing step S311, the control unit CPU displays a timeout notice (for example, a character string such as "Time will expire in a few seconds and the transaction will be forcibly terminated") on the transaction screen 70 of the display device 1. In addition to displaying it, the voice output unit 60 is caused to output voice guidance to the effect that a time-out will occur.
1573 Subsequently, the control unit CPU activates a suspend button (not shown) (a button for extending the timeout period) and an instruction display (not shown) (for example, characters such as "Press the suspend button if you want to continue trading"). column) is displayed on the transaction screen 70.

[0152]

1580 Thereafter, the control unit CPU enters a state of accepting input from the suspend button (not shown) for a predetermined time, and after the predetermined time has elapsed, determines whether or not the suspend button (not shown) has been pressed (step S313).
1583 At this time, if the control unit CPU determines that the suspend button (not shown) has not been pressed (step S313; NO), the process proceeds to step S309. On the other hand, if the control unit CPU determines that the suspend button (not shown) has been pressed (step S313; YES), the process returns to step S304. As a result, the control unit CPU jumps to the process of step S303, and the time-out period is extended until the next process of step S303 is performed.

[0153]

1592 According to the ATM according to the fourth embodiment, when data is not input to the input device 2a after the screen transition is performed, the ATM generates a warning sound as the first step, and displays the display device as the second step. In step 1, an operation method explanation display (help display 106) is displayed, in the third step, a timeout warning is displayed and voice guidance is given, and in the fourth step, a timeout warning alarm is generated.

1598 In this manner, time-out information is provided to the ATM user in stages, so that the user can operate the ATM without feeling any psychological pressure.

[0154]

1603 Further, by displaying the help display 106, the user who lacks operational knowledge can be relieved, so that the possibility of the transaction being forcibly terminated due to timeout can be reduced.

1606 Furthermore, a suspend button (not shown) is provided, and pressing this button extends the time until timeout, so that it is possible to give the user time to try to understand the operation method of the ATM. Therefore, it is possible to give satisfaction to the user as compared with the conventional automatic teller machine which inevitably terminates when the timeout time comes. [Embodiment 5] Next, an ATM according to Embodiment 5 will be described. In the conventional automated teller machine, there was no warning sound such as a signal sound when the transaction screen was switched. may not notice, and transactions may take time.

[0155]

1617 In view of this, conventional automated teller machines display characters on the transaction screen in large size or blink the characters in order to notify the user that the transaction screen has been switched and that data can be entered. However, if the user does not pay attention to the display device, the user will miss these signals, which is not sufficient.

[0156]

1624 The ATM according to Embodiment 5 has been made in view of the problems described above.

1626 Since the ATM according to the fifth embodiment is substantially the same as the ATM according to the first embodiment, the description of common points will be omitted, and differences will be described.

1629 FIG. 24 is a flow chart showing processing (attention calling processing) by the control unit CPU of the ATM according to the fifth embodiment.

[0157]

This alerting process starts when any one of the operating procedures ends (step S401). When the control unit CPU advances the process to step S402, the transaction screen 70 is rewritten. That is, internal processing (screen display processing: see FIG. 4) for displaying the screen transition described in the first embodiment on the display device 1 is performed.

[0158]

Subsequently, the control unit CPU transfers the data (video signal) of the transaction screen 70 to the display device 1, and displays the transaction screen 70 in the next operation procedure (step S403). When the transaction screen 70 is displayed on the display device 1 by the process of step S403, the control unit CPU gives an operation command to the voice output unit 60 to generate a signal sound (step S404). Then, the control unit CPU becomes in a state in which the user can input data, that is, in a state of waiting for a signal from the input device 2a (step S405).

[0159]

According to the ATM according to the fifth embodiment, since a signal sound is generated when the transaction screen 70 is changed, the user can be made to pay attention to the transaction screen 70 . In addition, since the data input is made possible following the generation of the signal sound, the user can start data input to the ATM upon the generation of the signal sound. Therefore, it is possible to shorten the operation time of the ATM by the user, which in turn contributes to the improvement of the operation rate of the customer in the financial institution. [Embodiment 6] Next, an ATM according to Embodiment 6 will be described. Since the ATM according to Embodiment 6 is substantially the same as the ATM according to Embodiment 1, common points will be omitted and only differences will be described.

[0160]

FIG. 25 is a flow chart showing a finger drag determination process in the customer operation unit UOP. This determination process starts when the transaction screen 70 is displayed on the display device 1 and data can be input.

[0161]

In step S501, it is determined whether or not an object has been detected in contact with the touch panel of the input device 2a. At this time, if an object is detected (step S501; YES), the process proceeds to step S502. On the other hand, if no object is detected (step S501; NO), the process of step S501 is repeated until YES is determined in step S501.

[0162]

1681 When the process proceeds to step S502, the object detected in step S501 remains detected, and the contact position coordinates between the object and the touch panel are the contact position detected in step S501. It is determined whether or not it differs from the coordinates.

1685 At this time, if the object is still detected and the contact position coordinates are different (step S502; YES), it is assumed that the finger is being dragged, and a signal to that effect is transferred to the control unit CPU. (step S503), and this determination process ends.

[0163]

1691 On the other hand, if the object is not in the state of being detected, or if the contact position coordinates do not differ (step S502; NO), then either key or button on the input panel display 84 is normally pressed. Then, a signal to that effect is transferred to the control unit CPU (step S504).

1695 Then, this determination processing ends.

[0164]

1699 FIG. 26 is a flow chart showing a drag warning sound generating process by the control unit CPU.

1701 This process starts when the transaction screen 70 is displayed on the display device 1 and data can be input.

[0165]

1706 First, the control unit CPU waits for key input (step S505), and determines whether or not there is key input (step S506).

1708 That is, it is determined whether or not a signal has been transferred from the input device 2a. At this time, if it is determined that the signal has been transferred from the input device 2a, the control unit CPU advances the process to step S507.

[0166]

1714 When proceeding to step S507, the control unit CPU determines whether or not the signal transferred from the input device 2a is a signal indicating a finger dragging action.

1716 At this time, if the control unit CPU determines that the signal does not indicate a drag motion, the process proceeds to step S508, performs other processes, and terminates the drag warning sound generation process. On the other hand, if it is determined that the signal indicates a dragging motion, the control unit advances the process to step S509.

[0167]

1723 When the process proceeds to step S509, the control unit CPU gives an operation signal to the audio output unit 60 to generate a signal sound indicating a warning.

1725 Subsequently, the control unit CPU outputs to the display device 1, for example, "You are dragging your finger. A window containing the character string "Please move away from the screen" is displayed (step S510). After that, the control unit CPU returns the process to step S506.

[0168]

1732 According to the sixth embodiment, when a finger dragging action is performed, a signal sound is emitted, so that the user pays attention to the display device 1 .

1734 Then, the display device 1 displays a warning message about dragging the finger, so the user can check whether there is an error in the input data. will be corrected. For this reason, it is possible to prevent data input errors and erroneous operations of the device due to finger dragging. [Embodiment 7] Next, an ATM according to Embodiment 7 will be described. In a conventional automatic transaction device, each of a plurality of transaction screens is created individually according to the operation details required for transaction. Moreover, the display order of a plurality of transaction screens is determined by a processor device mounted on the automatic transaction device according to a sequence defined by a control program. Therefore, if you want to change the display order of multiple transaction screens, you have to modify the program. In addition, when the input object to be input to the automated teller machine is changed, it is necessary to change the data of the transaction screen as well as the program.

[0169]

1749 However, since control programs and transaction screen data for automated teller machines are usually stored in hard disks, it takes time and is extremely difficult to change them.

1751 Embodiment 7 has been made in view of the above-described problems.

[0170]

1755 FIG. 27 is a block diagram showing the central processing unit 3 (control unit CPU) of the ATM according to the seventh embodiment.

1757 However, since the ATM according to the fourth embodiment is substantially the same as the ATM according to the first embodiment, the same constituent elements are given the same reference numerals and explanations thereof are omitted, and only the points of difference are explained. In FIG. 27, the central processing unit 3 has a hard disk 24 . A screen creation table 25 is held in the hard disk 24 .

[0171]

1765 FIG. 28 is an explanatory diagram of the screen creation table 25. As shown in FIG.
1766 28, the screen creation table 25 contains a plurality of output data (data defined in the control program recorded in the HD 10 shown in FIG. 3 and used for displaying the transaction screen 70 on the display device 1). data), an explanation display 83, and an input panel display 84 corresponding to each are stored. This screen creation table 25 is created by paying attention to the fact that the explanation display 83 and the input panel display 84 among the screen elements of the transaction screen 70 can be specified in a 1:1 relationship with respect to the input object. is. Also, the background 81 is uniquely determined by selecting the transaction type, so it is held as fixed data.

[0172]

1777 FIG. 29 is a flow chart showing processing by the processing control device 20 shown in FIG.
1778 In FIG. 29, among the processes of steps S601 to S609, the processes of steps S601 to S604 and the processes of steps S606 to S609 are the same as the processes of steps S01 to S04 and steps S06 to S09 shown in FIG. Therefore, the description is omitted, and step S605 will be described.

[0173]

1785 When the process proceeds to step S605, the subroutine of the screen creation process by the display data processing unit 21 is started.
1787 FIG. 30 is a flowchart showing screen creation processing. When the screen creation process starts, the display data processing unit 21 first receives the texture data of the background 81 corresponding to the transaction type from the image data holding unit 7 (step S701). Subsequently, the display data processing unit 81 receives the texture data of the procedure display 82 corresponding to the transaction type from the image data holding unit 7 (step S702).

[0174]

1796 Subsequently, the display data processing unit 21 searches the screen creation table 25 based on the output data defined in the control program, and identifies the corresponding input target (step S703).
1799 Subsequently, the display data processing unit 21 identifies the explanation display 83 corresponding to the input object identified in step S703, and reads the texture data of the corresponding explanation display 83 from the image data holding unit 7 (step S704).

[0175]

1805 Subsequently, the display data processing unit 21 identifies the input panel display 84 corresponding to the input target identified in step S703, and reads the texture data of the corresponding input panel display 84 from the image data holding unit 7 (step S705). .

1808 The display data processing unit 21 then receives necessary character data from the CG unit 6 . Then, the screen creation process ends, and the process proceeds to step S606 in the main routine.

[0176]

1814 According to the ATM according to Embodiment 7, the transaction screen 70 is created based on the contents stored in the screen creation table 25. Therefore, if the contents stored in the screen creation table 25 are changed, the display contents of the transaction screen 70 and the transaction screen 70 can be changed. You can change the display order of

1819 Therefore, there is no need to change the content of the control program recorded on the HD 10. FIG.

[0177]

1824 EFFECTS OF THE INVENTION According to the automated teller machine according to the present invention, operability can be improved as compared with the conventional one, regardless of the user's proficiency level of operation.

[0178]

1830 Brief description of the drawing

[0179]

1834 Figure 1 Block diagram showing main parts of ATM

[0180]

1838 Figure 2 ATM external configuration diagram

[0181]

1842 Block diagram showing the specific configuration of Figure 3 ATM

[0182]
1846 FIG. 4 Flowchart showing processing by control unit

[0183]
1850 Fig. 5 Explanatory diagram of transaction screen

[0184]
1854 Figure 6 Explanatory diagram of the screen elements of the transaction screen

[0185]
1858 Fig. 7 Explanatory diagram of procedure display

[0186]
1862 Figure 8 Explanatory diagram of procedure display

[0187]
1866 Fig. 9 Explanatory diagram of procedure display

[0188]
1870 Fig. 10 Explanatory diagram of input panel display

[0189]
1874 Fig. 11 Explanatory diagram of input panel display

[0190]
1878 Fig. 12 Explanatory diagram of input panel display

[0191]
1882 Fig. 13 Explanatory diagram of input panel display

[0192]

1886 Fig. 14 Explanatory diagram of confirmation screen

[0193]
1890 Figure 15 Explanatory diagram of return button

[0194]
1894 Figure 16 Explanatory diagram of help display

[0195]
1898 Figure 17 Conceptual diagram of operation procedure

[0196]
1902 Figure 18 Diagram showing an example of operation procedure

[0197]
1906 FIG. 19 Explanatory diagram of transaction screen according to Embodiment 2

[0198]
1910 Block diagram showing the configuration of the ATM according to FIG. 20 Embodiment 3

[0199]
1914 FIG. 21 Flowchart showing proficiency level determination processing

[0200]
1918 FIG. 22 Flowchart showing proficiency level determination processing

[0201]
1922 FIG. 23 Flowchart showing timeout processing

[0202]
1926 FIG. 24 Flowchart showing alerting process

[0203]
1930 FIG. 25 Flowchart showing drag determination processing

[0204]
1934 FIG. 26 Flowchart showing drag warning sound generation processing

[0205]
1938 Figure 27 Block diagram of ATM according to Embodiment 7

[0206]
1942 Fig. 28 Explanatory diagram of screen creation table

[0207]
1946 FIG. 29 Flowchart showing screen creation processing

[0208]
1950 Flowchart showing FIG. 30 screen creation processing

[0209]
1954 FIG. 31 Explanatory diagram of conventional technology

[0210]
1958 FIG. 32 Explanatory diagram of conventional technology

[0211]
1962 Fig. 33 Explanatory diagram of conventional technology

[0212]
1966 Code explanation

[0213]

1970 A, B Timer CPU Control device 1 Display device 2a Input device 3 Central processing unit 6 CG unit 7 Image data holding unit 8 ROM 9 RAM 20 Processing control unit 21 Display data processing unit 22 Display control unit 23 Interrupt processing unit 24 EEPROM 25 Screen creation table 70 Transaction screen 71 Transaction type display area 72 Operation explanation area 73 Input object display area 74 Input data display area 75 Operation area 80 Attention area 81 Background 81a Transaction type display column 81b Cancel button 82 Procedure display 83, 183 Explanation display 84, 184 Input panel Display 87 Input data column 92 First confirmation button 101 Correction button 102 Back button 105 Second confirmation button 106 Help display 107 Quick display button 108 Detailed explanation button

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CLAIMS JPH1125320A

1.

13 a display device for displaying information; an input device for inputting information relating to transactions; and a controller for controlling information display on the display device and based on information input from the input device according to the information displayed on the display device. and a control unit configured to perform transaction processing by arranging a plurality of input item fields in which a plurality of items of information input from the input device are displayed on the display device in order of input. and, when each of the plurality of information is input from the input device in accordance with the input order, an operation screen corresponding to each information is displayed in a state superimposed on the procedure display. An automatic transaction device characterized by

2.

25 The automated teller machine according to claim 1, wherein said procedure display is always displayed on said display device.

3.

30 a display device for displaying information; an input device for inputting information relating to transactions; and a controller for controlling information display on the display device and based on information input from the input device according to the information displayed on the display device. a specific area is set on the screen of the display device, and the control unit displays a plurality of information items input from the input device to the display device a plurality of input item fields each indicated with are arranged in order of input, and the procedure display is displayed substantially orthogonal to the longitudinal direction of each of the input item fields in accordance with the progress of the operation procedure of the

transaction. An automated teller machine characterized by displaying an input item column corresponding to an operation currently being performed among the plurality of input item columns in the specific area by moving in a direction.

4.

44 The operation screen is arranged below the specific area, an explanation display showing an explanation of the operation screen is arranged above the specific area, and a transaction type display showing a transaction type above the explanation display. 3. The automated teller machine according to claim 2, wherein columns are arranged.

5.

51 An input information display area for displaying information corresponding to the input item is formed in each of the input item fields, and the control unit includes holding means for holding information input from the input device. returning the display contents of the display device to the state at the time of inputting the information held in the holding means in response to a request from the user, reading the corresponding information from the holding means and displaying it in the input information display area. 3. The automatic transaction device according to claim 2, characterized by:

6.

61 In response to a request from a user, the control unit excludes an operation screen in a range overlapping at least the procedure display from the display contents of the display, and displays the information held by the holding means as input information in the corresponding input item column. 6. The automated teller machine according to claim 5, wherein the information is displayed in an area.

7.

69 2. The automated teller machine according to claim 1, wherein said control unit changes the speed of changing the display contents of said display device according to a request from a user.

8.

75 The control unit has information presenting means for displaying operation information related to the input of information on the display device when information is input from the input device, and the operation information is displayed on the display device by the information presenting means. 2. The automated teller machine according to claim 1, wherein the number of times the is displayed is changed according to a request from the user.

9.

83 When displaying the procedure display on the display device, the control unit fixes the number of input item columns constituting the procedure display and the threshold value for determining whether to display the procedure display fixedly. 3. The automatic teller machine according to claim 2, wherein the procedure display is fixedly displayed on the display device when the number of input item fields is less than a fixed threshold value by comparing with a threshold value.

10.

92 The method according to claim 3, wherein said control unit enlarges and displays an input information display area of an input item column displayed in said specific area and information displayed in this input information display area. Automatic trading device.

11.

98 10. The automated teller machine according to claim 1, wherein a part of said operation screen is displayed translucently.

12.

103 10. The automated teller machine according to claim 4, wherein said transaction type display field is provided with a cancel button for forcibly terminating processing related to the transaction.

13.

109 10. The automated teller machine according to claim 5, wherein an input information display area in each of said plurality of input item fields is provided with a button for correcting information displayed in the input information display area. .

14.

115 10. When all the information in the transaction is input, the control unit causes the display to display the procedure display as a confirmation screen for each input information, and displays the input information corresponding to each of the all information. 6. The automated teller machine according to claim 5, wherein the information is displayed in an area.

15.

123 10. A plurality of input item fields are divided into a plurality of operation sets according to attributes of information input from the input device, and the operation sets are displayed in different colors. 3. The automatic transaction device according to 3.

16.

129 The automated teller machine according to claim 15, wherein a plurality of input item fields constituting said operation set are color-coded in a state of drawing a gradation according to the order of information input.

17.

135 16. The automated teller machine according to claim 15, wherein the background color of the screen forming the display contents of said display device changes according to the color of the input item column displayed in said specific area.

18.

141] The control unit detects an input time, which is the time required for a user to input specific information, and compares the detected input time with a proficiency level threshold, which is a threshold for judging the user's proficiency level of operation. 2. The automated teller machine according to claim 1, wherein, in contrast, when said input time is equal to or less than said proficiency level threshold, the change speed of the display contents of said display device is increased.

19.

150 10. The control unit has information presenting means for displaying operation information related to the input of information on the display device when information is input from the input device, and the input time is equal to or less than the proficiency level threshold. 19. The automated teller machine according to claim 18, wherein the number of times the operation information is displayed on the display device by the information presenting means is reduced.

20.

159 10. A display device for displaying information; an input device for inputting information relating to transactions; and a control unit for performing transaction processing based on the user, wherein the control unit selects either one of one procedure consisting of a plurality of operations and a plurality of procedures corresponding to the plurality of operations included in the one procedure. An automatic transaction device characterized by providing in

response to a request from.

21.

168 The automatic transaction according to claim 1 or 20, wherein said control unit causes said display device to display a caution display for prompting the input of information when there is no information input from said input device for a predetermined time. Device.

22.

174 21. The automated teller machine according to claim 1 or 20, wherein said control unit causes said display device to display information input operation guidance when there is no information input from said input device for a predetermined time.

23.

180 10. A screen displayed on the display when information is input from the input device is generated by synthesizing a plurality of image data by the control section, and an image corresponding to each image data is generated by the 21. The automatic transaction device according to claim 1 or 20, wherein the information is displayed in a predetermined area set on the screen of the display device.

24.

188] The control unit has a plurality of types of image data for the explanation display and a plurality of types of image data for the operation screen, generates image data for a procedure display according to the type of transaction, and stores a plurality of input item fields for the procedure display. according to the input order of the information, acquire the image data of the explanation display and the image data of the operation screen corresponding to the specified items in the input item column, and acquire the image data of the procedure display and the image of the operation screen 5. The automated teller machine according to claim 4, wherein data of an image to be displayed on said display device is generated using the data and image data of the generated procedure display.

25.

200 21. The automated teller machine according to claim 1 or 20, further comprising voice output means for outputting voice when said control unit is ready to receive information from said input device.

26.

206 10. The automatic processing method according to claim 3, further comprising voice output means for outputting voice when said control unit moves said procedure display in a direction substantially orthogonal to the longitudinal direction of each of said input item columns. trading device.

27.

213 10. The input device is a touch panel, position detection means for detecting position information of an object in contact with the touch panel, and whether the position of the object in contact with the touch panel is changed based on the detected position information. and a voice output means for outputting a warning sound when the determination means determines that the object is changing its position while in contact with the touch panel. The automatic transaction device according to claim 1 or 20.

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最終頁に続く

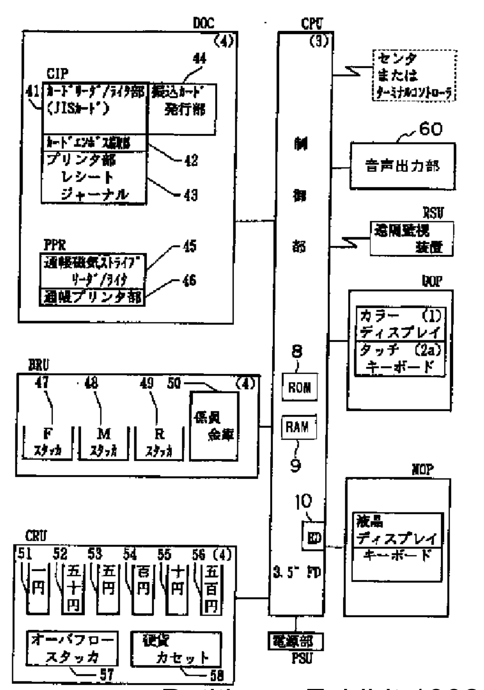
(54)【発明の名称】　自動取引装置

(57)【要約】

【課題】利用者の操作の習熟度に関係なく操作性の向上を図ることができる自動取引装置を提供すること。

【解決手段】本発明による自動取引装置によれば、制御部ＣＰＵがユーザからの要求に応じた取引の取引画面７０をディスプレイ装置１に表示させる。ディスプレイ装置１には、入力対象を示す入力データ欄８７を入力順に並べてなる手順表示８２が表示される。そして、制御部ＣＰＵは、入力対象の何れかをユーザに入力させる際には、入力対象に応じた種類の操作画面８４を、取引画面７０の手順表示７２の上に重ねた状態で表示させる。これによって、ユーザが手順表示８２から取引の操作手順の流れ、入力対象等を適正に把握した上で、データ入力を行うことが可能となる。

ＡＴＭの具体的構成を示すブロック図



Petitioner Exhibit 1002-2349

【特許請求の範囲】
【請求項１】情報を表示するディスプレイ装置と、取引に係る情報を入力する入力装置と、前記ディスプレイ装置の情報表示を制御し且つ前記ディスプレイ装置に表示された情報に応じて前記入力装置から入力された情報に基づいて取引処理を行う制御部とを備え、
前記制御部が、前記ディスプレイ装置に対し、前記入力装置から入力される複数の情報の項目が夫々示された複数の入力項目欄を入力順に並べて形成された手順表示を表示させるとともに、前記複数の情報の夫々が前記入力順に従って前記入力装置から入力される際に各情報に対応する操作画面を前記手順表示の上に重ねた状態で夫々表示させることを特徴とする自動取引装置。
【請求項２】前記手順表示が、前記ディスプレイ装置に常時表示されることを特徴とする請求項１記載の自動取引装置。
【請求項３】情報を表示するディスプレイ装置と、取引に係る情報を入力する入力装置と、前記ディスプレイ装置の情報表示を制御し且つ前記ディスプレイ装置に表示された情報に応じて前記入力装置から入力された情報に基づいて取引処理を行う制御部とを備え、
前記ディスプレイ装置の画面には、特定領域が設定されており、前記制御部が、前記ディスプレイ装置に対し、前記入力装置から入力される複数の情報の項目が夫々示された複数の入力項目欄を入力順に並べて形成された手順表示を表示させるとともに、前記取引の操作手順の進行に応じて前記手順表示を前記各入力項目欄の長手方向とほぼ直交する方向へ移動させることによって、前記複数の入力項目欄のうち現在行われている操作に対応する入力項目欄を前記特定領域にて表示させることを特徴とする自動取引装置。
【請求項４】前記特定領域の下側に前記操作画面が配置され、前記特定領域の上側に前記操作画面の説明が示された説明表示が配置され、この説明表示の上側に取引種別が示された取引種別表示欄が配置されることを特徴とする請求項２記載の自動取引装置。
【請求項５】前記各入力項目欄の夫々には、入力項目に対応する情報が示される入力情報表示域が形成されており、前記制御部は、前記入力装置から入力された情報を保持する保持手段を有し、ユーザからの要求に応じて前記ディスプレイ装置の表示内容を前記保持手段に保持された情報の入力時の状態に戻し、前記保持手段から該当する情報を読み出して当該入力情報表示域に表示させることを特徴とする請求項２記載の自動取引装置。
【請求項６】前記制御部が、ユーザからの要求に応じて少なくとも前記手順表示と重なる範囲の操作画面を前記ディスプレイの表示内容から除外し、前記保持手段に保持された情報を該当する入力項目欄の入力情報表示域に表示させることを特徴とする請求項５記載の自動取引装置。
【請求項７】前記制御部が、前記ディスプレイ装置の表示内容の変更速度をユーザからの要求に応じて変化させることを特徴とする請求項１記載の自動取引装置。
【請求項８】前記制御部が、前記入力装置から情報が入力される際にその情報の入力に係る操作情報を前記ディスプレイ装置に表示させる情報提示手段を有するとともに、前記情報提示手段によって前記ディスプレイ装置に前記操作情報が表示される回数をユーザからの要求に応じて変更することを特徴とする請求項１記載の自動取引装置。
【請求項９】前記制御部は、前記手順表示を前記ディスプレイ装置に表示させる際に、その手順表示を構成する入力項目欄の数と手順表示を固定して表示させるか否かを判定するための閾値である固定閾値とを対比し、前記入力項目欄の数が固定閾値未満である場合に、前記手順表示を前記ディスプレイ装置に固定して表示させることを特徴とする請求項２記載の自動取引装置。
【請求項１０】前記制御部は、前記特定領域にて表示される入力項目欄の入力情報表示域，及びこの入力情報表示域に表示される情報を拡大して表示することを特徴とする請求項３記載の自動取引装置。
【請求項１１】前記操作画面の一部が半透明で表示されることを特徴とする請求項１記載の自動取引装置。
【請求項１２】前記取引種別表示欄には、取引に係る処理を強制終了させる取消ボタンが設けられていることを特徴とする請求項４記載の自動取引装置。
【請求項１３】前記複数の入力項目欄の夫々における入力情報表示域にはこの入力情報表示域に表示された情報を修正するためのボタンが設けられていることを特徴とする請求項５記載の自動取引装置。
【請求項１４】前記制御部は、取引における全ての情報が入力された場合に、入力された各情報の確認画面として前記手順表示を前記ディスプレイに表示させるとともに、前記全ての情報の夫々を該当する入力情報表示域に表示させることを特徴とする請求項５記載の自動取引装置。
【請求項１５】前記複数の入力項目欄が、前記入力装置から入力される情報の属性に応じて複数の操作セットに区分けされており、操作セット毎に異なる色で表示されていることを特徴とする請求項３記載の自動取引装置。
【請求項１６】前記操作セットを構成する複数の入力項目欄が、情報の入力順に沿ったグラデーションを描く状態で色分けされていることを特徴とする請求項１５記載の自動取引装置。
【請求項１７】前記ディスプレイ装置の表示内容をなす画面の背景の基調色が、前記特定領域にて表示される入力項目欄の色に応じて変化することを特徴とする請求項１５記載の自動取引装置。
【請求項１８】前記制御部は、ユーザが特定の情報を入力するに要した時間である入力時間を検出し、検出した

入力時間とユーザの操作の習熟度を判定するための閾値である習熟度閾値とを対比し、前記入力時間が前記習熟度閾値以下である場合には、前記ディスプレイ装置の表示内容の変更速度を上昇させることを特徴とする請求項１記載の自動取引装置。

【請求項１９】前記制御部は、前記入力装置から情報が入力される際にその情報の入力に係る操作情報を前記ディスプレイ装置に表示させる情報提示手段を有し、前記入力時間が前記習熟度閾値以下である場合には、前記情報提示手段によって前記ディスプレイ装置に前記操作情報が表示される回数を低減することを特徴とする請求項１８記載の自動取引装置。

【請求項２０】情報を表示するディスプレイ装置と、取引に係る情報を入力する入力装置と、前記ディスプレイ装置の情報表示を制御し且つ前記ディスプレイ装置に表示された情報に応じて前記入力装置から入力された情報に基づいて取引処理を行う制御部とを備え、

前記制御部が、複数の操作からなる一つの手順と前記一つの手順に含まれる複数の操作に夫々対応する複数の手順との何れか一方をユーザからの要求に応じて提供することを特徴とする自動取引装置。

【請求項２１】前記制御部は、前記入力装置から所定時間情報の入力がない場合に、情報の入力を促すための注意表示を前記ディスプレイ装置に表示させることを特徴とする請求項１又は２０記載の自動取引装置。

【請求項２２】前記制御部は、前記入力装置から所定時間情報の入力がない場合に、情報の入力操作ガイダンスを前記ディスプレイ装置に表示させることを特徴とする請求項１又は２０記載の自動取引装置。

【請求項２３】前記入力装置から情報が入力される際に前記ディスプレイに表示される画面は、前記制御部が複数の画像データを合成することによって生成されており、前記各画像データに対応する画像は、前記ディスプレイ装置の画面に設定された所定領域にて表示されることを特徴とする請求項１又は２０記載の自動取引装置。

【請求項２４】前記制御部は、前記説明表示の画像データ及び前記操作画面の画像データを夫々複数種類保有し、取引種別に応じた手順表示の画像データを生成し、この手順表示をなす複数の入力項目欄の何れかを情報の入力順に従って特定し、特定した入力項目欄の項目に夫々対応する説明表示の画像データ及び操作画面の画像データを取得し、取得した手順表示の画像データ，操作画面の画像データ，及び作成した手順表示の画像データを用いて前記ディスプレイ装置に表示させる画像のデータを生成することを特徴とする請求項４記載の自動取引装置。

【請求項２５】前記制御部が前記入力装置から情報を受け取り可能となった場合に音声を出力する音声出力手段をさらに備えたことを特徴とする請求項１又は２０記載の自動取引装置。

【請求項２６】前記制御部が前記手順表示を前記各入力項目欄の長手方向とほぼ直交する方向へ移動させた場合に音声を出力する音声出力手段をさらに備えたことを特徴とする請求項３記載の自動取引装置。

【請求項２７】前記入力装置がタッチパネルであり、このタッチパネルに接触した物体の位置情報を検出する位置検出手段と、検出された位置情報に基づいて前記物体が前記タッチパネルと接触した状態でその位置を変えているか否かを判定する判定手段と、前記判定手段が前記物体がタッチパネルと接触した状態でその位置を変えていると判定した場合に警告音を出力する音声出力手段とを備えたことを特徴とする請求項１又は２０記載の自動取引装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、現金自動預金支払装置（ＡＴＭ：Automatic Teller's Machine)，現金自動支払装置（ＣＤ：Cash Dispenser)，現金自動預金装置，振込専用装置，或いは証券発行装置等と称される自動取引装置に関する。

【０００２】

【従来の技術】近年、銀行等の金融機関において、行員等を介さないで取引を可能にする自動取引装置が実用化されている。このような自動取引装置では、顧客が装置のディスプレイの画面表示を見ながら対話的に情報の入力等の操作を行うことによって、所望の取引が行われる。

【０００３】即ち、自動取引装置のディスプレイ装置には、初期画面として取引可能な項目を全て表示したスタート画面が表示される。そして、顧客がこのスタート画面で目的とする取引項目を選択すると、自動取引装置による処理が開始される。ディスプレイはタッチパネルを備えており、顧客がディスプレイ装置に表示されたボタンを押すことによって、自動取引装置に対する操作やデータ入力がなされる。

【０００４】スタート画面で任意の取引が選択される（ディスプレイ装置に表示された任意の取引種別ボタンが押される）と、自動取引装置は、当該取引に対応した処理を実行する。即ち、自動取引装置は、当該取引が顧客との間でなされるように予め定められた操作手順に従って、自動取引装置の操作内容を示す複数の取引画面をディスプレイ装置に順次表示する。これに対し、顧客が各取引画面の表示内容に従ってその画面内に設定されたボタンを押すことで、操作手順が進められ、次の取引画面がディスプレイ装置に表示される。そして、全ての操作手順が終了すると、自動取引装置による取引処理が終了し、当該取引が顧客と金融機関との間で実行されたものとして取り扱われる。

【０００５】日常生活を営む上で金融機関との取引は不可欠であり、あるデータによれば、銀行等の金融機関の

来店客の約８０％は自動取引装置を利用して取引を行っている。このような大多数の人が利用する自動取引装置は、非常に公共性の高い装置であるといえる。

【０００６】

【発明が解決しようとする課題】しかしながら、従来における自動取引装置は、以下の問題を有していた。即ち、自動取引装置の利用者は、若年層から高齢層までと広い年齢層にまたがっている。また、自動取引装置の操作についての知識，或いは金融機関との取引知識等も利用者によって千差万別である。即ち、自動取引装置の操作に対する習熟度は、利用者によって大きく異なる。これに対処すべく、自動取引装置は、利用者の習熟度に関係なく利用者の全てに対し平等な操作環境を提供するように構成されることが望まれる。

【０００７】ところが、従来における自動取引装置では、自動取引装置の操作は、各取引画面に表示された指示に従って行われるが、各取引画面には、その時点での操作内容が示されるのみであった。また、各取引画面は、操作手順が進む度に次の取引画面と完全に切り替わっていた(図３２，図３３参照)。このため、利用者は、既に行った操作，既に入力したデータの内容，これから行う操作の内容，或いは操作手順の全体の流れ等を、現在ディスプレイに表示されている取引画面の表示内容から把握することができなかった。従って、利用者が現在行っている操作や操作手順の進み具合を把握できなくなり、データの誤入力，装置の誤操作を行ってしまう場合があった。

【０００８】また、従来における自動取引装置では、自動取引装置を用いて実行可能な複数の取引の夫々に対して１通りの操作手順のみが設定され、この操作手順に従った複数の取引画面がディスプレイに順次表示されるのみであった(図３１，図３２，図３３参照)。このため、自動取引装置の利用者は、その習熟度に拘わらず同一の操作手順に従って自動取引装置の操作を行わなくてはならなかった。ここで、自動取引装置の操作手順は、可能な限り広い範囲の利用者に対応すべく、平均的な操作の習熟度を持つ利用者に合わせて設定されていた。

【０００９】このため、操作手順は、習熟度の低い利用者にとっては簡略的であり、習熟度の高い利用者にとっては冗長なものとなっていた。従って、習熟度の低い利用者が自動取引装置の操作手順の順序，或いは操作方法等について把握又は予測できず、誤った操作を行ってしまう場合があった。一方、習熟度が高い利用者が、冗長な操作手順に従って自動取引装置を操作することに煩わしさを覚え、この煩わしさのために取引画面の表示内容(入力対象等)の確認を疎かにし、データの誤入力，或いは誤操作を行ってしまう場合があった。

【００１０】本発明は上記問題に鑑みなされたものであり、利用者の操作の習熟度に関係なく操作性の向上を図ることができる自動取引装置を提供することを課題とする。

【００１１】

【課題を解決するための手段】本発明は、上述した課題を解決するために以下の構成を採用する。すなわち、請求項１の発明は、情報を表示するディスプレイ装置と、取引に係る情報を入力する入力装置と、前記ディスプレイ装置の情報表示を制御し且つ前記ディスプレイ装置に表示された情報に応じて前記入力装置から入力された情報に基づいて取引処理を行う制御部とを備えた自動取引装置である。この自動取引装置は、前記制御部が、前記ディスプレイ装置に対し、前記入力装置から入力される複数の情報の項目が夫々示された複数の入力項目欄を入力順に並べて形成された手順表示を表示させるとともに、前記複数の情報の夫々が前記入力順に従って前記入力装置から入力される際に各情報に対応する操作画面を前記手順表示の上に重ねた状態で夫々表示させることを特徴とする。

【００１２】請求項１の発明によると、制御部がディスプレイ装置に対し、手順表示を表示させる。そして、複数の情報の夫々が入力される際には、制御部は、各情報に対応する操作画面を手順表示の上に重ねた状態で表示させる。従って、自動取引装置のユーザは、手順表示から複数の入力項目，入力項目数，入力順等の情報を把握した上で、手順画面の上に重ねて表示された操作画面を用いて操作することが可能となる。

【００１３】請求項２の発明は、請求項１の手順表示が、前記ディスプレイ装置に常時表示されることで、特定したものである。請求項３の発明は、情報を表示するディスプレイ装置と、取引に係る情報を入力する入力装置と、前記ディスプレイ装置の情報表示を制御し且つ前記ディスプレイ装置に表示された情報に応じて前記入力装置から入力された情報に基づいて取引処理を行う制御部とを備えた自動取引装置である。この自動取引装置は、前記ディスプレイ装置の画面には、特定領域が設定されており、前記制御部が、前記ディスプレイ装置に対し、前記入力装置から入力される複数の情報の項目が夫々示された複数の入力項目欄を入力順に並べて形成された手順表示を表示させるとともに、前記取引の操作手順の進行に応じて前記手順表示を前記各入力項目欄の長手方向とほぼ直交する方向へ移動させることによって、前記複数の入力項目欄のうち現在行われている操作に対応する入力項目欄を前記特定領域にて表示させることを特徴とする自動取引装置である。

【００１４】請求項４の発明は、請求項２の特定領域の下側に前記操作画面が配置され、前記特定領域の上側に前記操作画面の説明が示された説明表示が配置され、この説明表示の上側に取引種別が示された取引種別表示欄が配置されることで、特定したものである。

【００１５】請求項５の発明は、請求項２の各入力項目欄の夫々には、入力項目に対応する情報が示される入力

情報表示域が形成されており、前記制御部は、前記入力装置から入力された情報を保持する保持手段を有し、ユーザからの要求に応じて前記ディスプレイ装置の表示内容を前記保持手段に保持された情報の入力時の状態に戻し、前記保持手段から該当する情報を読み出して当該入力情報表示域に表示させることで、特定したものである。

【００１６】請求項６の発明は、請求項５の制御部が、ユーザからの要求に応じて少なくとも前記手順表示と重なる範囲の操作画面を前記ディスプレイの表示内容から除外し、前記保持手段に保持された情報を該当する入力項目欄の入力情報表示域に表示させることで、特定したものである。

【００１７】請求項７の発明は、請求項１の制御部が、前記ディスプレイ装置の表示内容の変更速度をユーザからの要求に応じて変化させることで、特定したものである。請求項８の発明は、請求項１の制御部が、前記入力装置から情報が入力される際にその情報の入力に係る操作情報を前記ディスプレイ装置に表示させる情報提示手段を有するとともに、前記情報提示手段によって前記ディスプレイ装置に前記操作情報が表示される回数をユーザからの要求に応じて変更することで、特定したものである。

【００１８】請求項９の発明は、請求項２の制御部が、前記手順表示を前記ディスプレイ装置に表示させる際に、その手順表示を構成する入力項目欄の数と手順表示を固定して表示させるか否かを判定するための閾値である固定閾値とを対比し、前記入力項目欄の数が固定閾値未満である場合に、前記手順表示を前記ディスプレイ装置に固定して表示させることで、特定したものである。

【００１９】請求項１０の発明は、請求項３の制御部が、前記特定領域にて表示される入力項目欄の入力情報表示域，及びこの入力情報表示域に表示される情報を拡大して表示することで、特定したものである。

【００２０】請求項１１の発明は、請求項１の操作画面の一部が半透明で表示されることで、特定したものである。請求項１２の発明は、請求項４の取引種別表示欄には、取引に係る処理を強制終了させる取消ボタンが設けられていることで、特定したものである。

【００２１】請求項１３の発明は、請求項５の複数の入力項目欄の夫々における入力情報表示域には、この入力情報表示域に表示された情報を修正するためのボタンが設けられていることで、特定したものである。

【００２２】請求項１４の発明は、請求項５の制御部が、取引における全ての情報が入力された場合に、入力された各情報の確認画面として前記手順表示を前記ディスプレイに表示させるとともに、前記全ての情報の夫々を該当する入力情報表示域に表示させることで、特定したものである。

【００２３】請求項１５の発明は、請求項３の複数の入力項目欄が、前記入力装置から入力される情報の属性に応じて複数の操作セットに区分けされており、セット毎に異なる色で表示されていることで、特定したものである。

【００２４】請求項１６の発明は、請求項１５の操作セットを構成する複数の入力項目欄が、情報の入力順に沿ったグラデーションを描く状態で色分けされていることで、特定したものである。

【００２５】請求項１７の発明は、請求項１５のディスプレイ装置の表示内容をなす画面の背景の基調色が、前記特定領域にて表示される入力項目欄の色に応じて変化することで、特定したものである。

【００２６】請求項１８の発明は、請求項１の制御部が、ユーザが特定の情報を入力するに要した時間である入力時間を検出し、検出した入力時間とユーザの操作の習熟度を判定するための閾値である習熟度閾値とを対比し、前記入力時間が前記習熟度閾値未満である場合には、前記ディスプレイ装置の表示内容の変更速度を上昇させることで、特定したものである。

【００２７】請求項１９の発明は、請求項１８の制御部が、前記入力装置から情報が入力される際にその情報の入力に係る操作情報を前記ディスプレイ装置に表示させる情報提示手段を有し、前記入力時間が前記習熟度閾値未満である場合には、前記情報提示手段によって前記ディスプレイ装置に前記操作情報が表示される回数を低減することで、特定したものである。

【００２８】請求項２０の発明は、情報を表示するディスプレイ装置と、取引に係る情報を入力する入力装置と、前記ディスプレイ装置の情報表示を制御し且つ前記ディスプレイ装置に表示された情報に応じて前記入力装置から入力された情報に基づいて取引処理を行う制御部とを備えた自動取引装置である。この自動取引装置は、前記制御部が、複数の操作からなる一つの手順と前記一つの手順に含まれる複数の操作に夫々対応する複数の手順との何れか一方をユーザからの要求に応じて提供することを特徴とする。

【００２９】請求項２１の発明は、請求項１又は２０の制御部が、前記入力装置から所定時間情報の入力がない場合に、情報の入力を促すための注意表示を前記ディスプレイ装置に表示させることで、特定したものである。

【００３０】請求項２２の発明は、請求項１又は２０の制御部が、前記入力装置から所定時間情報の入力がない場合に、情報の入力操作ガイダンスを前記ディスプレイ装置に表示させることで、特定したものである。

【００３１】請求項２３の発明は、請求項１又は２０において、入力装置から情報が入力される際に前記ディスプレイに表示される画面は、前記制御部が複数の画像データを合成することによって生成されており、前記各画像データに対応する画像は、前記ディスプレイ装置の画面に設定された所定領域にて表示されることで、特定し

たものである。

【００３２】請求項２４の発明は、請求項４の制御部が、前記説明表示の画像データ及び前記操作画面の画像データを夫々複数種類保有し、取引種別に応じた手順表示の画像データを生成し、この手順表示をなす複数の入力項目欄の何れかを情報の入力順に従って特定し、特定した入力項目欄の項目に夫々対応する説明表示の画像データ及び操作画面の画像データを取得し、取得した手順表示の画像データ，操作画面の画像データ，及び作成した手順表示の画像データを用いて前記ディスプレイ装置に表示させる画像のデータを生成することで、特定したものである。

【００３３】請求項２５の発明は、請求項１又は２０の自動取引装置が、前記制御部が前記入力装置から情報を受け取り可能となった場合に音声を出力する音声出力手段をさらに備えたことで、特定したものである。

【００３４】請求項２６の発明は、請求項３の自動取引装置が、前記制御部が前記手順表示を前記各入力項目欄の長手方向とほぼ直交する方向へ移動させた場合に音声を出力する音声出力手段をさらに備えたことで、特定したものである。

【００３５】請求項２７の発明は、請求項１又は２０の入力装置がタッチパネルであり、このタッチパネルに接触した物体の位置情報を検出する位置検出手段と、検出された位置情報に基づいて前記物体が前記タッチパネルと接触した状態でその位置を変えているか否かを判定する判定手段と、前記判定手段が前記物体がタッチパネルと接触した状態でその位置を変えていると判定した場合に、警告音を出力する音声出力手段とを備えたことで、特定したものである。

【００３６】

【発明の実施の形態】以下、本発明の実施形態を図面に基づいて説明する。

〔実施形態１〕最初に、本発明による実施形態１を説明する。

〔自動取引装置の構成〕図１は、実施形態１による現金自動預金支払装置（以下、「ＡＴＭ」という：自動取引装置に相当）の主要構成を示すブロック図である。図１において、ＡＴＭは、ディスプレイ装置１，入力装置２ａ，中央処理部３および媒体処理装置４を備えている。

【００３７】ディスプレイ装置１は、例えばＣＲＴ表示器または液晶ディスプレイパネルを利用し、ＡＴＭの操作情報等を表示する。入力装置２ａは、ディスプレイ装置１の表示面に重ねられた透明な板状のスイッチ(タッチパネル)である。入力装置２ａは、利用者がタッチパネルに触れた位置を検出し、この位置に応じた情報を中央処理部３に入力する。媒体処理装置４は磁気カード、通帳、伝票、現金等を含む媒体を取り扱う。

【００３８】中央処理部３は、入力制御部５，ＣＧ(Character Generator)部６，イメージデータ保持部７，及び処理制御装置２０を備えている。入力制御部５は、入力装置２ａを制御する。ＣＧ部６は、例えば表示に必要な文字パターン(キャラクタコード，フォントデータ)を記憶するデータセットからなるキャラクタジェネレータを有し、ディスプレイ装置１に表示されるメッセージ等の表示情報を構成する文字データを生成する。イメージデータ保持部７には、予めディスプレイ装置１に表示する表示画面を形成する複数のイメージデータが格納されている。複数のイメージデータの夫々は、必要に応じてこのイメージデータ保持部７から読み出され、表示に供される。また、各イメージデータは、必要に応じてＣＧ部６が発生する文字パターンと合成して表示に供される。

【００３９】なお、イメージデータ保持部７に格納されるイメージデータは、例えば、ＡＴＭの描画データであっても良く、実物のＡＴＭをビデオカメラ等の撮像装置で撮像し必要な部分のみを切り出したイメージデータであっても良い。

【００４０】処理制御装置２０は、表示データ処理部２１、表示制御部２２および割り込み制御部２３を有している。処理制御装置２０は、ディスプレイ装置１による情報表示を制御するとともに、入力制御部５を介して入力装置２ａから入力される情報に基づいて取引処理を行う。処理制御装置２０は、中央処理部３の例えばソフトウェア主導で機能して主たる処理制御を行う装置であり、例えばマイクロプロセッサユニットにより構成される。

【００４１】表示データ処理部２１は、入力制御部５，ＣＧ部６，イメージデータ保持部７，及び割り込み処理部２３から得られる入力情報，表示文字データ，イメージデータ，及び割り込み等の情報に基づいて、ディスプレイ装置１に表示するための表示データを生成し、表示制御部２２に供給する。

【００４２】表示制御部２２は、表示データ処理部２１から受け取った表示データをもとにディスプレイ装置１を制御してこの表示データに応じた画面表示を行う。割り込み処理部２３は、タイマ割り込みのためのタイマ制御部２３ａを有し、入力制御部５および媒体処理装置４からの情報に応じて、表示データ処理部２１に対する割り込み制御を行う。

【００４３】図２は、図３に示す構成が組み込まれたＡＴＭの外観構成を示す斜視図である。図２には、ＡＴＭの筐体，図１に示したディスプレイ装置１と入力装置２ａとからなる表示入力部３１，預金通帳の挿入・取り出しのための通帳挿抜口３２，カードや伝票の挿入・取り出しのためのカード挿抜口３３，硬貨の挿入・取り出しのための硬貨挿抜口３４，及び紙幣の挿入・取り出しのための紙幣挿抜口３５とが示されている。

【００４４】図３は、ＡＴＭの具体的な内部構成を示すブロック図である。図３において、ＡＴＭは、証書出力

・カード読み書き部ＤＯＣ，紙幣リサイクル部ＢＲＵ，コインリサイクル部ＣＲＵ，顧客操作部ＵＯＰ，管理操作部ＭＯＰ，制御部ＣＰＵ，及び電源部ＰＳＵを、その内部に搭載している。

【００４５】制御部ＣＰＵは、上述した中央処理部３に相当する（図１参照）。制御部ＣＰＵは、通信回線等の伝送路を介してセンタのホストコンピュータに接続されている。或いは、制御部ＣＰＵは、通信回線等の伝送路からターミナルコントローラ（ターミナルコントローラには複数のＡＴＭ等の端末装置が接続される）に接続され、このターミナルコントローラを介してセンタのホストコンピュータに結合されている。ＡＴＭは、センタとの交信を行って、センタの元帳、すなわち個人の残高、取引履歴等が格納されているファイルを更新しながら取引を進める。

【００４６】また、制御部ＣＰＵには、特に支店，無人化店舗（ＡＴＭ装置だけが設置してある店舗）等に設置されたＡＴＭの状態を遠隔地から監視するための遠隔監視装置ＲＳＵが、通信回線等の伝送路を介して結合されている。遠隔監視装置ＲＳＵは、複数台のＡＴＭを監視して、それらの障害予防，障害発見，障害対策，或いは保守等を行う。

【００４７】証書出力・カード読み書き部ＤＯＣ，紙幣リサイクル部ＢＲＵ，及びコインリサイクル部ＣＲＵは、上述した媒体処理装置４に相当する（図１参照）。証書出力・カード読み書き部ＤＯＣは、カード読み書き・画像読み取り・プリンタ部ＣＩＰ，及び通帳プリンタ部ＰＰＲからなる。カード読み書き・画像読み取り・プリンタ部ＣＩＰは、カードリーダ／ライタ部４１，カードエンボス読み取り部４２、プリンタ部４３，及び振込カード発行部４４からなる。

【００４８】カードリーダ／ライタ部４１は、取引を行うためにカード挿抜口３３に挿入されたカードの磁気ストライプの口座番号、支店番号等の情報の読み取りを行い、必要に応じてその磁気ストライプに書き込みを行う。カードエンボス読み取り部４２は、カード挿抜口３３に挿入されたカードのカードのエンボス加工部の名前、口座番号等をイメージ的に読み取る。プリンタ部４３は、カードから読み取った口座番号、取引額等をレシート（明細票）に印字してカード挿抜口３３から出力し、且つレシートに印字した同じデータを装置内に印字情報の控えすなわちジャーナルとして残す。振込カード発行部４４は、振込取引に使用する振込カードに、裏面の磁気ストライプに振込先等の振込情報を書き込み且つ表面の空白部分に必要情報を印字し、振込カードを発行する。この振込カードもカード挿抜口３３から出力される。

【００４９】通帳プリンタＰＰＲは、通帳磁気ストライプリーダ／ライタ部４５および通帳プリンタ部４６を有している。通帳磁気ストライプリーダ／ライタ部４５は、例えば通帳挿抜口３２に挿入された通帳の磁気ストライプの読み書きを行う。通帳プリンタ部４６は、通帳への取引履歴の印字を行う。紙幣リサイクル部ＢＲＵは、例えば３つのスタッカ４７，４８，４９と係員金庫５０とを有し、紙幣を取り扱う。

【００５０】３つのスタッカ４７～４９は、例えば千円札を格納する１つのスタッカ４７、一万円札を格納する２つのスタッカ４８，４９である。出金取引を行う場合には、指定された金額分だけ、各スタッカ４７～４９より紙幣挿抜口３５に払い出し、入金取引を行う場合には、紙幣挿抜口３５に挿入された紙幣を金種毎に各スタッカ４７～４９に収納する。なお、五千円札は、回収専用のスタッカ（図示せず）に収納される。さらに、３つのスタッカ４７～４９は、着脱可能な係員金庫５０との間で、必要に応じて紙幣のやりとりを行う。すなわち、出金取引が連続して行われることにより３つのスタッカ４７～４９の何れかの紙幣が減少した場合には、係員金庫５０から紙幣が減少したスタッカに紙幣が補充され、入金取引が連続して行われる。一方、スタッカ４７～４９の何れかが紙幣で満杯になった場合には、満杯となったスタッカから紙幣が回収され係員金庫５０に搬送される。

【００５１】硬貨リサイクル部ＣＲＵは、各硬貨毎のスタッカ５１，５２，５３，５４，５５，５６，オーバフロースタッカ５７，及び硬貨カセット５８からなり、硬貨を取り扱う。出金取引や振込取引のように釣り銭が必要な取引等により、硬貨の払い出しが必要になった場合には、各スタッカ５１～５６から必要な枚数、必要な金額分の硬貨が、硬貨挿抜口３４から払い出される。また、硬貨が硬貨挿抜口３４に挿入された場合には、挿入された硬貨は、金種毎に各スタッカ５１～５６に格納される。さらに、硬貨の払い出しが連続し、各スタッカ５１～５６の硬貨が不足すると、硬貨が硬貨カセット５８から各スタッカ５１～５６へ補充される。さらに、硬貨の収納が連続することによって、各スタッカ５１～５６からオーバフローした硬貨は、オーバフロースタッカ５７に格納される。なお、オーバフロースタッカ５７，及び硬貨カセット５８は着脱可能であり、硬貨の補充・取り出しに用いられる。

【００５２】顧客操作部ＵＯＰは、ディスプレイ装置１としてのカラーディスプレイ装置５９，及びその表示画面上に重ね合わされた入力装置２ａとしてのタッチパネルからなるタッチキーボード６０を有している。すなわち、カラーディスプレイ装置５９の表示面およびタッチキーボード６０が、図３に示す表示入力部３１を構成する。

【００５３】管理操作部ＭＯＰは、液晶ディスプレイ６１，及びキーボード６２を有し、遠隔監視装置ＲＳＵと同様に、ＡＴＭの内部状態を把握するとともに、必要な保守操作を可能とする。

【００５４】音声出力部６０は、音声処理プロセッサ，増幅回路，及びスピーカ等からなる。この音声出力部６０は、制御部ＣＰＵからの命令に応じて音声を外部に出力する。

〔ＡＴＭによる処理〕次に、上述したＡＴＭによる処理として、制御部ＣＰＵによる顧客操作部ＵＯＰに対する処理を説明する。図１において、中央処理部３（制御部ＣＰＵ）の処理制御装置２０は、図３に示す電源部ＰＳＵがＯＮとされると、自身が保有するＲＯＭ８又はハードディスク（ＨＤ）１０に記録された制御プログラムをＲＡＭ９にロードし、ＲＡＭ９にロードされた制御プログラムを実行し、ディスプレイ装置１に対する画面表示処理をスタートする。

【００５５】図４は、ディスプレイ装置１に対する画面表示処理を示すフローチャートである。図４において、処理がスタートすると、表示データ処理部２１は、入力装置２ａであるタッチパネルから位置情報が入力制御部５を介して転送されてきたか否かを判定する（ステップＳ０１）。このとき、表示データ処理部２１は、位置情報がきていないと判定した場合には、処理をステップＳ０４へ進める。これに対し、表示データ処理部２１は、位置情報がきたと判定した場合には、その位置情報を取得する（ステップＳ０２）。

【００５６】続いて、表示データ処理部２１は、取得した位置情報に基づいて、利用者によってディスプレイ装置１に表示された「取消」「修正」等のＡＴＭの操作ボタンが押されたのか否かを判定する。このとき、表示データ処理部２１は、操作ボタンが押されたと判定した場合（ステップＳ０３；ＹＥＳ）には、処理をステップＳ０５へ進める。これに対し、表示データ処理部２１は、操作ボタンが押されなかったと判定した場合（ステップＳ０３；ＮＯ）には、データ入力キーが押されたものとして、処理をステップＳ０４へ進める。

【００５７】表示データ処理部２１は、ステップＳ０４へ処理を進めた場合には、ステップＳ０２にて取得した位置情報に対応する文字データ（押されたキー（ボタン）に対応する文字データ）をＣＧ部６から読み出し、処理をステップＳ０５へ進める。

【００５８】表示データ処理部２１は、ステップＳ０５へ処理を進めた場合には、制御プログラムに従ってＣＧ部６から文字データを読み出すとともに、イメージデータ保持部７からイメージデータ（テクスチャデータ）を読み出す。続いて、表示データ処理部２１は、自身が保有する図示せぬＶＲＡＭ（Video RAM）上において、文字データとイメージデータとを合成した画面データを生成する（ステップＳ０６）。続いて、表示データ処理部２１は、図示せぬＶＲＡＭの記憶内容を表示制御部２２に転送する（ステップＳ０７）。

【００５９】すると、表示制御部２２が、図示せぬＶＲＡＭの記憶内容をビデオ信号に変換し（ステップＳ０８）、ディスプレイ装置１に転送する（ステップＳ０９）。これによって、ディスプレイ装置１には、ＡＴＭの取引画面７０（図５参照）が表示されるとともに、入力装置２ａから入力された情報が表示される。なお、ステップＳ０９の処理が終了すると、処理がステップＳ０１に戻る。

〔ディスプレイ装置の表示内容〕次に、ディスプレイ装置１の表示内容を説明する。

〈取引画面〉図５は、ディスプレイ装置１に表示される取引画面７０の説明図である。ＡＴＭの利用者は、ディスプレイ装置１に表示された取引画面７０の表示内容に従ってＡＴＭを操作し取引を行う。ディスプレイ装置１には、ＡＴＭに予め設定されている操作手順に従って、複数の取引画面７０が表示される。このとき、取引画面７０が他の取引画面７０に切り替わっても利用者が適正に取引画面７０の表示内容を把握できるように、取引画面７０は、以下のように構成されている。

【００６０】図５において、取引画面７０は、矩形に設定されており、取引種別表示領域７１と、操作説明領域７２と、入力対象表示領域７３と、入力データ表示領域７４と、操作領域７５とからなる。

【００６１】取引種別表示領域７１は、取引画面７０の最も上側に設定された帯状の領域であり、取引種別（例えば、「振込」「払出」「預入」等）が表示される。また、操作説明領域７２は、取引種別表示領域７１のすぐ下側に設定された帯状の領域であり、利用者に対するＡＴＭの操作説明を示す文字列が表示される。

【００６２】入力対象表示領域７３及び入力データ表示領域７４は、操作説明領域７２のすぐ下側に設定された帯状の領域である。入力対象表示領域７３は、取引画面７０の左側に配置されており、入力データ表示領域７４は、取引画面７０の右側に配置されている。入力対象表示領域７３には、入力対象（例えば、「依頼人名」「預入金額」「口座番号」等）を示す文字列が表示される。入力データ表示領域７４には、ＡＴＭの利用者が入力装置２ａを介して入力したデータを示す文字列が表示される。

【００６３】操作領域７５は、取引画面７０の最も下側に設定された矩形の領域である。この操作領域７５には、利用者がＡＴＭにデータを入力するためのキーやＡＴＭの操作ボタンが表示される。

【００６４】上述した各領域７２～７５の位置は、ディスプレイ装置１の表示内容の変更に関係なく固定されている。このため、ＡＴＭの利用者は、ＡＴＭの操作を進めていくうちにどの情報がどの位置に表示されるのかを把握又は予測できる。従って、取引画面７０が他の取引画面７０に切り替わった場合でも、利用者は取引画面７０に表示された内容を適正に把握できるので、利用者は円滑にＡＴＭを操作し、取引を行うことができる。

〈取引画面の画面要素〉図６は、取引画面７０を構成す

る画面要素の説明図である。図6には、「振込」の場合における取引画面７０の画面要素が示されている。図6に示すように、取引画面７０は、背景８１，手順表示８２，入力パネル表示８３，及び説明表示８４の各画面要素をＡＴＭの操作手順に従って重ねることによって構成される。これらの画面要素は、図1に示すイメージデータ保持部7内にテクスチャデータとして格納されている。また、イメージデータ保持部7は、これらのテクスチャデータに対応するカラーパレットデータを有している。そして、上述した画面表示処理(図4参照)が行われることによって、取引画面７０がディスプレイ装置1に表示される。

〈背景〉図6において、背景８１は、矩形に設定されており、取引画面７０の全体に亘って配置される。背景８１の上部には、帯状の取引種別表示欄８１ａが設けられており、図5に示した取引種別表示領域７１に配置される。この取引種別表示欄８１ａには、取引種別を示す文字列が表示される(図6では、例として「お振込み」の文字列を図示)。

〈手順表示〉手順表示８２は、背景８１の上に重ねて表示される。この手順表示８１は、図5に示した操作説明領域７２，入力対象表示領域７３，入力データ表示領域７４，及び操作領域７５に亘って配置される。この手順表示８２には、取引の際にＡＴＭの利用者が行う操作手順が示されている。即ち、手順表示７２は、複数の帯状の入力データ欄８７(図6には、例として入力データ欄８７ａ～８７ｇを図示)からなる。各入力データ欄８７は、ＡＴＭの操作手順に従ってＡＴＭに入力されるデータ等が表示される欄であり、操作手順に従ってＡＴＭに入力される順で取引画面７０の上から下へ向かって並べられている。

【００６５】複数の入力データ欄８７の夫々における最も左側には、操作手順の順番である手順番号を示す数字が表示され、その右側には、入力対象名(操作項目名)が表示される。そして、入力対象名の右側には、入力装置２ａを介して入力されたデータを示す文字列が表示される。

【００６６】図7は、背景８１の上に手順表示８２が重ねられた取引画面７０の画面表示例を示す図である。この図7に示す例では、各入力データ欄８７ａ～８７ｇには、その最も左側に手順番号を示す数字が表示され、その右側には、入力対象名として、「振込先金融機関」「振込先支店名」「口座番号」「受取人名」「振込金額」「依頼人名」「電話番号」の項目名が夫々表示されている。そして、各入力対象名の右側には、各入力対象名に対応する入力データが表示されている。

【００６７】ところで、操作手順は、関連づけ可能な手順からなる複数の操作セットで構成されている。これに対応して、各入力データ欄８７は、操作セットを構成する複数の入力データ欄８７が一かたまりで配置され、互いに異なる操作セットを構成する入力データ欄８７同士は、間隔をあけて配置されている。

【００６８】例えば、図7に示す例では、「振込」の操作手順は、振込先に係る操作セット，金額に係る操作セット，及び依頼人に係る操作セットからなる。このような操作セットの構成に応じて、振込先に係る操作セットに対応する入力データ欄８７ａ～８７ｄ，及び依頼人に係る操作セットに対応する入力データ欄８７ｆ,８７ｇが、夫々一つの塊をなす状態で配置されている。そして、入力データ欄８７ｄと入力データ欄８７ｅとの間，入力データ欄８７ｅと入力データ欄８７ｆとの間には、それぞれスペース(空白)が設けられている。

【００６９】従って、ＡＴＭの利用者は、手順表示８２を見ることによって、操作手順の手順数，操作セット数，操作手順の順序，及び入力対象を容易に把握することができる。

〈手順番号の背景色〉図7において、図示することはできないが、各手順番号の背景色は、操作セットに応じて異なる色で表示されている。具体的には、入力データ欄８７ａ～８７ｄにおける各手順番号の背景色は、番号順に沿った赤色のグラデーションで設定されており、入力データ欄８７ｅにおける手順番号の背景色は、緑色で設定されており、入力データ欄８７ｆ,８７ｇにおける手順番号の背景色は、番号順に沿った青色のグラデーションで設定されている。

【００７０】これによって、ＡＴＭの利用者は、操作セットの意味を理解しなくても操作セットを把握することができる。また、操作手順が進むことによって、手順番号の背景色が長波長の色から短波長の色へと変化するので、利用者は手順番号の背景色から操作手順の進行状況を把握又は予測できる。

【００７１】また、取引画面７０の背景８１の基調色は、手順番号の背景色に応じて変化するようになっている。例えば、現在行われている操作手順に該当する手順番号の背景色が赤色である場合には、背景８１の基調色は赤色となる。これによって、利用者は現在行っている操作がどの操作セットに属するのかを容易に把握することができる。

〈注視領域〉図7において、取引画面７０の上縁から約１０分の３から約１０分の４までの帯状の範囲は、注視領域８０として設定されている。この注視領域８０は、人間工学において情報を精度良く受容できるとされている範囲である。上述した入力対象表示領域７３及び入力データ表示領域７４は、この注視領域８０に配置されている。このように、横長の注視領域８０を設定し、注視領域８０の上側に操作説明領域７２を設定し、注視領域８０の下側に操作領域７５が設定されているので、無駄な視線移動が抑えられる。従って、取引画面７０の視認性の向上を図ることができるとともに、取引画面７０の分かりにくさ，及び操作のしずらさを改善することがで

きる。

【００７２】上述した複数の入力データ欄８７の夫々は、操作手順に従って注視領域８０(入力対象表示領域７３及び入力データ表示領域７４)に表示される。例えば、図７に示すように、取引が「振込」であれば、最初に、手順番号“１”を表示した入力データ欄８７(入力データ欄８７ａ)が、注視領域８０にて表示される。その後、データ入力が終了し、操作手順が次に進むと、図８に示すように、手順表示８２が画面の上側にスクロールし、次の手順番号“２”を表示した入力データ欄(入力データ欄８７ｂ)が、注視領域８０にて表示される。

【００７３】即ち、手順表示８２は、操作手順が進む度に画面の上側へスクロールし、次の手順番号を表示した入力データ欄８７が、注視領域８０にて表示される。注視領域８０にて入力データ欄８７に表示される各データのうち、手順番号及び入力対象名は、注視領域８０内の入力対象表示領域７３に表示され、入力データを示す文字列は、注視領域８０内の入力データ表示領域７４に表示される。

【００７４】このように、現在進行中の操作手順を示す入力データ欄８７が注視領域８０に表示される。従って、ＡＴＭの利用者は、取引画面７０の最も見やすい部分である注視領域８０さえ見ていれば、注視領域８０にて表示される手順番号や入力対象を示す文字列から、現在自身が行っている操作手順や操作手順の進行状況を容易に把握することができる。また、手順表示８２がスクロールすることで、利用者は操作手順が進行していることを直感的に把握することができる。

【００７５】また、手順表示８２がスクロールする際には、ＡＴＭからシグナル音が発生する。この機能は、手順表示８２をスクロールさせる処理が行われている際に、制御部ＣＰＵから音声出力部６０(図３参照)に動作命令が与えられ、音声出力部６０がシグナル音を出力することで実現できる。このシグナル音によって、利用者を取引画面７０に注目させることができ、操作手順が進んだことを利用者に適正に把握させることができる。従って、利用者が操作手順の進行に気付かない場合に生じるタイムロスをなくし、ＡＴＭの操作時間の短縮を図ることができる。

【００７６】また、図７に示す例のように、取引の操作手順数が少ない場合には、取引開始時において手順表示８２を構成する複数の入力データ欄８７の全てが、ディスプレイ装置１に表示される。これに対し、取引における操作手順数が多く、取引開始時において複数の入力データ欄８７の全てを一度にディスプレイ装置１に表示できない場合には、図９(ａ)の画面表示例に示すように、表示可能な入力データ欄８７のみがディスプレイ装置１に表示される。

【００７７】上述した機能は、例えば以下のようにして実現される。即ち、図１に示す表示データ処理部２１は、ディスプレイ装置１に一度に表示可能な入力データ欄８７の数(閾値)を保有している。表示データ処理部２１は、取引開始時において、該当する手順表示８２のデータをイメージデータ保持部７から受け取り、その手順表示８２を構成する入力データ欄８７の数と上述した閾値とを対比する。このとき、入力データ欄８７の数が閾値を下回っている場合には、表示データ処理部２１は、ディスプレイ装置１に手順表示８２を構成する入力データ欄８７の全てを表示させる。これに対し、入力データ欄８７の数が閾値を下回っている場合には、表示データ処理部２１は、ディスプレイ装置１に手順表示８２を構成する入力データ欄８７の一部を表示させる。

【００７８】そして、図９(ｂ)の画面表示例に示すように、一つの操作手順が終了し、手順表示８２が画面の上側にスクロールする度に、取引開始時に表示できなかった入力データ欄８７の何れかが画面内に表示される。このとき、手順表示８２が画面の上側へスクロールすることによって、手順表示８２の一部が取引種別表示欄８１ａの上に重なることとなる場合には、その取引種別表示欄７１ａと重なる範囲の手順表示８２は、取引画面７０から消える。

【００７９】ところで、取引の操作手順数が少ない場合(例えば「払い戻し」の取引のように、「暗証番号」と「払い戻し金額」とを入力すれば操作手順が終了する場合)には、操作手順が次に進んでも手順表示８２がスクロールしない。この場合には、図１６に示すように、説明表示８３と入力パネル表示８４とが接した状態で、取引画面７０の下部に配置される。

【００８０】この機能は、図１に示す処理制御装置２０を以下のように構成することで実現できる。即ち、上述したように、表示データ処理部２１が表示すべき手順表示８２の入力データ欄８７の数と閾値とを対比し、入力データ欄８７の数が閾値を上回っている場合には、操作手順が次に進む際に手順表示８２のスクロール処理を行い、入力データ欄８７の数が閾値を下回っている場合には、図１６に示す取引画面７０をディスプレイ装置１に表示し、操作手順が次に進んでも手順表示８２のスクロール処理を行わないようにする。

〈説明表示及び入力パネル表示〉図６に戻って、説明表示８３は、帯状に設定されており、各操作手順における操作説明を示す文字列を表示する(図６では、「ご依頼人を入れ確認を押して下さい」の文字列を表示)。この説明表示８３は、手順表示８２の上に重ねた状態で、図５に示す操作説明領域７２に配置される。

【００８１】また、入力パネル表示８４は、矩形に設定されており、各操作手順において入力対象表示領域７３に表示された入力対象を入力するためのキーやボタンを表示する。この入力パネル表示８４は、手順表示８２の上に重ねた状態で、図５に示す操作領域７５に配置される。

【００８２】図１０～図１２は、説明表示８３及び入力パネル表示８４の画面表示例を示す説明図である。図１０～図１２に示すように、説明表示８３及び入力パネル表示８４は、利用者の入力対象に応じて複数種類用意されている。例えば、口座番号を入力するための説明表示８３ａ及び入力パネル表示８４ａ(図１０参照)，金額を入力するための説明表示８３ｂ及び入力パネル８４ｂ(図１１参照)，文字を入力するための説明表示８３ｃ及び入力パネル表示８４ｃ(図１２参照)等が用意されている。

【００８３】図１０に示すように、入力パネル表示８４ａには、口座番号を入力するためのテンキー９１や、入力した口座番号を一旦確定させるための第１確認ボタン９２が設けられている。また、図１１に示すように、入力パネル表示８４ｂには、金額を入力するためのテンキー９１，桁(万,千)を入力するための桁ボタン９３，及び入力した金額を一旦確定させるための第１確認ボタン(円ボタン)９２等が設けられている。また、図１２に示すように、入力パネル表示８４ｃには、文字を入力するための５０音キー群９４，特定の単語(株式会社，有限会社，営業所，支店)を入力するための単語キー群９５，第１確認ボタン９２等が設けられている。

【００８４】このように、操作領域７５に配置される入力パネル表示８４を手順表示８２と別個の画面要素としてあるので、入力パネル表示８４(操作領域７５)が取引画面７０を占める割合を大きくとることができる。このため、入力パネル表示８３に表示されるキーやボタンの大きさ，或いはこれらの配置等を最適化することができる。従って、キーやボタンの押し間違いによる誤入力，及び誤操作の可能性を低減できる。これは、ＡＴＭの操作の習熟度の低い利用者，或いは視覚機能や手指の巧緻性の衰えた利用者にとって特に有効である。

【００８５】なお、入力パネル表示８４に表示されるキーやボタンに代えてアイコンが設けられていても良い。

〈取引画面の切り替え〉ところで、上述した背景８１と手順表示８２とは、ＡＴＭの利用者によるＡＴＭの操作開始から操作終了までのほぼ全体に亘ってディスプレイ装置１に表示される。従って、利用者は、これから行う入力操作の全体像を把握し、前後の項目間の関係を理解することができる。このため、事前に各入力対象(各操作手順)に対して精神的に準備が可能である。また、各操作手順において、操作手順の全体が把握できないことによる不安や苛立ちを感ずることがない。さらに、入力要求内容の解釈を誤り誤入力を行う等の危険性を回避することができる。

【００８６】これに対し、説明表示８３と入力パネル表示８４とは、操作手順に応じた種類のものが、各操作手順の開始に当たってディスプレイ装置１に表示される。実施形態１によるＡＴＭでは、操作手順に応じた説明表示８３及び入力パネル表示８４の切り替えによって、取引画面７０の切り替えが行われる。各操作手順が開始される際には、図１３の画面表示例に示すように、説明表示８３が画面の下縁から出現し、上述した操作説明領域７２に収まるまで画面の上縁へ向かって移動する。また、説明表示８３の出現と同時に、或いは説明表示８３の出現に続いて、入力パネル表示８４が画面の下縁から出現し、上述した操作領域７５に収まるまで画面の上縁へ向かって移動する。

【００８７】そして、説明表示８３が操作説明領域７２に収まり、且つ入力パネル表示８４が操作領域７５に収まると、手順表示８２のうち、操作説明領域７２に存する部位，及び操作領域７５に存する部位(説明表示８３又は入力パネル表示８４と重なる部位)が、説明表示８３又は入力パネル表示８４とによって隠された状態となる。これによって、ＡＴＭの利用者には、手順表示７２に示された入力対象名のうち、注視領域８０にて表示されている入力対象名のみが見える状態となる。従って、利用者は、現在行っている操作手順を明確に把握することができる。

【００８８】但し、説明表示８３及び入力パネル表示８４は、手順表示８２における各手順番号を示す数字の上に重ならないように設定されている。従って、ＡＴＭの利用者は、データの入力中においても操作手順数を把握できると共に、現在の操作手順がどのあたりまで進んでいるかを把握することができる。

【００８９】その後、入力パネル表示８４を用いてデータが入力され、操作手順が終了すると、説明表示８３及び入力パネル表示８４は、画面の下縁へ向かって移動し、ディスプレイ装置１から消える。そして、操作手順が次に進むと、その操作手順に応じた説明表示８３及び入力パネル表示８４が、上述した手法によってディスプレイ装置１内に現れる。また、手順表示８２が画面の上側へスクロールし、次の手順番号が示された入力データ欄８７が注視領域８０にて表示される。

【００９０】以下、操作手順が進む際に行われる説明表示８３及び入力パネル表示８４の切り替えと、手順表示８２のスクロールとを合わせて「画面遷移」と称する。

〈注視領域における拡大表示〉図１０～図１２に示すように、各入力データ欄８７は、注視領域８０にて表示される場合には、その入力データ表示領域７４に存する範囲が拡大して表示されるとともに、入力データを示す文字が他の入力データ欄８７における入力データを示す文字よりも拡大して表示される。これは、図１に示す表示データ処理部２１が、注視領域８０にて表示される入力データ欄８７の入力データ表示領域７４を拡大するとともに、当該入力データ表示領域７４にて表示される文字のフォントを拡大する処理を行うことで実現される。

【００９１】このように、入力されたデータを拡大表示することで、視力の低いＡＴＭの利用者が入力データを容易に判読可能となり、利用者の視力負担の軽減を図る

ことができる。従って、データの誤入力やＡＴＭの誤操作の可能性を低減できる。また、視力負担の軽減が図られるので、高齢者，或いは弱視等の軽度の視覚障害者等をＡＴＭの利用者として加えることが可能となり、ＡＴＭの利用者の範囲拡大を図ることができる。

【００９２】また、注視領域８０の入力データ表示領域７４に表示される文字は、他の入力データ欄８７における入力データの文字よりも大きく表示されるので、他の入力データよりも強調された状態となる。従って、他の入力データ領域８７における文字との判別が容易に可能となるため、利用者の情報認知精度が向上する。

〈修正ボタン〉図６に示すように、複数の入力データ欄８７の夫々における最も右側には、修正ボタン１０１が夫々設けられている。各修正ボタン１０１は、ＡＴＭの利用者がデータ入力をミスした場合にそのデータの修正を行うためのボタンである。修正ボタン１０１の何れかが押されると、その修正ボタン１０１が属する入力データ欄８７における入力済みのデータを示す文字がクリアされ、利用者が新たにデータを入力可能な状態となる。

【００９３】このように、入力データ毎にその修正ボタン１０１を設けてあり、入力されたデータの隣に修正ボタン１０１を配置してあるので、利用者は、修正ボタン１０１の意味を適正に把握できるとともに、データ入力をミスした場合にその修正ボタン１０１を迷うことなく見つけることができる。また、利用者が、誤って別の修正ボタンを押してしまい修正を要しないデータが消えてしまうこと等を防止できる。また、利用者が修正ボタン１０１と誤認して取消ボタン８１ｂを押してしまうことも防止できる。従って、利用者によるＡＴＭ操作の正確性と操作速度の向上を図ることができる。

〈確認ボタン〉図１０～図１２に示すように、各入力パネル表示８４(例えば、８４ａ～８４ｃ)の右下のコーナーには、第１確認ボタン９２が夫々設けられている。この第１確認ボタン９２が押されると、入力装置２ａから確認信号が割込み処理部２３に対して与えられ、割込み処理部２３が表示データ処理部２１に対して確認処理命令を与える。

【００９４】すると、表示データ処理部２１が確認処理を行いＶＲＡＭの記憶内容を変更する。これによって、図１４に示すように、説明表示８３及び入力パネル表示８４が取引画面７０から消えるとともに、手順表示８２が画面の下側にスクロールし、これまでに入力されたデータを表示する状態となる。そして、利用者は、各入力データ領域８７に設けられた修正ボタン１０１の何れかを押すことによって、対応する入力データの修正を行うことができる。

【００９５】さらに、手順表示８２の下側には、矩形の確認表示１０４が表示される。確認表示１０４には、その左側に入力データの確認を促す指示が表示されるとともに、その右側に第２確認ボタン１０５が表示される。そして、ＡＴＭの利用者が第２確認ボタン１０５を押すと、当該操作手順が終了したものとして、操作手順が次に進められる。

【００９６】このように、手順表示８２を入力データの確認画面として用いるので、ＡＴＭの利用者は、今までに入力したデータを一括して確認・修正できるとともに、操作手順の順序，各操作手順の関連，入力データ間の関係等を理解できる。

〈取消ボタン〉図６に示すように、取引種別表示欄８１ａの右側には、取消ボタン８１ｂが設けられている。この取消ボタン８１ｂは、取引を取り消す(ＡＴＭの操作を強制終了させる)ためのボタンである。取消ボタン８１ｂが押されると、リセット信号が入力装置２ａから割込み処理部２３に与えられる。すると、割込み処理部２３が、リセット信号に基づいて強制終了命令を表示データ処理部２１に与える。これによって、表示データ処理部２１が取引を強制終了させる。その後、表示データ処理部２１は、図示せぬ取引種別選択画面をディスプレイ装置１に表示させる。

【００９７】このように、取引種別名と取消ボタン８１ｂとが同一の欄内に配置されているので、ＡＴＭの利用者が取消ボタン８１ｂに表示された「取消」の文字の意味を適正に把握することができる。従って、ＡＴＭの利用者が誤って取消ボタン８１ｂを押してしまい、それまでに行っていた操作が無駄となってしまうことを防止できる。

〈戻りボタン〉従来における自動取引装置では、入力すべきデータを全て入力する前に、既に入力したデータを利用者が見ることができなかった。また、利用者が既に入力したデータの一部を修正したい場合があってもその要求に応える機能が従来における自動取引装置には備わっていなかった。このため、利用者が既に行った操作手順をもう一度行いたい場合には、利用者は「取消」ボタンを押すしかなかった。

【００９８】ところが、利用者が「取消」ボタンを押した場合には、操作手順が一番最初に戻るとともに、既に入力されたデータが消去されてしまう。このため、利用者は操作をもう一度始めからやり直さなければならなかった。即ち、例えば利用者が既に入力したデータの誤りに気付いた場合には、「取消」ボタンを押して操作をやり直すしかないので、利用者が苛立ちを感じてしまい、これを起因としてデータ入力や操作を誤る場合があった。

【００９９】この問題に鑑み、実施形態１によるＡＴＭでは、図１０,図１１,図１２,及び図１５に示すように、入力パネル表示８４に戻りボタン１０２が設けられている。戻りボタン１０２が押されると、ＡＴＭの操作手順が一つ前の操作手順に戻る。例えば、図１５(ａ)に示すように、操作手順が手順番号“２”まで進み、注視領域８０にて入力データ欄８７ｂが表示されている場合

において、戻りボタン１０２が押されたとする。

【０１００】すると、手順表示８２が画面の下側へスクロールし、図１５(b)に示すように、一つ前の操作手順である手順番号“1”が示された入力データ欄８７ａを注視領域８０にて表示する状態となる。このとき、入力データ欄８７ａの入力データ表示領域７４には、既に入力したデータが表示される。

【０１０１】上述した機能は、以下のようにして実現される。即ち、各操作手順において入力されたデータは、図１に示す処理制御装置２０の図示せぬ記憶装置に保持される。戻りボタン１０２が押されると、割込み信号が入力装置２ａから割込み処理部２３に入力される。割込み処理部２３は、割込み信号に従って、操作手順を一つ前に戻す旨の命令(手順回帰命令)を表示データ処理部２１に与える。表示データ処理部２１は、手順回帰命令に従って、取引画面７０の内容を一つ前の操作手順に戻すとともに、図示せぬ記憶装置から該当する入力データを読み出してディスプレイ装置１に表示させる。なお、図示せぬ記憶装置に保持された利用者の入力データは、取引(ＡＴＭの操作)が終了すると消去される。

【０１０２】また、戻りボタン１０２が押された場合には、説明表示８３及び入力パネル表示８４が、一つ前の操作手順に対応するものへ変更される。このとき、利用者が修正ボタン１０１を押せば、変更された入力パネル表示８４を用いて既に入力したデータの修正を行うことができる。また、変更された入力パネル表示８４に設けられた戻りボタン１０２が押されると、操作手順がさらに一つ前に戻る。従って、利用者は、既に行った操作手順の何れにも操作手順を戻すことができる。

【０１０３】このように、実施形態１のＡＴＭによれば、戻りボタン１０２を設けることによって、操作手順を既に行った操作手順に戻すことができる。また、操作手順を戻した際には、既に入力したデータが注視領域８０に表示される。このため、既に行った操作手順の確認・やり直しを操作手順毎に行うことができる。従って、ＡＴＭの利用者の操作性が向上を図ることができ、ひいては、利用者の誤操作や誤入力を回避することができる。データ入力のやり直しができる点で、特に習熟度の低い利用者に対する安心感を与えることができる。

【０１０４】また、戻りボタン１０２は、入力パネル表示８４の種類に拘わらず同一の位置(入力パネル表示８４の右上コーナー)に設けられている。このため、ＡＴＭの利用者は、戻りボタン１０２の位置を特に意識しなくても覚えることができる。従って、利用者は、操作手順を既に行った手順に戻したい場合には、適正に戻りボタン１０２を押すことができる。

〈ヘルプ表示〉図１６は、取引画面７０に表示されるヘルプ表示(解説画面)１０６の説明図である。図１６に示すように、ヘルプ表示１０６は、ＡＴＭの利用者が行うべき操作を示すものであり、入力パネル表示８４の上に重ねて表示される。ヘルプ表示１０６は、取引画面７０の画面要素に対する処理と同様の処理によってディスプレイ装置１に表示される。

【０１０５】図１６には、ヘルプ表示１０６の例として、カードの差込口を解説する画像が表示されている。このヘルプ表示１０６は、画面遷移が終了した際に所定時間表示され、所定時間が経過すると取引画面７０から消える。なお、ヘルプ表示１０６には、図示はしないが、文字列からなるものも用意されている。

〈快速表示ボタン及び丁寧説明ボタン〉図１０～図１２，及び図１６に示すように、入力パネル表示８４の左下コーナーには、快速表示ボタン１０７及び丁寧説明ボタン１０８が設けられている。快速表示ボタン１０７が押されると、各操作手順が通常モードから快速モードへ変更される。即ち、各操作手順におけるヘルプ表示１０６の表示回数が低減されるとともに、画面遷移が高速で行われる状態となる。なお、快速モードへの変更は、制御部ＣＰＵに保持されている熟練者フラグがＯＮとされることで行われる。

【０１０６】これに対し、丁寧説明ボタン１０８が押されると、各操作手順が通常モードから詳細モードへ変更される。即ち、画面遷移の様子が通常モードの場合よりも低速で表示されるとともに、各操作手順におけるヘルプ表示１０６の表示回数，種類が増加する。また、操作に関する詳細説明の文字列が取引画面７０に適宜表示される状態となる。

【０１０７】なお、快速モードの際に快速表示ボタン１０７が押されると、快速モードが通常モードへ戻る。また、詳細モードの際に快速表示ボタン１０７が押されると、詳細モードが快速モードへ変更される。一方、詳細モードの際に丁寧表示ボタン１０８が押されると、詳細モードが通常モードへ戻る。また、快速モードの際に丁寧表示ボタン１０８が押されると、快速モードが詳細モードへ変更される。

【０１０８】このように、快速表示ボタン１０７及び丁寧説明ボタン１０８が設けられているので、利用者はその習熟度に応じたモードを選択してＡＴＭを操作できる。快速モードで操作を行うことにより操作時間の短縮を図ることができる。また、詳細モードで操作を行うことにより、確実かつ正確に操作を行うことができ、操作ミスやデータ入力ミスの発生を回避できる。

〔ＡＴＭの操作手順〕図１７は、上述したＡＴＭにおける操作手順の概念図であり、図１８は、ＡＴＭにおける操作手順の例を示す図である。図１７に示すように、実施形態１におけるＡＴＭは、各取引の操作手順が複階層化されている。具体的には、操作手順は、メイン手順層(最短シーケンス)，選択手順層(サブシーケンス)，及び詳細手順層(サブシーケンス)から構成されている。

【０１０９】メイン手順層は、最短の手順(必要最小限の手順)からなる。選択手順層は、利用者の選択によっ

て操作手順に加えられる手順からなる。詳細手順層は、選択手順層における各手順をさらに詳細化した複数の手順からなり、利用者の選択によって操作手順に加えられる。このように、操作手順が複階層化され、選択手順層及び詳細手順層に属する手順を操作手順に加えるか否かが利用者の選択にゆだねられているので、利用者は自身の習熟度に応じた手順でＡＴＭの操作(取引)を行うことができる。

【０１１０】図１８には、「振込」の取引における操作手順が示されている。この操作手順は、制御部ＣＰＵが画面作成処理によって生成した取引画面７０をディスプレイ１に表示させることによって、利用者に対して提供される。図１８において、「振込先入力」の手順(図１８参照)は、利用者が振込カードを有していれば、その内容が記録されているので省略可能な手順である。

【０１１１】この「振込先入力」の手順は、振込先の「金融機関の選択」「支店名の入力」及び「口座番号の入力」という３つの手順からなる。ところで、「振込先入力」の手順は、「振込」の取引に慣れた利用者であれば一つの手順として処理することが可能である。

【０１１２】このため、ディスプレイ装置１の取引画面７０には、制御部ＣＰＵによって、省略される手順(「金融機関の選択」「支店名の入力」及び「口座番号の入力」)が表示されるとともに、一度に処理できる手順として「振込先入力」の手順が表示される。さらに、省略される手順と「振込先入力」の手順との一方を選択する旨が表示される。

【０１１３】ここで、「振込先入力」の手順が選択された場合には、利用者が「振込先入力」の手順における操作を行った後、操作手順を次の「振込金入力」の手順へ進めることとなる。これに対し、省略される手順が選択された場合には、利用者は「金融機関の選択」「支店名の入力」及び「口座番号の入力」の各手順における操作(図１８参照)を経て、操作手順を次の「振込金入力」へ進めることとなる。

【０１１４】また、「金融機関選択」の手順が終了すると、次の手順を「支店名入力」の手順で行うか、「支店名頭文字入力」及び「支店名選択」の手順で行うかの選択指示が制御部ＣＰＵの処理によってディスプレイ装置１に表示される。これに対し、利用者は、何れか一方を選択して操作手順を進めていくこととなる。

【０１１５】このように、複数の操作からなる複雑な手順を、単純な複数の手順として処理することが可能となっている。従って、習熟度の高い利用者には最短の手順を提供し、習熟度の低い利用者には詳細な手順を踏んでＡＴＭの操作を行わせることができる。

【０１１６】また、各手順に対応づけて、手順における操作や入力対象の意味を示す「解説」のヘルプ表示１０６(図１８参照)が用意されており、各「解説」のヘルプ表示１０６は、図示せぬ手順選択指示とともにディスプレイ装置１に表示される。これによって、利用者は、手順の選択を慎重且つ適正に行うことができる。

【０１１７】以上説明したように、実施形態１によるＡＴＭによれば、ＡＴＭの利用者は自身の操作の習熟度に応じた操作手順でＡＴＭの操作を行うことができるので、ＡＴＭの操作性が向上する。

〔実施形態２〕次に実施形態２による自動取引装置(ＡＴＭ)を説明する。但し、実施形態２によるＡＴＭは、実施形態１によるＡＴＭとほぼ同様であるので、相違する点についてのみ説明する。

【０１１８】図１９は、実施形態２によるＡＴＭのディスプレイ装置１に表示される取引画面７０の一部を示す説明図である。なお、実施形態１における構成要素と同一の構成要素については同一の符号を付してある。図１９において、背景８１及び手順表示８２の上には、説明表示１８３及び入力パネル表示１８４が表示されている。説明表示１８３は、操作説明を示す文字列を除いて半透明で表示されている。また、入力パネル表示８４は、５０音キー群９４を除いて半透明で表示されている。

【０１１９】このため、ＡＴＭの利用者は、半透明な説明表示１８３及び入力パネル表示１８４を介してこれらの背後に存する手順表示８２の表示内容を見ることができる。従って、各入力データ欄８７に表示された既に入力結果の確認，入力を要求される入力対象の全体像の認識することができる。

【０１２０】実施形態２によれば、ＡＴＭの利用者は、手順表示８２の表示内容を説明表示１８３及び入力パネル表示１８４を介して見ることができる。このため、利用者は、実施形態１に比べて手順表示８２の表示内容をより適正に把握することができる。また、説明表示１８３及び入力パネル表示１８４を半透明とすることで、従来一画面で納まらなかった情報を一画面で表示することが可能となるので、複雑な内容の情報，或いは多量の情報を一画面で表示できる。従って、操作手順の短縮化を図ることができる。

【０１２１】なお、実施形態２では、説明表示１８３及び入力パネル表示１８４を半透明で表示する構成としたが、説明表示１８３又は入力パネル表示１８４の一方のみが半透明で表示される構成となっていても良い。

〔実施形態３〕次に、実施形態３によるＡＴＭを説明する。実施形態3によるＡＴＭは、実施形態１によるＡＴＭとほぼ同様であるので、共通点については説明を省略し、相違点について説明する。

【０１２２】図２０は、実施形態３によるＡＴＭの構成を示すブロック図である。但し、実施形態１と同一の構成要素については、同一の符号を付して説明を省略する。制御部ＣＰＵは、実施形態１にて説明した構成に加え、時間を計測するタイマA及びタイマＢを有している。この制御部ＣＰＵは、利用者のＡＴＭの操作の習熟

度を判定する処理（習熟度判定処理）を行う。

【０１２３】習熟度判定処理は、利用者によるデータ入力の速さを測ることによって行われる。例えば、利用者が数字（暗証番号，口座番号等）を入力する場合には、利用者が４桁の数字を入力するまでの所用時間によって習熟度の高低を判定する。或いは、任意の数字入力があってからその数字入力を修正する修正キーが押されるまでの時間によって習熟度の高低を判定する（数字入力による習熟度判定処理）。

【０１２４】また、５０音の文字（受取人，依頼人等）入力の場合には、文字の入力時間間隔によって習熟度の高低を判定する。或いは、任意の文字入力があってからその文字入力を修正する修正キーが押されるまでの時間によって習熟度の高低を判定する（文字入力による習熟度判定処理）。

【０１２５】また、習熟度判定処理は、利用者の金融用語の知識度を測ることによって行われる。例えば、特定の金融用語がディスプレイ装置１に表示されてから、入力パネル表示８４の何れかのキーが押されるまでの時間によって習熟度の高低を判定する。特定の金融用語には、例えば、「普通」「当座」「振込カード」「現金振込」「口座振込」等の金融用語が挙げられる（用語による習熟度判定処理）。

【０１２６】図２１は、実施形態３における制御部ＣＰＵによる習熟度判定処理を示すフローチャートである。図２１において、習熟度判定処理は、制御部ＣＰＵがＡＴＭのディスプレイ装置１に取引画面７０が表示されることによってスタートする。但し、ここでは、上述した数字入力による判定処理を行うものとし、取引画面７０として、図示せぬ暗証番号入力画面（暗証番号を入力する操作手順にて表示される取引画面７０）がディスプレイ装置１に表示されたものとする。

【０１２７】ステップＳ１０１では、制御部ＣＰＵは、タイマＡ及びタイマＢをストップし、且つリセット（クリア）した後、処理をステップＳ１０２へ進める。ステップＳ１０２では、制御部ＣＰＵは、図示せぬ暗証番号入力画面に表示されたテンキーの何れかが押されるのを待機する。その後、制御部ＣＰＵは、テンキーの何れかが押されたと判定した場合（ステップＳ０１２；ＹＥＳ）には、処理をステップＳ１０３へ進める。制御部ＣＰＵは、ステップＳ１０３へ処理を進めた場合には、タイマＢをストップした後、処理をステップＳ１０４へ進める。

【０１２８】ステップＳ１０４では、制御部ＣＰＵは、ステップＳ１０２にて押されたキーによって４桁の暗証番号の１桁目の番号が入力されたのか否かを判定する。このとき、制御部ＣＰＵは、１桁目の番号が入力されたと判定した場合（ステップＳ１０４；ＹＥＳ）には、処理をステップＳ１０５へ進め、タイマＡによる計時をスタートさせる。その後、制御部ＣＰＵは、処理をステップＳ１０２へ戻し、再び図示せぬ暗証番号入力画面に表示されたテンキーが押されるのを待機する。これに対し、制御部ＣＰＵは、１桁目の番号が入力されたのではないと判定した場合（ステップＳ１０４；ＮＯ）には、処理をステップＳ１０６へ進める。

【０１２９】制御部ＣＰＵは、ステップＳ１０６へ処理を進めた場合には、ステップＳ１０２にて押されたキーによって４桁の暗証番号の４桁目の番号が入力されたのか否かを判定する。このとき、制御部ＣＰＵは、４桁目の番号が入力されたと判定した場合（ステップＳ１０６；ＹＥＳ）には、処理をステップＳ１１１へ進める。これに対し、制御部ＣＰＵは、４桁目の番号が入力されたのではないと判定した場合（ステップＳ１０６；ＮＯ）には、処理をステップＳ１０７へ進める。

【０１３０】制御部ＣＰＵは、ステップＳ１０７へ処理を進めた場合には、図示せぬ暗証番号入力画面に表示された修正キーが押されたか否かを判定する。このとき、制御部ＣＰＵは、修正キーが押されなかったと判定した場合（ステップＳ１０７；ＮＯ）には、処理をステップＳ１０８へ進め、タイマＢによる計時をスタートさせる。その後、制御部ＣＰＵは、処理をステップＳ１０２へ戻し、再び図示せぬ暗証番号入力画面に表示されたテンキーが押されるのを待機する。これに対し、制御部ＣＰＵは、修正キーが押されたと判定した場合（ステップＳ１０７；ＹＥＳ）には、処理をステップＳ１０９へ進める。

【０１３１】制御部ＣＰＵは、ステップＳ１０９へ処理を進めた場合には、ステップＳ１０３にてストップさせたタイマＢの計時時間（ある数字を入力しその誤りに気付いて修正キーを押すまでの時間）を参照し、その計時時間が規定値以下であるか否かを判定する。このとき、制御部ＣＰＵは、規定値以下でないと判定した場合（ステップ１０９；ＮＯ）には、処理をステップＳ１０８へ進める。これに対し、制御部ＣＰＵは、規定値以下であると判定した場合（ステップＳ１０９；ＹＥＳ）には、処理をステップＳ１１０へ進める。

【０１３２】制御部ＣＰＵは、ステップＳ１１０へ処理を進めた場合には、利用者は操作の熟練者であるものとして、実施形態１にて説明した熟練者フラグをＯＮとする。その後、制御部ＣＰＵは、処理をステップＳ１０８へ進める。一方、制御部ＣＰＵは、ステップＳ１０６にてＹＥＳの判定を行い、処理をステップ１１１へ進めた場合には、タイマＡによる計時をストップする。その後、制御部ＣＰＵは、処理をステップＳ１１２へ進める。

【０１３３】ステップＳ１１２では、制御部ＣＰＵは、ステップＳ１１１にてストップさせたタイマＡの計時時間（４桁の暗証番号入力に要した時間）を参照し、その計時時間が規定値以下であるか否かを判定する。このとき、制御部ＣＰＵは、規定値以下でないと判定した場合

(ステップ１０９；ＮＯ)には、習熟度判定処理を終了させる。これに対し、制御部ＣＰＵは、規定値以下であると判定した場合(ステップＳ１０９；ＹＥＳ)には、処理をステップＳ１１３へ進める。

【０１３４】制御部ＣＰＵは、ステップＳ１１３へ処理を進めた場合には、利用者は操作の熟練者であるものとして、実施形態１にて説明した熟練者フラグをＯＮとする。その後、制御部ＣＰＵは、習熟度判定処理を終了させる。この習熟度判定処理が終了すると、制御部ＣＰＵ(中央処理部３)は、次の取引画面７０をディスプレイ装置１に表示させる処理を開始する。

【０１３５】熟練者フラグがＯＮとなることによって、実施形態１にて説明したように、快速表示ボタン１０７が押された場合と同じ状態，即ち、画面遷移が高速で行われるとともに、ヘルプ表示１０６の表示回数が低減される。

【０１３６】また、文字入力による習熟度判定処理は、図２１に示したフローチャートと同一の処理によって実現される。但し、文字入力による習熟度判定処理では、５０音の入力パネル表示８４ｃを含む取引画面７０がディスプレイ装置１に表示されることによって処理がスタートする。また、タイマAは、ある文字データが４文字分入力されるまでの時間を計時する。また、タイマＢは、利用者が任意の文字データを入力してからその誤りに気付いて修正キー１０１を押すまでの時間を計時する。そして、ステップＳ１０９及びステップＳ１１２の各処理において用いられる規定値は、数字入力による習熟度判定処理の場合と異なる値で設定される。

【０１３７】図２２は、用語による習熟度判定処理を示すフローチャートである。この判定処理は、特定の用語を入力するためのキーが配置された入力パネル表示８４を含む取引画面７０がディスプレイ装置に表示されることによってスタートする。

【０１３８】処理がスタートすると、制御部ＣＰＵは、タイマAをストップし、且つリセット(クリア)し(ステップＳ２０１)、その後、タイマAによる計時をスタートさせる(ステップＳ２０２)。続いて、制御部ＣＰＵは、特定の用語を入力するためのキーが押されたか否かを判定する(ステップＳ２０３)。このとき、制御部ＣＰＵは、該当するキーが押されたと判定した場合(ステップＳ２０３；ＹＥＳ)には、処理をステップＳ２０４へ進める。これに対し、該当するキーが押されていないと判定した場合(ステップＳ２０３；ＮＯ)には、このステップＳ２０３にてＹＥＳの判定がなされるまで、ステップＳ２０３の処理が繰り返し行われる。

【０１３９】制御部ＣＰＵは、ステップＳ２０４へ処理を進めた場合には、タイマAによる計時をストップさせる。続いて、制御部ＣＰＵは、タイマAの計時時間を参照し、その計時時間が規定値以下であるか否かを判定する。このとき、制御部ＣＰＵは、規定値以下でないと判定した場合(ステップ２０５；ＮＯ)には、この判定処理を終了させる。これに対し、制御部ＣＰＵは、規定値以下であると判定した場合(ステップＳ２０５；ＹＥＳ)には、処理をステップＳ２０６へ進める。

【０１４０】制御部ＣＰＵは、ステップＳ２０６へ処理を進めた場合には、利用者は操作の熟練者であるものとして、実施形態１にて説明した熟練者フラグをＯＮとする。その後、制御部ＣＰＵは、この判定処理を終了させる。

【０１４１】実施形態３による効果は、実施形態１による効果とほぼ同様である。但し、ＡＴＭの利用者の操作の習熟度を判定し、習熟度が高い場合には、操作手順を省略する。従って、習熟度が高い利用者は、簡略化された操作手順によってＡＴＭを操作でき、習熟度の低い利用者は、詳細な操作手順によってＡＴＭを操作できる。即ち、実施形態３によれば、利用者の習熟度に応じた操作手順を自動的に提供できる。従って、多くの利用者が快適にＡＴＭを操作することが可能となる。

【０１４２】なお、上述した各習熟度判定処理にて用いられた各規定値は、適宜設定可能である。従って、地域差による操作の習熟度の差を吸収できる。例えば、都市部のターミナル駅近傍等では、ＡＴＭの操作に熟練した利用者が多いので、各規定値をローカルな地域に比べて短い時間で設定する。一方、ローカルな地域では、都市部に比べてＡＴＭの操作に熟練した利用者が少ないので、各規定値を都市部に比べて長い時間で設定する。

〔実施形態４〕次に、実施形態４によるＡＴＭを説明する。従来における自動取引装置は、画面遷移させた後、入力が所定時間ない場合には、取引処理全体をキャンセルするタイムアウト時間を定義し、このタイムアウト時間を基づいて、画面遷移後タイムアウト前の適当な時間前(例えば５秒前)にアラームを鳴らして入力を催促していた。その後も入力がない場合には、自動取引装置は、タイムアウト時間がくると同時に取引を強制終了させていた。

【０１４３】このような対応方法は、利用者が自動取引装置の操作を途中で中断して不在になった場合や、利用者が意図的にタイムアウトによる強制終了を実行する場合には有効である。ところが、利用者が何をしてよいか理解できず入力を行うことができない場合等では、催促アラームは利用者を混乱させるのみとなることがあった。この場合には、利用者に催促アラームによって慌てさせられたためできることもできなくなってしまったという不満，或いは、機械に使われているという感覚が与えてしまう場合があった。

【０１４４】実施形態４によるＡＴＭは、上記問題に鑑みなされたものである。但し、実施形態４によるＡＴＭは、実施形態１によるＡＴＭとほぼ同様の構成を有しているので、共通点については説明を省略し、相違点について説明する。図２３は、実施形態４における制御部Ｃ

ＰＵによる処理(タイムアウト処理)を示すフローチャートである。

【０１４５】このタイムアウト処理は、取引画面７０の画面遷移が完了することによってスタートする。最初に、制御部ＣＰＵは、自身が保持する図示せぬ入力監視タイマを起動させる(ステップＳ３０１)。続いて、制御部ＣＰＵは、入力装置２ａからキー入力があったか否かを判定する(ステップＳ３０２)。このとき、制御部ＣＰＵは、キー入力があったと判定した場合(ステップＳ３０２；ＹＥＳ)には、タイムアウト処理を終了させ、次の処理を開始する。これに対し、制御部ＣＰＵは、キー入力が無いと判定した場合(ステップＳ３０２；ＮＯ)には、処理をステップＳ３０３へ進める。

【０１４６】制御部ＣＰＵは、処理をステップＳ３０３へ進めた場合には、図示せぬ入力監視タイマが、予め設定されているタイムアウト時間を計時し、タイムアウトが発生したか否かを判定する。このとき、制御部ＣＰＵは、タイムアウトが発生したと判定した場合(ステップＳ３０３；ＹＥＳ)には、取引を強制終了させて、このタイムアウト処理を終了させる。これに対し、制御部ＣＰＵは、タイムアウトが発生していないと判定した場合(ステップＳ３０３；ＮＯ)には、処理をステップＳ３０４へ進める。

【０１４７】制御部ＣＰＵは、処理をステップＳ３０４へ進めた場合には、図示せぬ入力監視タイマを起動させてから１０秒経過していない否かを判定する。このとき、制御部ＣＰＵは、１０秒経過していないと判定した場合(ステップＳ３０４；ＹＥＳ)には、音声出力部６０(図3参照)へ動作命令を与え、注意喚起音を発生させる(ステップＳ３０５)。その後、制御部ＣＰＵは、処理をステップＳ３０２へ戻す。これに対し、制御部ＣＰＵは、１０秒経過していると判定した場合(ステップＳ３０４；ＮＯ)には、処理をステップＳ３０６へ進める。

【０１４８】制御部ＣＰＵは、処理をステップＳ３０６へ進めた場合には、図示せぬ入力監視タイマを起動させてから１５秒経過していないか否かを判定する。このとき、制御部ＣＰＵは、１５秒経過していないと判定した場合(ステップＳ３０６；ＹＥＳ)には、ディスプレイ装置１の取引画面７０上にヘルプ表示１０６を表示させる(ステップＳ３０７)。その後、制御部ＣＰＵは、処理をステップＳ３０２へ戻す。これに対し、制御部ＣＰＵは、１５秒経過していると判定した場合(ステップＳ３０６；ＮＯ)には、処理をステップＳ３０８へ進める。

【０１４９】制御部ＣＰＵは、処理をステップＳ３０８へ進めた場合には、図示せぬ入力監視タイマを起動させてから２０秒経過していないか否かを判定する。このとき、制御部ＣＰＵは、２０秒経過していないと判定した場合(ステップＳ３０８；ＹＥＳ)には、処理をステップＳ３１１へ進める。これに対し、制御部ＣＰＵは、２０秒経過していると判定した場合(ステップＳ３０８；ＮＯ)には、処理をステップＳ３０９へ進める。

【０１５０】制御部ＣＰＵは、処理をステップＳ３０９へ進めた場合には、図示せぬ入力監視タイマがタイムアウト時間を計時する５秒前であるか否かを判定する。このとき、制御部ＣＰＵは、５秒前であると判定した場合(ステップＳ３０９；ＹＥＳ)には、音声出力部６０に動作命令を与え、警告アラームを発生させる。その後、制御部ＣＰＵは、処理をステップＳ３０２へ戻す。これに対し、制御部ＣＰＵは、５秒前でないと判定した場合(ステップＳ３０８；ＮＯ)には、処理をステップＳ３０２へ戻す。

【０１５１】一方、制御部ＣＰＵは、処理ステップＳ３１１へ進めた場合には、ディスプレイ装置１における取引画面７０上にタイムアウト予告(例えば、「あと数秒でタイムアウトとなり取引を強制終了します」の文字列等)を表示させるとともに、音声出力部６０にタイムアウトが発生する旨の音声案内を出力させる。続いて、制御部ＣＰＵは、図示せぬサスペンドボタン(タイムアウト時間を延長するためのボタン)，及び図示せぬ指示表示(例えば、「取引を継続したい場合にはサスペンドボタンを押して下さい」等の文字列)を、取引画面７０上に表示させる。

【０１５２】その後、制御部ＣＰＵは、所定時間図示せぬサスペンドボタンからの入力を受け付ける状態となり、所定時間が経過すると、図示せぬサスペンドボタンが押されたか否かを判定する(ステップＳ３１３)。このとき、制御部ＣＰＵは、図示せぬサスペンドボタンが押されなかったと判定した場合(ステップＳ３１３；ＮＯ)には、処理をステップＳ３０９へ進める。これに対し、制御部ＣＰＵは、図示せぬサスペンドボタンが押されたと判定した場合(ステップＳ３１３；ＹＥＳ)には、処理をステップＳ３０４へ戻す。これによって、制御部ＣＰＵがステップＳ３０３の処理をジャンプする状態となるので、次のステップＳ３０３の処理が行われるまでの間、タイムアウト時間が延長されることとなる。

【０１５３】実施形態４によるＡＴＭによると、画面遷移が行われてから入力装置２ａに対してデータ入力がなされない場合には、ＡＴＭは、第１段階として注意喚起音を発生し、第２段階としてディスプレイ装置１に操作方法説明表示(ヘルプ表示１０６)を表示し、第3段階としてタイムアウト発生予告の表示及び音声案内を行い、第4段階としてタイムアウトの警告アラームを発生する。このように、タイムアウトの情報を段階的にＡＴＭの利用者に対して提供するので、利用者が心理的圧迫感を受けることなく操作を行うことができる。

【０１５４】また、ヘルプ表示１０６を表示することで、操作知識の不足している利用者に対する救済を与えるので、タイムアウトが発生して取引が強制終了してしまう可能性を低減することができる。さらに、図示せぬサスペンドボタンを設け、このボタンを押すことでタイ

ムアウトまでの時間が延長される構成としたので、利用者に対しＡＴＭの操作方法の理解に努める猶予を与えることができる。従って、タイムアウト時間となれば必然的に強制終了してしまう従来の自動取引装置に比べ、利用者に対して満足感を与えることができる。

〔実施形態５〕次に、実施形態５によるＡＴＭを説明する。従来における自動取引装置では、取引画面が切り替わる際にシグナル音等の注意喚起音が無かったので、取引画面の切り替わりが終了したことや、データを入力可能な状態となったことにＡＴＭの利用者が気付かない場合があり、取引に時間を要してしまう場合があった。

【０１５５】このことに鑑み、従来における自動取引装置では、取引画面の切り替え完了やデータ入力可能であることを利用者に伝達するため、取引画面の文字を大きく表示したり、文字を点滅させることで利用者の注意を喚起していたが、利用者がディスプレイ装置に注目していない場合には、これらのシグナルを見逃すこととなり、十分ではなかった。

【０１５６】実施形態５によるＡＴＭは、上述した問題に鑑みなされたものである。実施形態５によるＡＴＭは、実施形態１によるＡＴＭとほぼ同様であるので、共通点については説明を省略し、相違点について説明する。図２４は、実施形態５におけるＡＴＭの制御部ＣＰＵによる処理(注意喚起処理)を示すフローチャートである。

【０１５７】この注意喚起処理は、操作手順の何れかが終了することによってスタートする(ステップＳ４０１)。制御部ＣＰＵは、処理をステップＳ４０２へ進めると、取引画面７０の書き換え処理を行う。即ち、ディスプレイ装置１に実施形態１にて説明した画面遷移を表示させるための内部処理(画面表示処理：図４参照)を行う。

【０１５８】続いて、制御部ＣＰＵは、ディスプレイ装置１に対して取引画面７０のデータ(ビデオ信号)を転送し、次の操作手順における取引画面７０を表示させる(ステップＳ４０３)。このステップＳ４０３の処理によって取引画面７０がディスプレイ装置１に表示されると、制御部ＣＰＵは、音声出力部６０に動作命令を与え、シグナル音を発生させる(ステップＳ４０４)。そして、制御部ＣＰＵは、利用者がデータ入力可能な状態，即ち、入力装置２ａからの信号を待機する状態となる(ステップＳ４０５)。

【０１５９】実施形態５によるＡＴＭによると、取引画面７０の画面遷移の際にシグナル音を発生させるので、利用者を取引画面７０に注目させることができる。また、シグナル音発生に続いてデータ入力を可能な状態とするので、利用者は、シグナル音の発生を契機としてＡＴＭに対するデータ入力を開始することができる。このため、利用者によるＡＴＭの操作時間の短縮を図ることができ、ひいては金融機関における顧客の稼働率向上に寄与することもできる。

〔実施形態６〕次に、実施形態６によるＡＴＭを説明する。実施形態６によるＡＴＭは、実施形態１によるＡＴＭとほぼ同様であるので、共通点については省略し、相違点についてのみ説明する。

【０１６０】図２５は、顧客操作部ＵＯＰにおける指の引きずり判定処理が示されたフローチャートである。この判定処理は、ディスプレイ装置１に取引画面７０が表示され、データ入力可能な状態となることによってスタートする。

【０１６１】ステップＳ５０１では、入力装置２ａのタッチパネルと接触する物体が検知されたか否かが判定される。このとき、物体が検知された場合(ステップＳ５０１；ＹＥＳ)には、処理がステップＳ５０２へ進む。これに対し、物体が検知されない場合(ステップＳ５０１；ＮＯ)には、ステップＳ５０１にてＹＥＳの判定がなされるまでステップＳ５０１の処理が繰り返し行われる。

【０１６２】ステップＳ５０２へ処理が進んだ場合には、ステップＳ５０１にて検知した物体が検知されたままの状態であり、且つその物体とタッチパネルとの接触位置座標が、ステップＳ５０１にて検知した際における接触位置座標と異なるか否かを判定する。このとき、物体が検知されたままの状態で、且つ接触位置座標が異なる場合(ステップＳ５０２；ＹＥＳ)には、指の引きずりが発生しているものとして、その旨の信号が制御部ＣＰＵへ転送される(ステップＳ５０３)、そして、この判定処理が終了する。

【０１６３】これに対し、物体が検知されたままの状態でない場合，或いは接触位置座標が異ならない場合(ステップＳ５０２；ＮＯ)には、正常に入力パネル表示８４のキー又はボタンの何れかが押されたものとして、その旨の信号が制御部ＣＰＵへ転送される(ステップＳ５０４)。そして、この判定処理が終了する。

【０１６４】図２６は、制御部ＣＰＵによる引きずり警告音発生処理が示されたフローチャートである。この処理は、ディスプレイ装置１に取引画面７０が表示され、データ入力可能な状態となることによってスタートする。

【０１６５】最初に、制御部ＣＰＵは、キー入力を待つ状態となり(ステップＳ５０５)、キー入力があるか否かを判定する(ステップＳ５０６)。即ち、入力装置２ａから信号が転送されてきたか否かを判定する。このとき、入力装置２ａから信号が転送されてきたと判定した場合には、制御部ＣＰＵは、処理をステップＳ５０７へ進める。

【０１６６】制御部ＣＰＵは、処理をステップＳ５０７へ進めた場合には、入力装置２ａから転送されてきた信号が指の引きずり動作を示す信号であるか否かを判定する。このとき、制御部ＣＰＵは、引きずり動作を示す信

号でないと判定した場合には、処理をステップＳ５０８へ進め、他の処理を行い、引きずり警告音発生処理を終了させる。これに対し、引きずり動作を示す信号であると判定した場合には、制御部は処理をステップＳ５０９へ進める。

【０１６７】制御部ＣＰＵは、処理をステップＳ５０９へ進めた場合には、音声出力部６０に動作信号を与え、警告を示すシグナル音を発生させる。続いて、制御部ＣＰＵは、ディスプレイ装置１に、例えば「指を引きずっています。画面からはなして下さい」の文字列を含むウインドウを表示させる（ステップＳ５１０）。その後、制御部ＣＰＵは、処理をステップＳ５０６へ戻す。

【０１６８】実施形態６によれば、指の引きずり動作が行われた場合には、シグナル音がなるので、利用者がディスプレイ装置１に注目する。すると、ディスプレイ装置１には、指の引きずりを警告するメッセージが表示されているので、利用者は、入力データに誤りがないかを確認し、誤りがある場合には、修正キー１０１を押して誤りを修正することとなる。このため、指の引きずりによるデータ入力ミスや装置の誤操作を防止することができる。

〔実施形態７〕次に、実施形態７によるＡＴＭを説明する。従来における自動取引装置では、複数の取引画面の夫々は、取引に必要な操作内容に応じて個別に作成されていた。また、複数の取引画面の表示順序は、自動取引装置に搭載されたプロセッサ装置によって、制御プログラムで規定されるシーケンスに従って決定されていた。このため、複数の取引画面の表示順序を変更したい場合には、プログラムを修正する必要があった。また、自動取引装置に入力される入力対象が変更される場合には、プログラムを変更するとともに、取引画面のデータを変更する必要があった。

【０１６９】ところが、自動取引装置の制御プログラムや取引画面のデータは、通常ハードディスクに格納されるため、その変更作業には時間を要し著しく困難であった。実施形態７は、上述した問題に鑑みなされたものである。

【０１７０】図２７は、実施形態７によるＡＴＭの中央処理装置３（制御部ＣＰＵ）を示すブロック図である。但し、実施形態４によるＡＴＭは、実施形態１によるＡＴＭとほぼ同様であるので、同様の構成要素については、同一の符号を付して説明を省略し、相違する点についてのみ説明する。図２７において、中央処理部３は、ハードディスク２４を有している。ハードディスク２４には、画面作成テーブル２５が保持されている。

【０１７１】図２８は、画面作成テーブル２５の説明図である。図２８において、画面作成テーブル２５には、複数の出力データ（図３に示すＨＤ１０に記録された制御プログラム内に規定されているデータであって、取引画面７０をディスプレイ装置１に表示するためのデータ）の夫々に対応する入力対象，説明表示８３，及び入力パネル表示８４が夫々格納されている。この画面作成テーブル２５は、取引画面７０の画面要素のうち、説明表示８３と入力パネル表示８４とは、入力対象に対して１：１の関係で特定され得ることに着目して作成されたものである。また、背景８１は、取引種別が選択されることによって一意的に決定されるので、固定データとして保有されている。

【０１７２】図２９は、図２７に示した処理制御装置２０による処理を示すフローチャートである。図２９において、ステップＳ６０１～Ｓ６０９の処理のうち、ステップＳ６０１～Ｓ６０４の処理，及びステップＳ６０６～Ｓ６０９の処理は、図１に示したステップＳ０１～Ｓ０４，及びステップＳ０６～Ｓ０９の処理と同様であるので説明を省略し、ステップＳ６０５について説明する。

【０１７３】ステップＳ６０５に処理が進んだ場合には、表示データ処理部２１による画面作成処理のサブルーチンがスタートする。図３０は、画面作成処理を示すフローチャートである。画面作成処理がスタートすると、表示データ処理部２１は、最初に、イメージデータ保持部７から取引種別に対応する背景８１のテクスチャデータを受け取る（ステップＳ７０１）。続いて、表示データ処理部８１は、イメージデータ保持部７から取引種別に対応する手順表示８２のテクスチャデータを受け取る（ステップＳ７０２）。

【０１７４】続いて、表示データ処理部２１は、制御プログラムに規定されている出力データに基づいて画面作成テーブル２５を検索し、対応する入力対象を特定する（ステップＳ７０３）。続いて、表示データ処理部２１は、ステップＳ７０３にて特定した入力対象に対応する説明表示８３を特定し、該当する説明表示８３のテクスチャデータをイメージデータ保持部７から読み出す（ステップＳ７０４）。

【０１７５】続いて、表示データ処理部２１は、ステップＳ７０３にて特定した入力対象に対応する入力パネル表示８４を特定し、該当する入力パネル表示８４のテクスチャデータをイメージデータ保持部７から読み出す（ステップＳ７０５）。そして、表示データ処理部２１は、必要な文字データをＣＧ部６から受け取る。すると、画面作成処理が終了し、メインルーチンにおけるステップＳ６０６へ処理が進む。

【０１７６】実施形態７によるＡＴＭによれば、取引画面７０が画面作成テーブル２５の格納内容に基づいて作成されるので、画面作成テーブル２５の格納内容を変更すれば、取引画面７０の表示内容や取引画面７０の表示順序の変更を行うことができる。従って、ＨＤ１０に記録された制御プログラムの内容変更等の必要がない。

【０１７７】

【発明の効果】本発明による自動取引装置によれば、利

用者の操作の習熟度に関係なく従来に比べて操作性の向上を図ることができる

【図面の簡単な説明】

【図１】ＡＴＭの主要部を示すブロック図
【図２】ＡＴＭの外観構成図
【図３】ＡＴＭの具体的構成を示すブロック図
【図４】制御部による処理を示すフローチャート
【図５】取引画面の説明図
【図６】取引画面の画面要素の説明図
【図７】手順表示の説明図
【図８】手順表示の説明図
【図９】手順表示の説明図
【図１０】入力パネル表示の説明図
【図１１】入力パネル表示の説明図
【図１２】入力パネル表示の説明図
【図１３】入力パネル表示の説明図
【図１４】確認画面の説明図
【図１５】戻りボタンの説明図
【図１６】ヘルプ表示の説明図
【図１７】操作手順の概念図
【図１８】操作手順の例を示す図
【図１９】実施形態２による取引画面の説明図
【図２０】実施形態３によるＡＴＭの構成を示すブロック図
【図２１】習熟度判定処理を示すフローチャート
【図２２】習熟度判定処理を示すフローチャート
【図２３】タイムアウト処理を示すフローチャート
【図２４】注意喚起処理を示すフローチャート
【図２５】引きずり判定処理を示すフローチャート
【図２６】引きずり警告音発生処理を示すフローチャート
【図２７】実施形態７によるＡＴＭのブロック図
【図２８】画面作成テーブルの説明図
【図２９】画面作成処理を示すフローチャート
【図３０】画面作成処理を示すフローチャート
【図３１】従来技術の説明図
【図３２】従来技術の説明図
【図３３】従来技術の説明図

【符号の説明】

Ａ，Ｂ　タイマ
ＣＰＵ　制御装置
１　ディスプレイ装置
２ａ　入力装置
３　中央処理装置
６　ＣＧ部
７　イメージデータ保持部
８　ＲＯＭ
９　ＲＡＭ
２０　処理制御装置
２１　表示データ処理部
２２　表示制御部
２３　割り込み処理部
２４　ＥＥＰＲＯＭ
２５　画面作成テーブル
７０　取引画面
７１　取引種別表示領域
７２　操作説明領域
７３　入力対象表示領域
７４　入力データ表示領域
７５　操作領域
８０　注視領域
８１　背景
８１ａ　取引種別表示欄
８１ｂ　取消ボタン
８２　手順表示
８３，１８３　説明表示
８４，１８４　入力パネル表示
８７　入力データ欄
９２　第１確認ボタン
１０１　修正ボタン
１０２　戻りボタン
１０５　第２確認ボタン
１０６　ヘルプ表示
１０７　快速表示ボタン
１０８　丁寧説明ボタン

【図２８】

画面作成テーブルの説明図

入力対象欄	説明表示欄	入力パネル表示欄	出力データ
振込先金融機関			
≈			
口座番号	83a	84a	
受取人名	83	84c	
振込金額	83b	84b	

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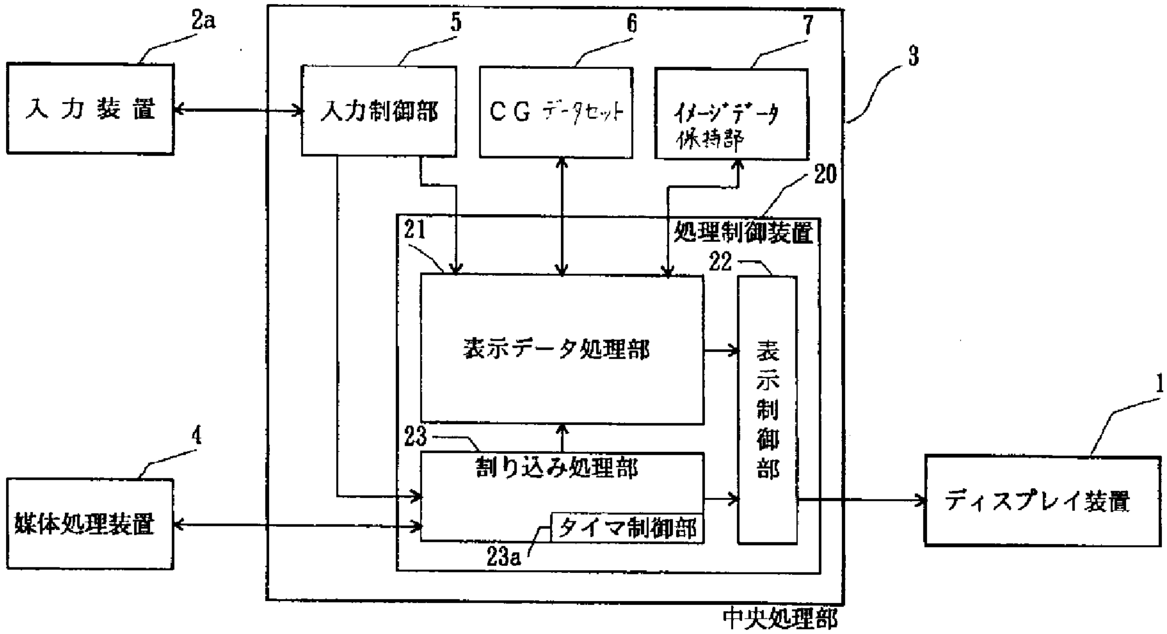
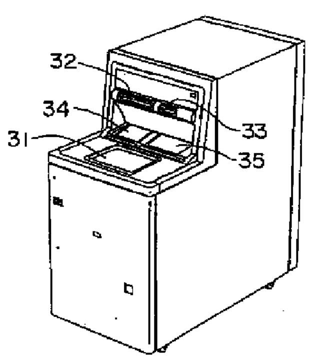
【図１】

ＡＴＭの主要部を示すブロック図



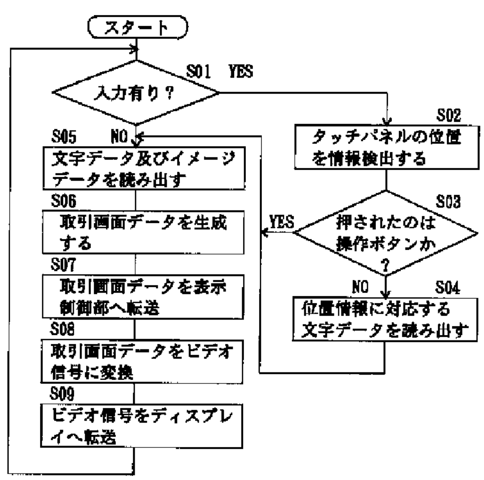
【図２】

ＡＴＭの外観構成図



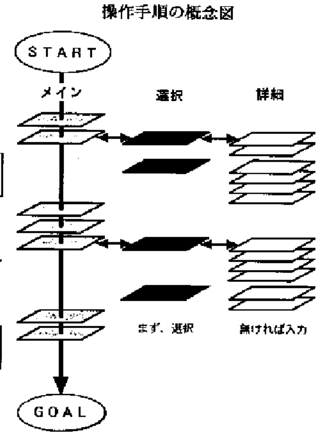
【図４】

制御部による処理を示すフローチャート



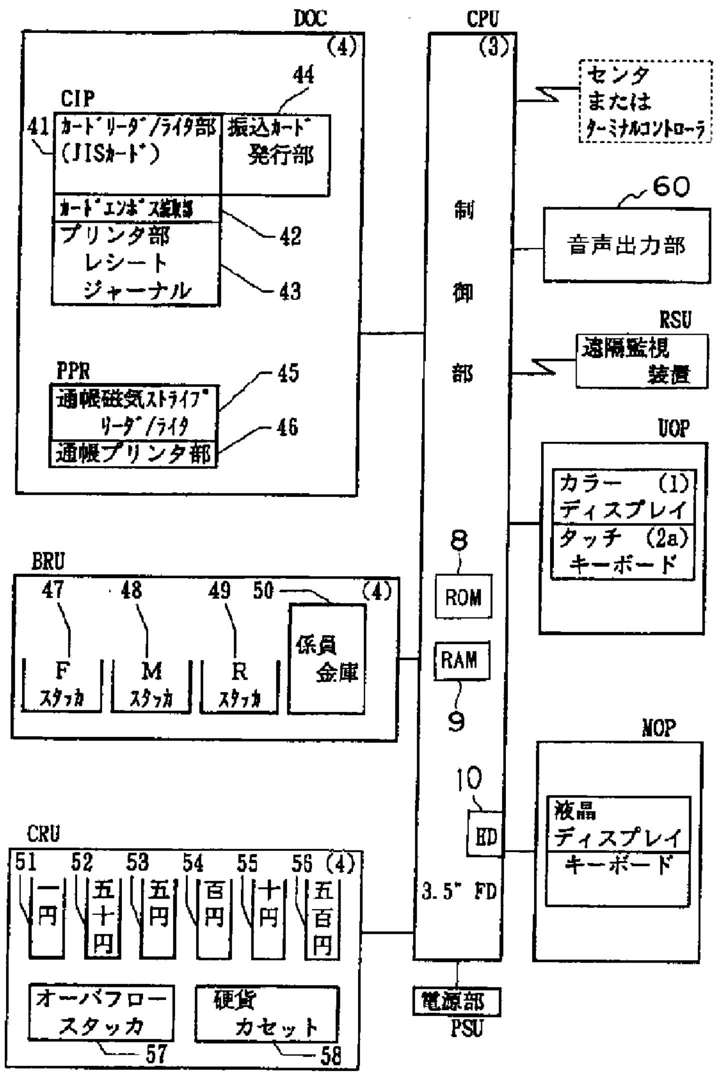
【図１７】

操作手順の概念図

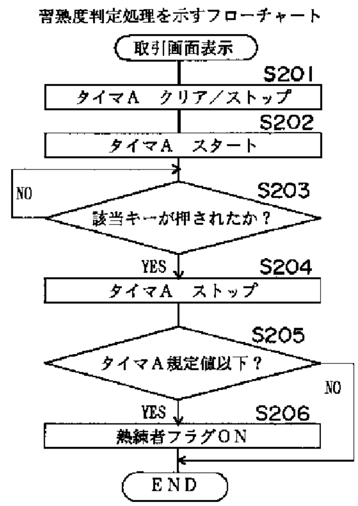


【図3】

ＡＴＭの具体的構成を示すブロック図

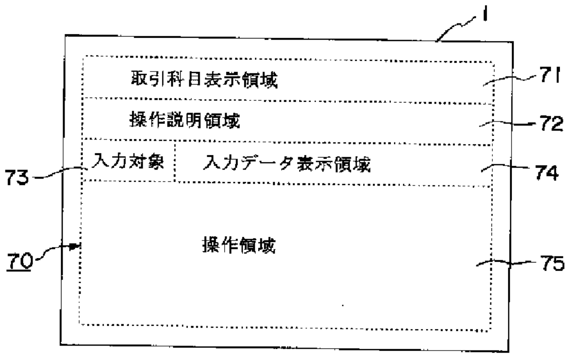


【図22】



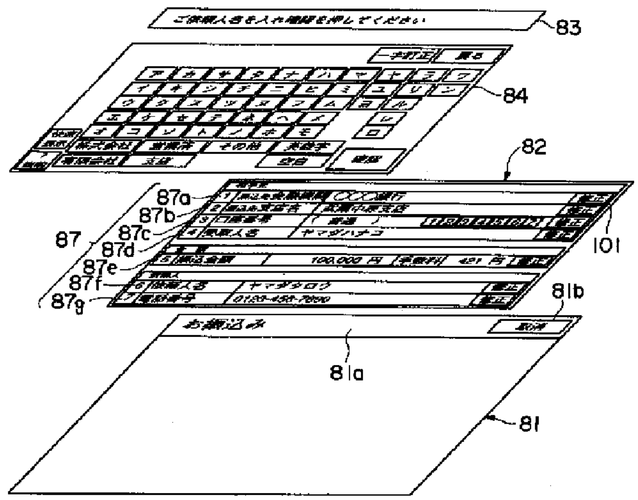
【図5】

取引画面の説明図



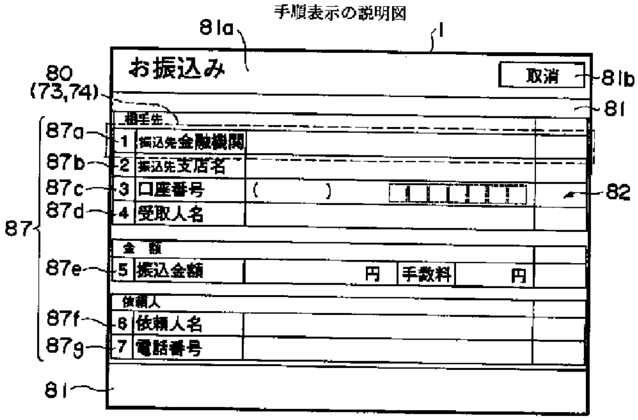
【図6】

取引画面の画面要素の説明図



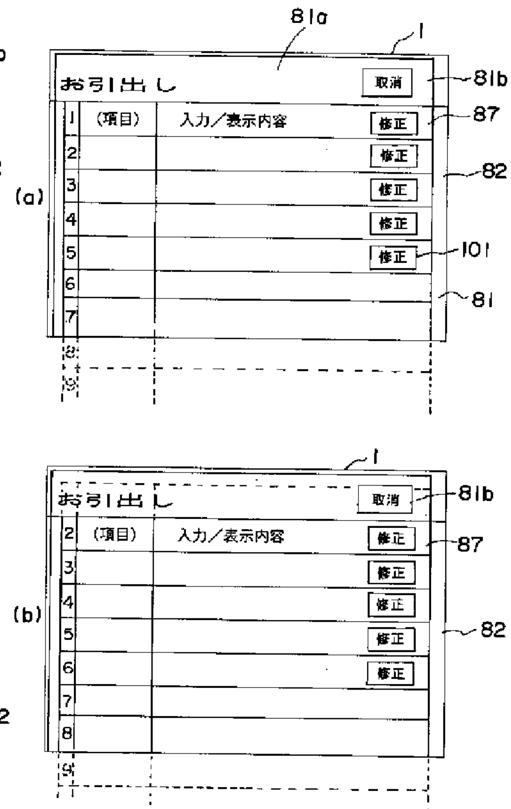
【図7】

手順表示の説明図



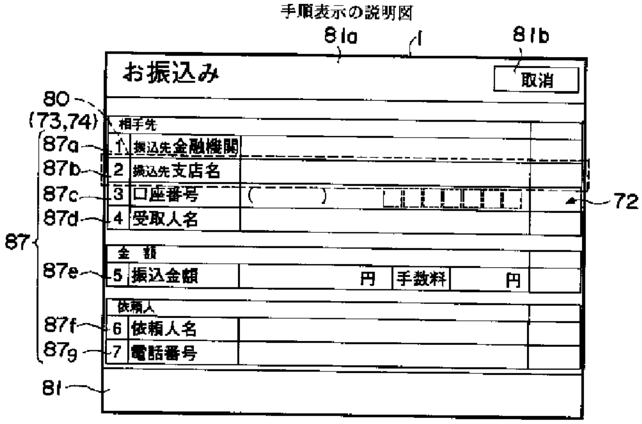
【図9】

手順表示の説明図



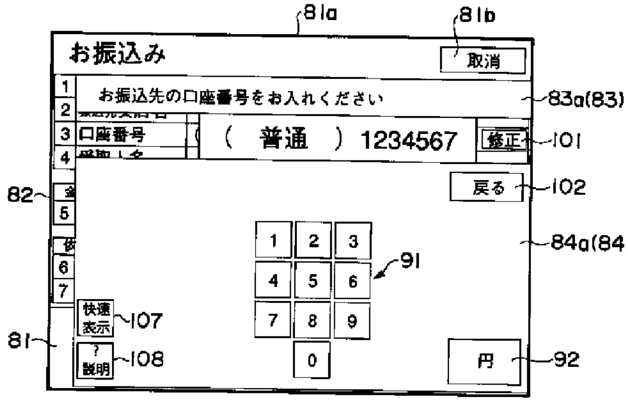
【図8】

手順表示の説明図



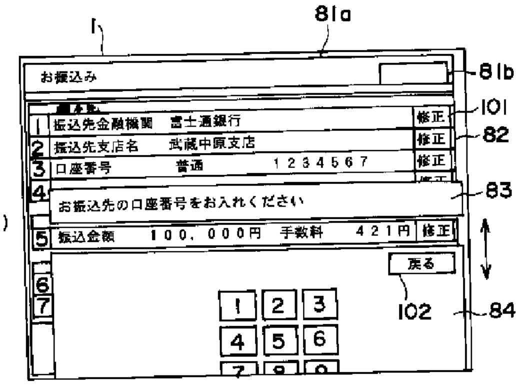
【図10】

入力パネル表示の説明図



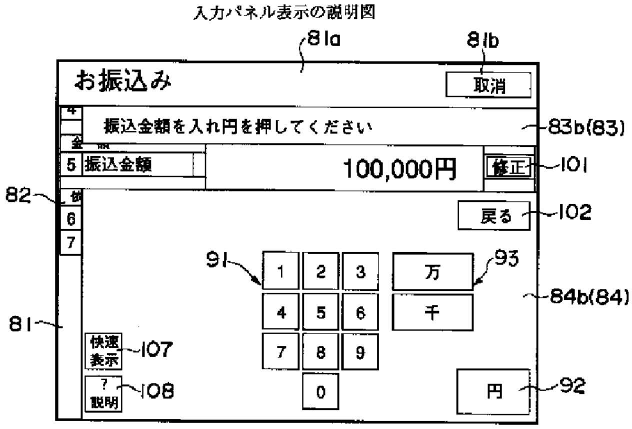
【図13】

入力パネル表示の説明図



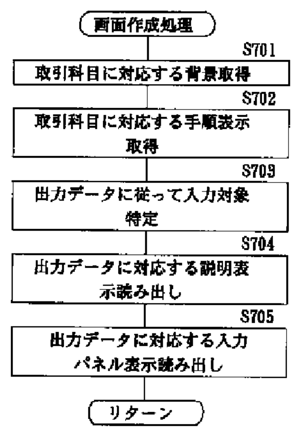
【図11】

入力パネル表示の説明図



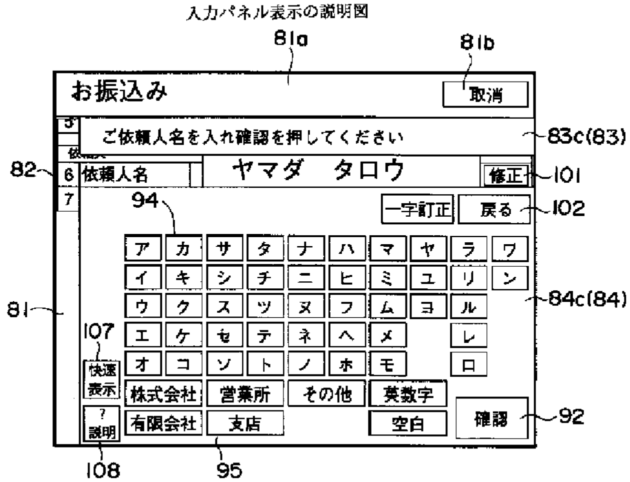
【図30】

画面作成処理を示すフローチャート



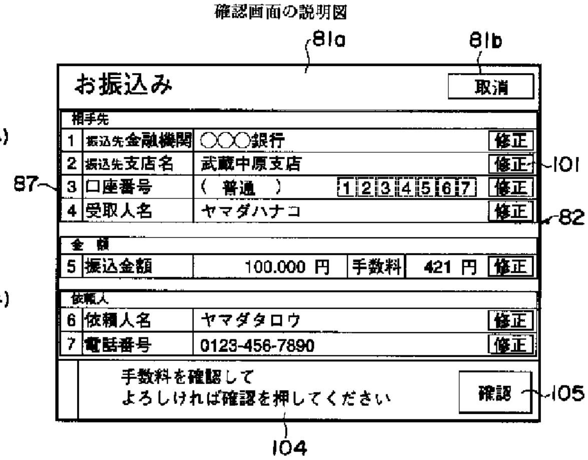
【図12】

入力パネル表示の説明図



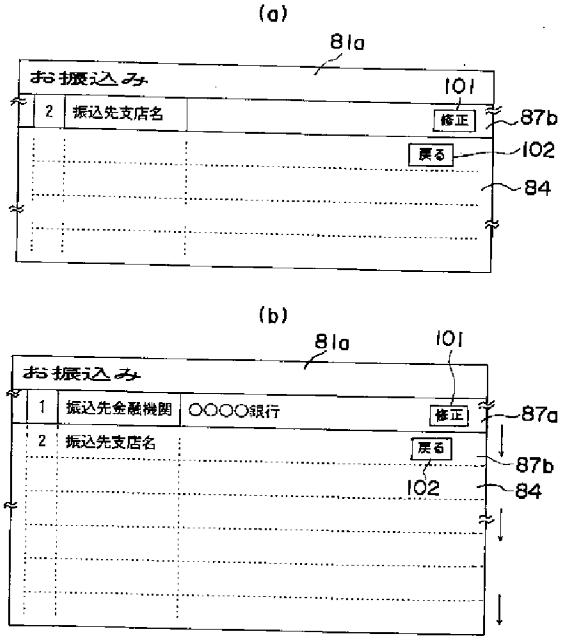
【図14】

確認画面の説明図



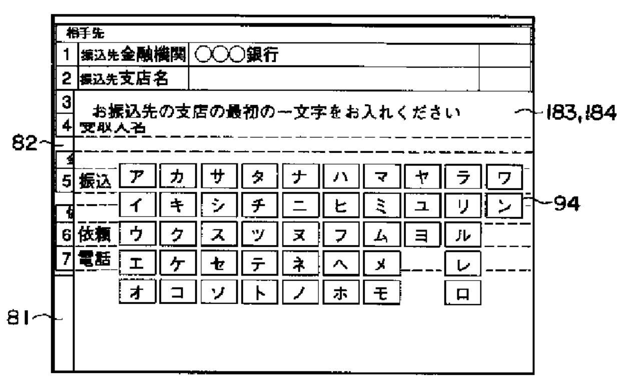
【図15】

戻りボタンの説明図



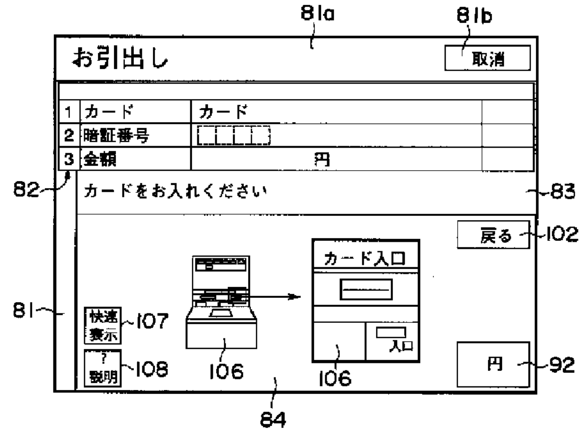
【図19】

実施形態2による取引画面の説明図



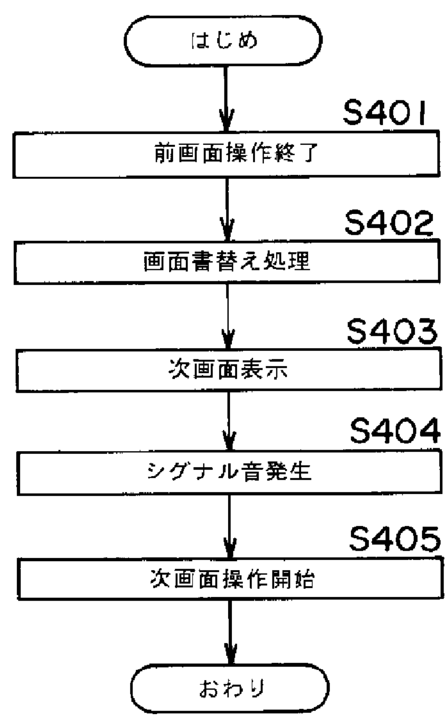
【図16】

ヘルプ表示の説明図



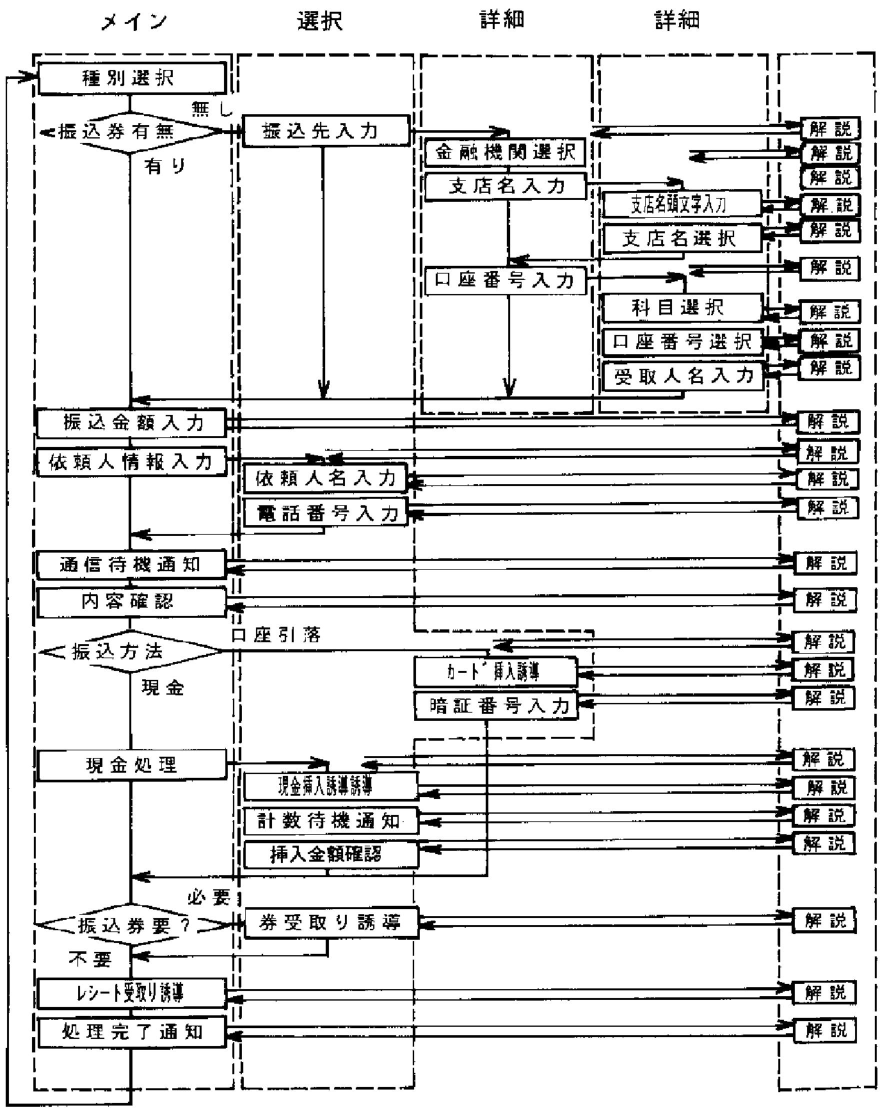
【図24】

注意喚起処理を示すフローチャート



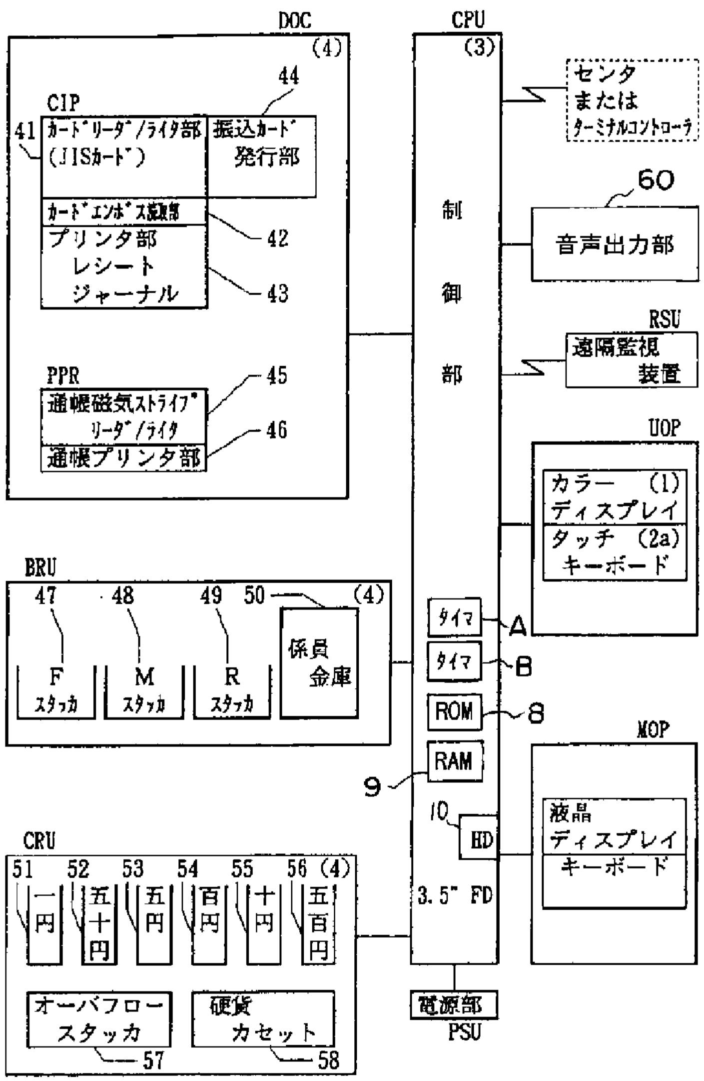
【図18】

操作手順の例を示す図



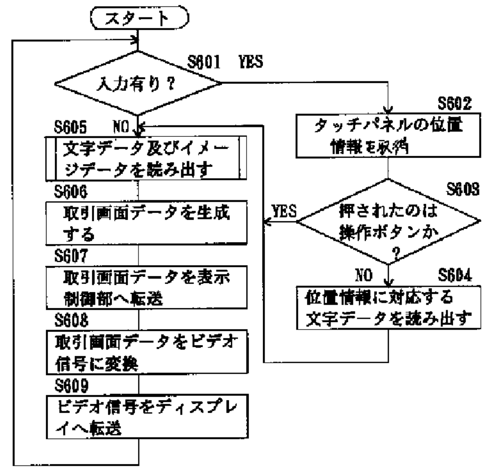
【図20】

実施形態３によるＡＴＭの構成を示すブロック図



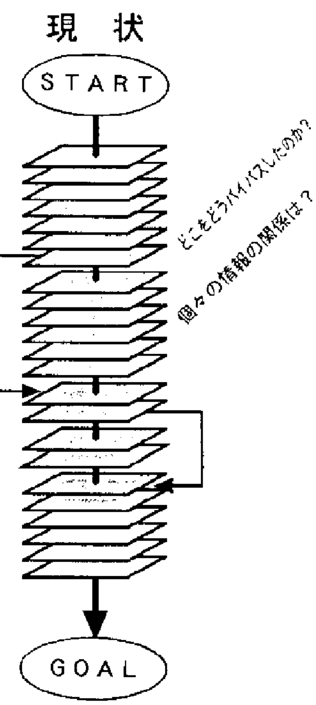
【図29】

画面作成処理を示すフローチャート



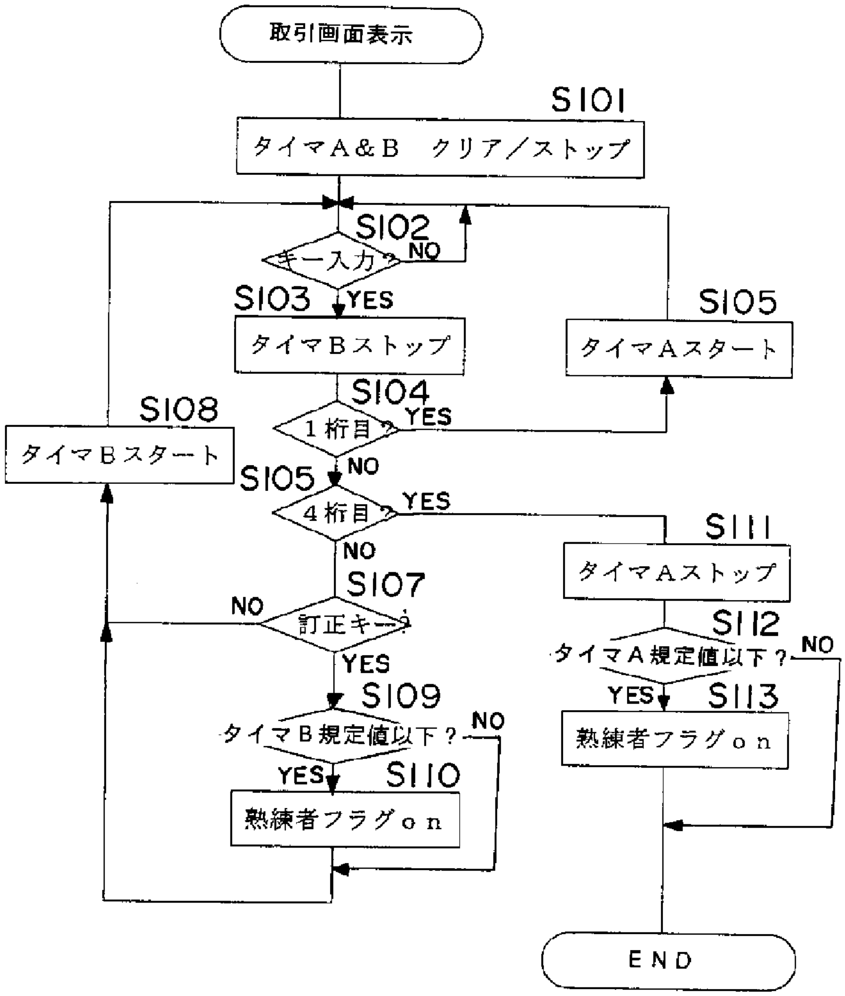
【図31】

従来技術の説明図

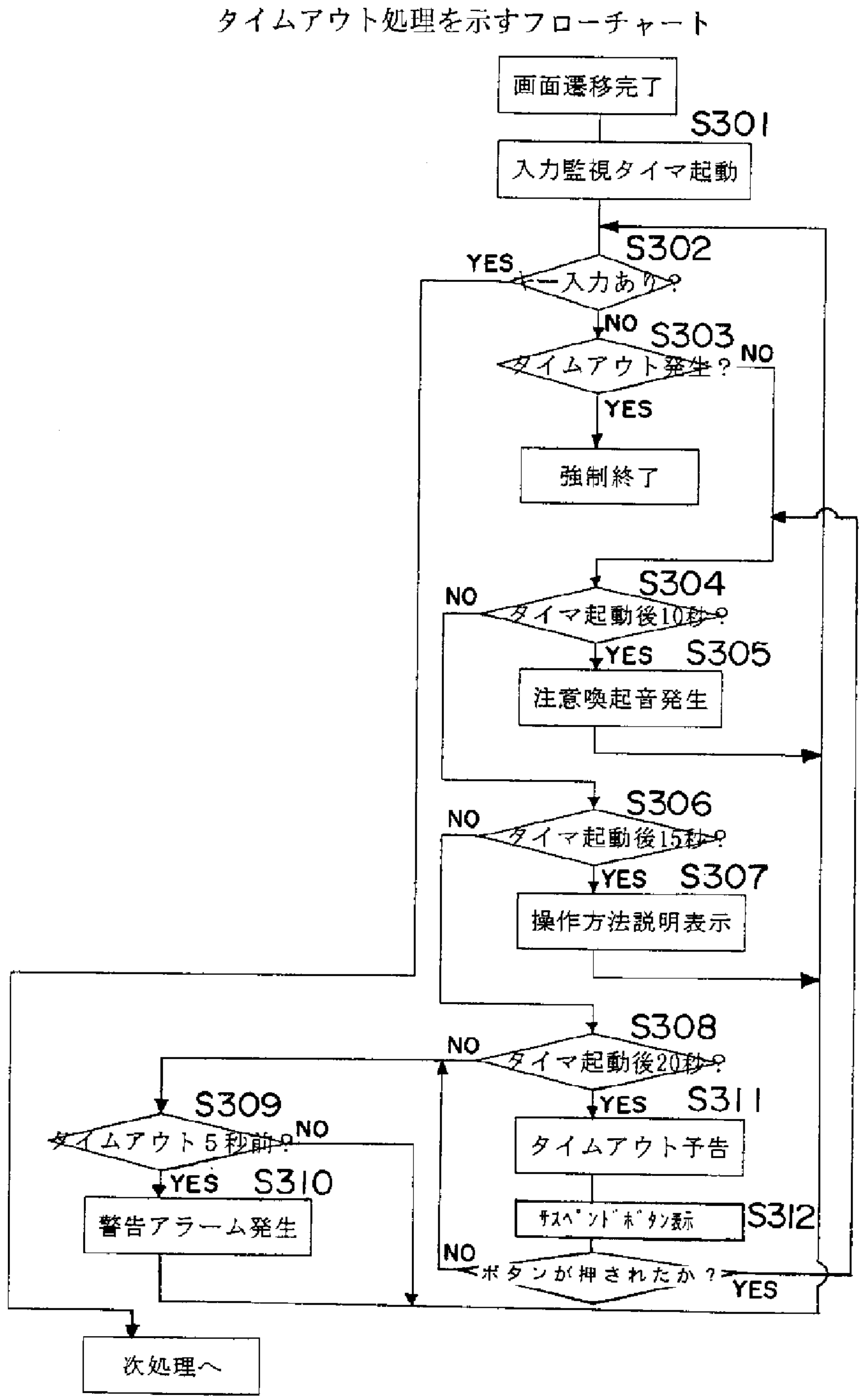


【図21】

習熟度判定処理を示すフローチャート

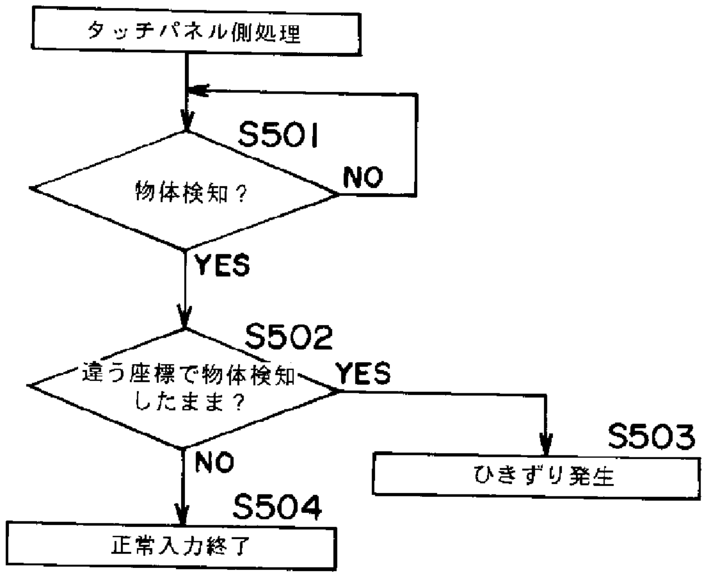


【図23】


タイムアウト処理を示すフローチャート
画面遷移完了
S301
入力監視タイマ起動
S302
キー入力あり？
YES
NO
S303
タイムアウト発生？
NO
YES
強制終了
S304
タイマ起動後10秒？
NO
YES
S305
注意喚起音発生
S306
タイマ起動後15秒？
NO
YES
S307
操作方法説明表示
S308
タイマ起動後20秒？
NO
YES
S311
タイムアウト予告
サスペンドボタン表示
S312
ボタンが押されたか？
NO
YES
S309
タイムアウト5秒前？
NO
YES
S310
警告アラーム発生
次処理へ

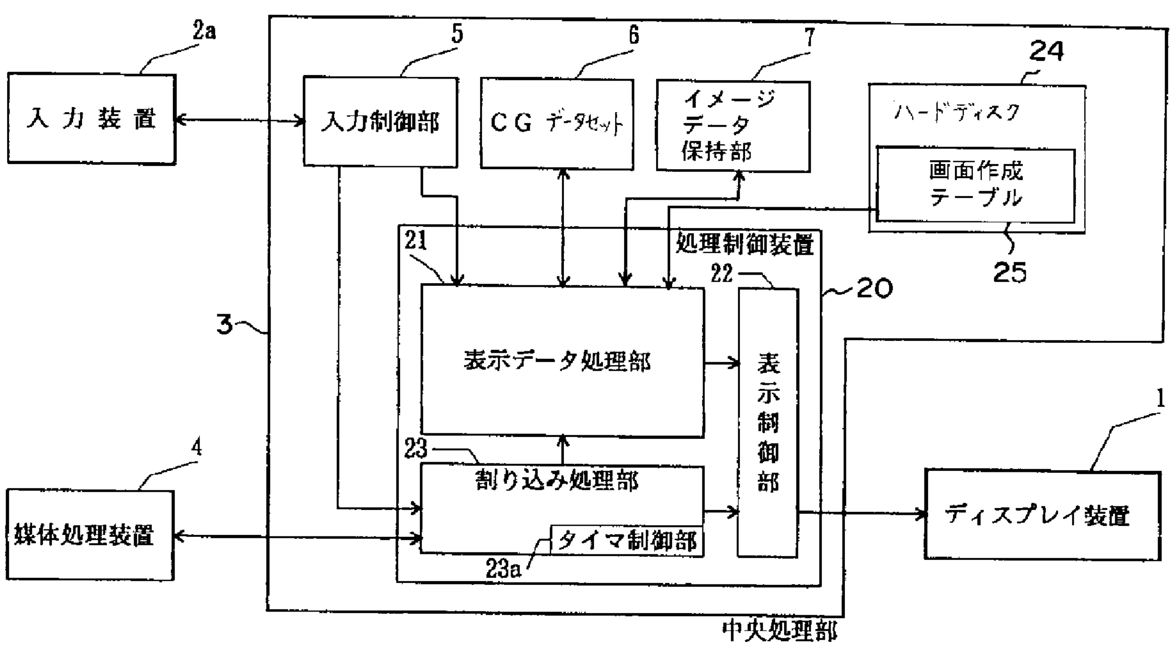
【図25】

引きずり判定処理を示すフローチャート



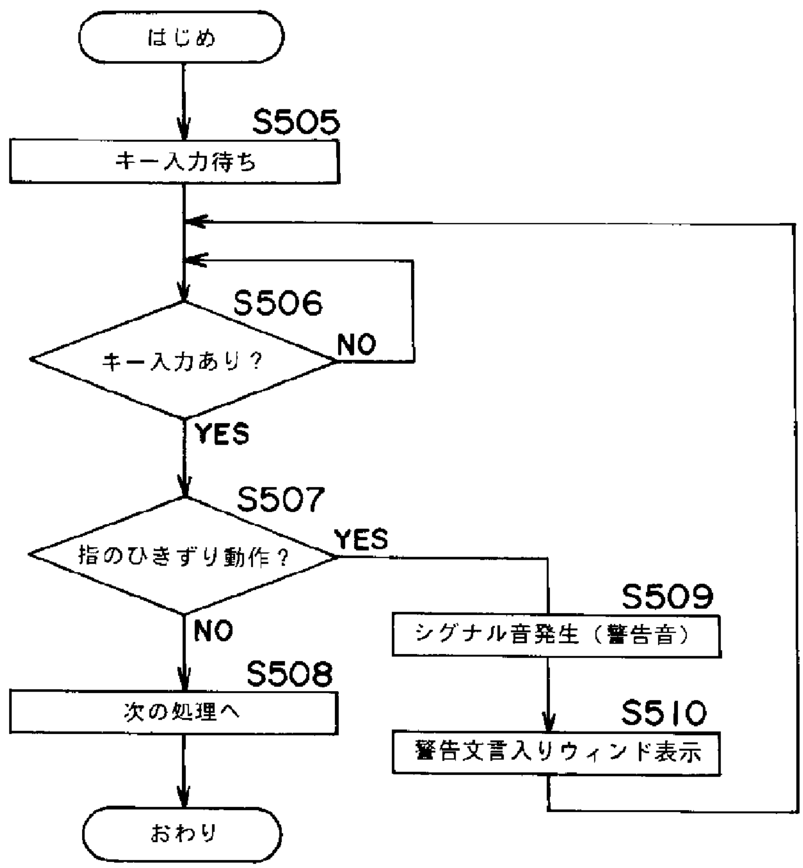
【図27】

実施形態7によるATMのブロック図



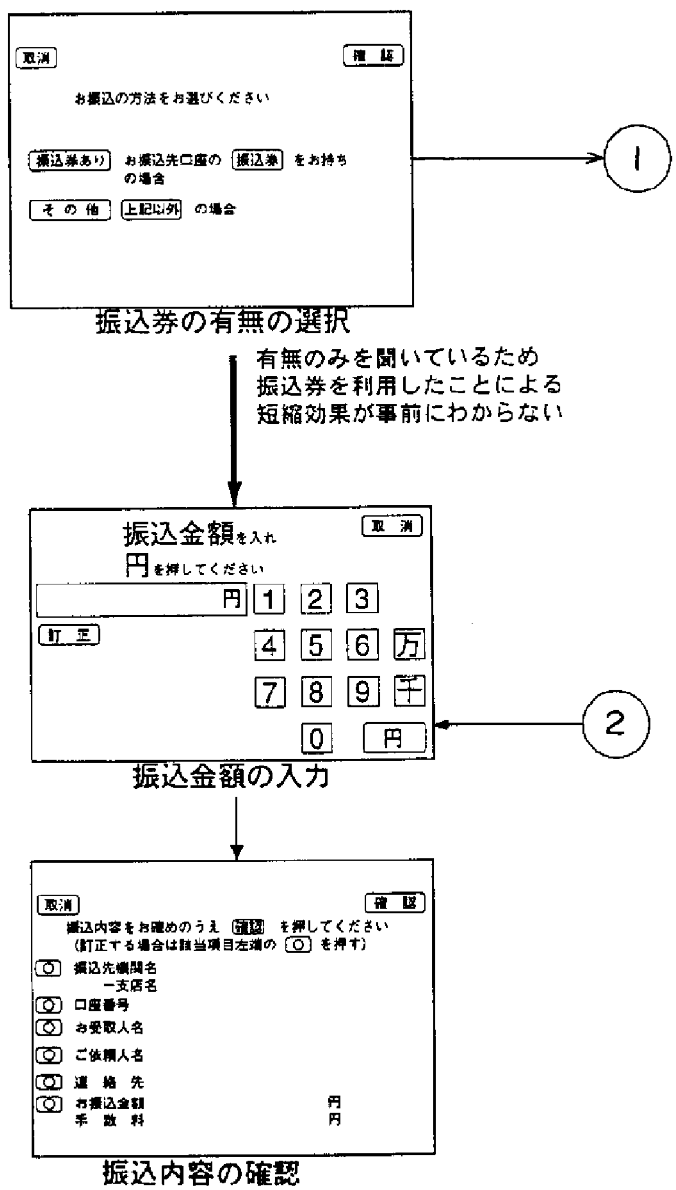
【図26】

引きずり警告音発生処理を示すフローチャート



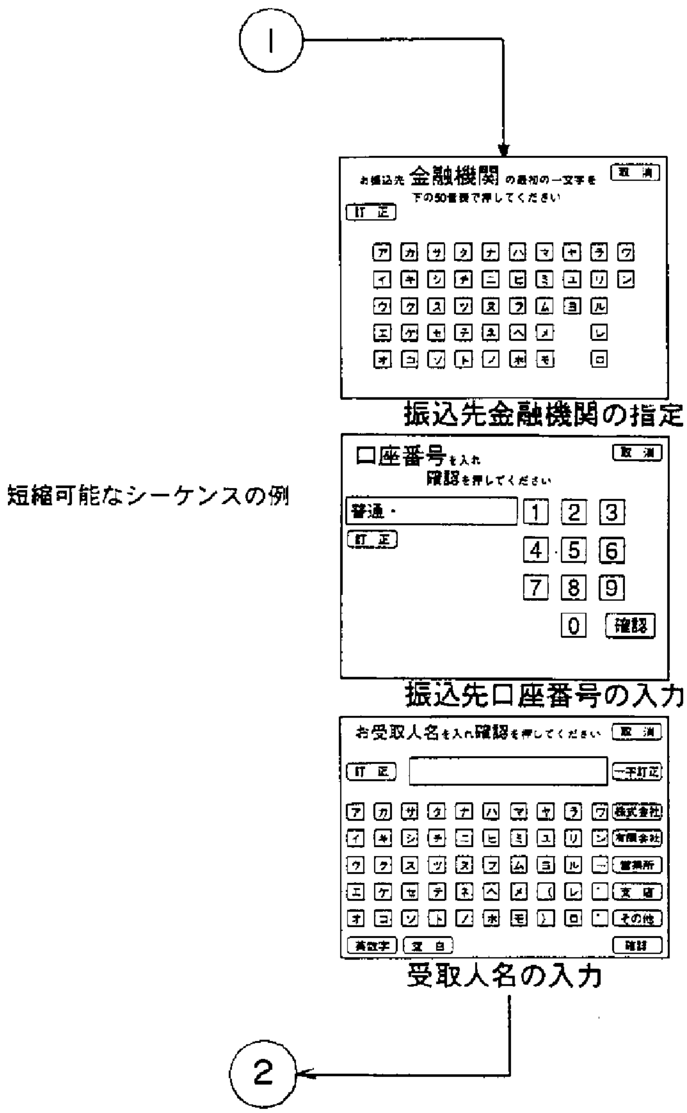
【図32】

従来技術の説明図



【図３３】

従来技術の説明図



フロントページの続き

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GAME WITH HAND MOTION CONTROL

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Applicant(s):

Classification:
- international: *A63F13/00; A63F13/06*
- cooperative: **G06F3/011 (EP, US); G06V40/107 (EP, US); G07F17/32 (EP, US); G07F17/3209 (EP, US);** A63F2300/1093 (EP, US); A63F2300/201 (EP, US); A63F2300/204 (EP, US); A63F2300/6045 (EP, US)

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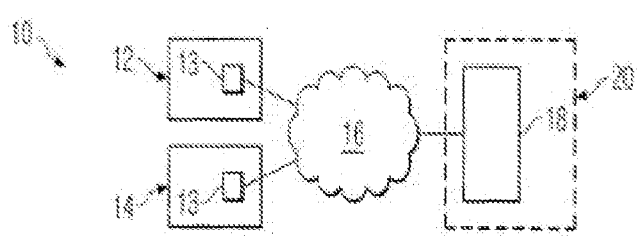
Abstract not available for JP2010528716 (A)
Abstract of corresponding document: US2008300055 (A1)

In various embodiments, the motion of a wristband is used to control games.



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Description: JP2010528716 (A) — 2010-08-26

GAME WITH HAND MOTION CONTROL

Description not available for JP2010528716 (A)
Description of corresponding document: US2008300055 (A1)

A high quality text as facsimile in your desired language may be available amongst the following family members:

US2008300055 (A1) WO2008150809 (A1) US2018018014 (A1) US2020033938 (A1) US2022107682 (A1)

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BRIEF DESCRIPTION OF THE FIGURES

[0001] FIG. 1 shows a gaming system according to some embodiments.

[0002] FIG. 2 shows a communications network according to some embodiments.

[0003] FIG. 3 shows a gaming service provider in communication with a gaming communication device according to some embodiments.

[0004] FIG. 4 shows a communications network according to some embodiments.

[0005] FIG. 5 shows a gaming system according to some embodiments.

[0006] FIG. 6 shows a wireless gaming system according to some embodiments.

[0007] FIG. 7 shows a mobile gaming device with promotional content according to some embodiments.

[0008] FIG. 8 is a block diagram of a gaming system in accordance with some embodiments.

[0009] FIG. 9 is a block diagram of a payment system forming a part of the gaming system illustrated in FIG. 8, according to some embodiments.

[0010] FIG. 10 is a schematic diagram of a portable gaming device of the gaming system illustrated in FIG. 8, according to some embodiments.

[0011] FIG. 11(a) is a flow diagram of a method of use of a portable gaming device by a player, according to some embodiments.

[0012] FIG. 11(b) is a flow diagram of a particular method of using the portable gaming device by a player, according to some embodiments.

[0013] FIG. 12 is a flow diagram of a method of use of the portable gaming device by a gaming service operator, according to some embodiments.

[0014] FIG. 13 is a flow diagram of a method of use of the portable gaming device according to some embodiments.

[0015] FIG. 14a shows some single camera based embodiments.

[0016] FIG. 14b illustrates some 3-D (3 Dimensional) sensing embodiments.

[0017] FIG. 14c illustrates some embodiments with two camera "binocular" stereo cameras.

[0018] FIG. 14d illustrates some steps according to some embodiments.

[0019] FIG. 14e shows a process for color mapping, according to some embodiments.

[0020] FIG. 15 shows the hardware components of an implementation of the multicamera control system, and their physical layout, according to some embodiments.

[0021] FIG. 16A shows the geometric relationship between the cameras and various image regions of FIG. 15, according to some embodiments.

[0022] FIG. 16B shows an image captured by one of the cameras of FIG. 15, according to some embodiments.

[0023] FIG. 17 is a flow diagram showing the processes that are performed within a microcomputer program associated with the multicamera control system, according to some embodiments.

[0024] FIG. 18 is a flow diagram showing a portion of the process shown in FIG. 17 in greater detail, and in particular, the processes involved in detecting an object and extracting its position from the image signals captured by the cameras, according to some embodiments.

[0025] FIG. 19A shows sample image data, presented as a gray-scale bitmap image, acquired by a camera and generated by part of the process shown in FIG. 18, according to some embodiments.

[0026] FIG. 19B shows sample image data, presented as a gray-scale bitmap image, generated by part of the process shown in FIG. 18, according to some embodiments.

[0027] FIG. 19C shows sample image data, presented as a gray-scale bitmap image, generated by part of the process shown in FIG. 18, according to some embodiments.

[0028] FIG. 19D shows sample image data, presented as a gray-scale bitmap image,

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generated by part of the process shown in FIG. 18, according to some embodiments.

[0029] FIG. 19E shows sample data, presented as a binary bitmap image, identifying those pixels that likely belong to the object that is being tracked in the sample, generated by part of the process shown in FIG. 18, according to some embodiments.

[0030] FIG. 20 is a flow diagram showing a portion of the process described in FIG. 18 in greater detail, and in particular, the processes involved in classifying and identifying the object given a map of pixels that have been identified as likely to belong to the object that is being tracked, for example given the data shown in FIG. 19E, according to some embodiments.

[0031] FIG. 21A shows the sample data presented in FIG. 19E, presented as a binary bitmap image, with the identification of those data samples that the processes shown in FIG. 20 have selected as belonging to the object in this sample, according to some embodiments.

[0032] FIG. 21B shows the sample data presented in FIG. 19E, presented as a bar graph, with the identification of those data samples that the processes outlined in FIG. 20 have selected as belonging to the object, with specific points in the graph being identified, according to some embodiments.

[0033] FIG. 21C shows a difference set of sample data, presented as a binary bitmap image, with the identification of those data samples that the processes shown in FIG. 20 have selected as belonging to the object and key parts of the object in this sample, according to some embodiments.

[0034] FIG. 22 is a flow diagram that shows a part of the process shown in FIG. 18 in greater detail, and in particular, the processes involved in generating and maintaining a description of the background region over which the object occludes, according to some embodiments.

[0035] FIG. 23A shows the geometry on which Eq. 3 is based, that is, an angle defining the position of the object within the camera's field of view, given the location on the image plane where the object has been sensed, according to some embodiments.

[0036] FIG. 23B shows the geometry on which Eq. 4, 5 and 6 are based, that is, the relationship between the positions of the cameras and the object that is being tracked, according to some embodiments.

[0037] FIG. 24 is a graph illustrating Eq. 8, that is, the amount of dampening that may be applied to coordinates given the change in position of the object to refine the positions, according to some embodiments.

[0038] FIG. 25A is an example of an application program that is controlled by the system, where the object of interest controls a screen pointer in two dimensions, according to some embodiments.

[0039] FIG. 25B shows the mapping between real-world coordinates and screen coordinates used by the application program in FIG. 25A, according to some embodiments.

[0040] FIGS. 26A and 26B are examples of an application program that is controlled by the multicamera control system, where the object of interest co

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a three dimensional virtual reality environment, according to some embodiments.

[0041] FIG. 27A shows the division of the region of interest into detection planes used by a gesture detection method to identify a gesture that may be associated with the intention to activate, according to some embodiments.

[0042] FIG. 27B shows the division of the region of interest into detection boxes used by a gesture detection method to identify a gesture that may be associated with selecting a cursor direction, according to some embodiments.

[0043] FIG. 27C shows an alternate division of the region of interest into direction detection boxes used by a gesture detection method to identify a gesture that may be associated with selecting a cursor direction, according to some embodiments.

[0044] FIG. 27D illustrates in greater detail the relationship of neighboring divisions of FIG. 27C, according to some embodiments.

[0045] FIG. 28 depicts the exterior appearance of a device according to some embodiments, in a state where the device is in the neutral position.

[0046] FIG. 29 depicts an example of an internal architecture of the implementation of FIG. 28, according to some embodiments.

[0047] FIG. 30 is a flowchart illustrating a method in accordance with another exemplary implementation, according to some embodiments.

[0048] FIGS. 31A to 31D depict examples of tilt regions that are defined about a neutral axis, according to some embodiments.

[0049] FIG. 32 illustrates a top exterior view of an example device according to another exemplary implementation, according to some embodiments.

[0050] FIGS. 33A to 33E illustrate example indicators according to some embodiments.

[0051] FIGS. 34A and 34B illustrate front and side views, respectively, of the device of FIG. 32, shown in the neutral position, according to some embodiments.

[0052] FIGS. 35A and 35B illustrate front views of the device of FIG. 32, shown in a state where the FIG. 32 device is manipulated in a negative roll orientation and a positive roll orientation, respectively, according to some embodiments.

[0053] FIGS. 36A and 36B illustrate side views of the device of FIG. 32, shown in a state where the FIG. 32 device is manipulated in a positive pitch orientation and a negative pitch orientation, respectively, according to some embodiments.

[0054] FIG. 37 is a table showing one possible mapping of device orientations used to output signals corresponding to characters and cases that are output when a control is selected, according to some embodiments.

[0055] FIGS. 38A and 38B illustrate a menu of symbols that is displayed in accordance with another exemplary implementation, according to some embodiments.

[0056] FIG. 39 is an external view illustrating a game system F1 according to some embodiments.

[0057] FIG. 40 is a functional block diagram of a game apparatus F3 shown in FIG. 39.

[0058] FIG. 41 is a perspective view illustrating an outer appearance of a controller F7 shown in FIG. 39.

[0059] FIG. 42 is a perspective view illustrating a state of a connecting cable F79 of the controller F7 shown in FIG. 41 being connected to or disconnected from a core unit F70.

[0060] FIG. 43 is a perspective view of the core unit F70 shown in FIG. 41 as seen from the top rear side thereof.

[0061] FIG. 44 is a perspective view of the core unit F70 shown in FIG. 41 as seen from the bottom front side thereof.

[0062] FIG. 45 is a perspective view illustrating a state where an upper casing of the core unit F70 shown in FIG. 41 is removed.

[0063] FIG. 46 is a perspective view illustrating a state where a lower casing of the core unit F70 shown in FIG. 41 is removed.

[0064] FIG. 47 is a perspective view illustrating a first example of the subunit F76 shown in FIG. 41.

[0065] FIG. 48 is a perspective view of a state where an upper casing of the subunit F76 shown in FIG. 47 is removed.

[0066] FIGS. 49A, 49B, and 49C are a top view, a bottom view and a left side view of a second example of the subunit F76 shown in FIG. 41, respectively.

[0067] FIG. 50 is a perspective view of the subunit F76 shown in FIG. 41 as seen from the top front side thereof.

[0068] FIG. 51 is a top view illustrating an example of a first modification of the subunit F76 shown in FIG. 41.

[0069] FIG. 52 is a top view illustrating an example of a second modification of the subunit F76 shown in FIG. 41.

[0070] FIG. 53 is a top view illustrating an example of a third modification of the subunit F76 shown in FIG. 41.

[0071] FIG. 54 is a top view illustrating an example of a fourth modification of the subunit F76 shown in FIG. 41.

[0072] FIG. 55 is a block diagram illustrating a structure of the controller F7 shown in FIG. 41.

[0073] FIG. 56 is a diagram illustrating a state of a game being generally controlled with the controller F7 shown in FIG. 41.

[0074] FIG. 57 shows an exemplary state of a player holding the core unit F70 with a right hand as seen from the front surface side of the core unit F70.

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[0075] FIG. 58 shows an exemplary state of a player holding the core unit F70 with a right hand as seen from the left side of the core unit F70.

[0076] FIG. 59 is a diagram illustrating a viewing angle of a LED module F8L, a viewing angle of a LED module F8R, and a viewing angle of an image pickup element F743.

[0077] FIG. 60 shows an exemplary state of a player holding the subunit F76 with a left hand as seen from the right side of the subunit F76.

[0078] FIG. 61 shows an exemplary game image displayed on the monitor F2 when the game apparatus F3 executes a shooting game.

DETAILED DESCRIPTION

[0079] In various embodiments, a player may use motion as an input to a game played on a mobile gaming device. The game may be a gambling game, such as a game of video poker, a slot machine game, a game of roulette, a game of craps, or any other gambling game. The player may make a bet on the game and may stand to win money depending on the outcome of the game. The player may have money at risk on the game.

[0080] The motion used as input may include motion of the mobile gaming device itself. Thus, the player may tilt, shake, move, rotate, or otherwise move the mobile gaming device. Such movements of the mobile gaming device may be interpreted by hardware sensors and/or by software as commands or instructions for the play of a game. A motion may thus be seen as an initiation signal for a game, or as a signal to cash out.

[0081] In various embodiments, a player may be provided with audio feedback. The audio feedback may be supplied following a motion made by the player, or following a motion that has been recognized by the mobile gaming device. The audio feedback may be supplied during a motion that is being made by the player. The audio feedback may enhance the gaming experience for the player by providing sounds a player might hear while playing a game at an actual gaming table or at a standalone gaming device, such as a slot machine. The audio feedback may provide information to the player. The audio feedback may tell the player that a motion he has made has been recognized as a command, or the motion he has made has not been recognized as a command.

[0082] In various embodiments, a player may be provided with force feedback or haptic feedback. The mobile gaming device may create haptic sensations using springs, motors, resistors, or other devices that may create motion, pressure, heat, or other tactile sensations or other sensations. Haptic feedback may allow the player to shake a mobile gaming device in his hand and have the feeling that he is shaking dice, for example.

[0083] In various embodiments, a player may have a wristband. The wristband may include motion sensors, such as accelerometers, for detecting motions. The player may move the hand wearing the wristband in particular ways in order to issue commands in a game. In various embodiments, a wristband may provide haptic feedback.

Wristband/Bracelet

[0084] In various embodiments, a player may wear a bracelet, wristwatch, wristband or other device around his wrist. The wristband may include one or more of: (a) a processor (e.g., a semiconductor processor); (b) a power source (e.g., a battery); (c) a motion sensor (e.g., an accelerometer; e.g., a gyroscope; e.g., a camera for determining motion based on a changing visual image); (d) a transmitter (e.g., an antenna); (e) a receiver (e.g., an antenna); (f) a memory (e.g., a semiconductor memory); (g) a display device (e.g., a liquid crystal display screen); (h) a speaker (e.g., for transmitting audio outputs); (i) a haptic output device.

Wristband Logs Motions

[0085] In various embodiments, a wristband may track motions made by the player wearing the wristband. For example, the motion sensors within the wristband may detect accelerations, changes in position, changes in orientation, angular displacements, paths, trajectories, or any other components of motion. The wristband may track motions of the hand or wrist on which the wristband is worn. The wristband may store data representative of the motions. Such data may be stored, for example, in a memory of the wristband. The wristband may also transmit an indication of motions made to another device, such as to a mobile gaming device, to a stationary gaming device, or to a casino server.

[0086] In various embodiments, the wristband may store or forward raw data, such as data indicating every reading received from motion sensors. In various embodiments, the wristband may translate the raw data into more condensed or more higher level data. For example, a series of readings from motion sensors in the bracelet may be translated into command. That is, the player wearing the wristband may have made a motion to give a command. The wristband may then store the command rather than the exact position of the wristband as a function of time. The wristband may also transmit the command to another device, e.g., via a transmitter on the wristband.

Motions Constitute Commands in a Game

[0087] In various embodiments, a motion of the wristband may be interpreted as a command in a game. A player may move his hand up and down, for example, in order to initiate the spin of reels in a slot machine game. A player may also move his hand in such a way as to signify commands to: (a) cash out; (b) hold a card in video poker; (c) discard a card in video poker; (d) double down in blackjack; (e) choose one of several options in a bonus round; (f) make a bet of a certain size; (g) show a list of game instructions; (h) initiate a bonus round; (i) select a pay-line to play; or to make any other command in a game, or to make any other command. The wristband may store a table which associates particular motions with particular game commands. Upon receiving sensor readings that are indicative of a particular motion, the wristband may look up in the table the motion corresponding to the command. The wristband may then transmit the command to a mobile gaming device, a stationary gaming device, or to another device, such as to the casino server. The casino server may relay the command to another device, such as to a stationary gaming device or to a mobile gaming device. In various embodiments, the command may then be executed or followed in the game.
Wristband Communicates with Mobile Gaming Device

[0088] In various embodiments, a wristband may communicate with a mobile gaming device. The wristband may have an antenna and receiver for this purpose. The mobile gaming device may similarly have an antenna and receiver for communicating with other devices. The mobile gaming device and the wristband may communicate via various protocols, such as via Bluetooth, Wi-Fi, or via any other protocol.

The Wristband Controls Other Devices

[0089] The wristband may be in communication with a mobile gaming device, stationary gaming device, or with any other device. The wristband may detect motions of a player, such as motions of the player's hand. The wristband may interpret the motions as commands for a device with which the wristband is in communication. The wristband may transmit the commands to the device and the other device may thereupon follow the commands. In some embodiments, the wristband captures raw data, such as a series of positions of the player's wrist as a function of time. The raw data is transmitted to another device. The other device then interprets the raw data as a command.
Communication with Multiple Devices at Once

[0090] In various embodiments, a wristband may be in communication with two or more devices. The wristband may be in communication with two or more devices at once. The wristband may transmit a single signal which may be received at both a first device and a second device. For example, a command transmitted by the wristband may be received at a first slot machine and at a second slot machine. In some embodiments, a first device and a second device may emit signals nearly simultaneously. The wristband may receive both signals.

[0091] In some embodiments, a player may identify himself to two or more devices, such as to two or more stationary gaming devices. The player may provide some proof of identity, such as a player tracking card, biometric, or a device (such as a wristband) with an identifier (e.g., a unique identifier) that can be tied to the player. The player may authorize or enable communication between his wristband and the two or more devices. As part of the authorization, the player may agree to play games on each of the two or more devices. Thus, in some embodiments, the player may authorize the two or more devices to interpret signals coming from the player's wrist band as command signals to be used in a game. In some embodiments, the player may present his wristband to the two or more devices. For example, the player may bring his wristband to within a few inches of an RFID reader on a slot machine. The slot machine may pick up a signal from an RFID tag on the wristband. The devices may thereafter recognize commands received from the wristband presented, but not from other wristbands. Thus, the devices may accept commands from the wristband for some period of time. In various embodiments, commands may be accepted until some termination command is received, until no more commands are detected (e.g., the wristband has been switched off or has moved out of communication range of the devices), until a certain period of time has passed, or until some other termination circumstance has occurred. In order to resume providing motion-based commands to a device, the player may once again authorize the receipt and use of commands from his wristband. The player may present his wristband again, for example.

[0092] In various embodiments, a player may engage in play at two or more gaming devices at once. The player may make motions and an indication of such motions (e.g., a command that has been derived from such motions) may be transmitted to the two or more gaming devices. Each of the two or more gaming devices may execute the command. Thus, in some embodiments, a player may conveniently play two or more games simultaneously while avoiding repetition of commands for each individual game. For example, a player may use a single shake of the wrist to start games at each of two slot machines.

[0093] In some embodiments, a first device may receive data (e.g., motion data) from a wristband. The first device may interpret the data as commands and may conduct a game based on the commands. A second device may receive the same data from the wristband. The second device may transmit the data (or an interpretation of the data) to friends of the player or to other parties, such that the other parties can follow what the player is doing. The second device may also transmit to friends of the player or to other parties an indication of game outcomes, payouts and other occurrences related to games played by the player. In some embodiments, a player may use the motions from his wristband to play several games at once. Data, such as outcomes, from the games may be transmitted to a casino server or to another device. Data may be made available for viewing by other parties, such as by the player's friends or by others who will play their own games using the random occurrences that happened in the player's game (e.g., others may bet on outcomes generated in the player's game).

[0094] In various embodiments, a player may play at two gaming devices at once. However, each command made by the player (e.g., through a motion) may apply to only one gaming device at a time. For example, a player may make a first command which applies only to a first game at a first gaming device. The player may then make a second command which applies only to a second game at a second gaming device. The player may then make a third command which applies only to the first game at the first gaming device. In various embodiments, two gaming devices may each be controllable by their own set of motion commands, where there is little or no overlap between the motions used for commands. Thus, for example, a motion made by a player may correspond to a valid command at one of the gaming devices but not at the other one. A different motion may not correspond to a valid command at the first gaming device, but it may at the second.

Times when a Data Stream from a Wristband is not Picked Up

[0095] In various embodiments, a device may be within communication range of a wristband that is transmitting data, yet the device may fail to receive the data, or the device may fail to interpret the data, or the device may fail to use the data. A device may be a mobile gaming device or stationary gaming device, such as a slot machine, for example. A device may fail to use data from a wristband if one or more of the following is true: (a) the player with the wristband has not identified himself to the device; (b) the player with the wristband has not provided proof of identification to the device; (c) the wristband is transmitting commands that do not make sense to the device; (d) the player with the wristband has not made at least some physical contact with the device (e.g., pressing a button on the device); (e) the player has not informed the device that it should be expecting motion commands from the wristband; (f) the device is currently accepting motion commands from a different wristband; (g) the player does not have a high enough credit balance to play games at the device (e.g., the player has a credit balance of zero); (h) the player has not made physical contact with the device in a predetermined period of time (e.g., the player has not physically pressed a button on the gaming device in the last 10 minutes); or if any other circumstance is true.

Biometric as Game Input

[0096] In various embodiments, the wristband may sense a pulse, a temperature, a skin conductivity level, a moisture level, an electric field (e.g., from nerve impulses), a degree of muscle tension, or any other biometric signal from the player. The signal may be translated into a number. For example, a numerical temperature reading in degrees Fahrenheit may be used as a seed for a random number generator, which is in turn used to generate an outcome in a game.

[0097] In various embodiments, a biometric reading received at a wristband may indicate that the wristband is still being worn. If the wristband detects a pulse, for example, the wristband or another device may infer that the wri[illegible] a player and hasn't been taken off. In various embodiments, a mobile gaming device, a stationary gaming device, or another device may take actions based on signals received from a wristband only if the wristband is currently being worn (or appears to be worn based on biometric signals received from the wristband). In some embodiments, if there is a break in biometric signals received at the wristband (e.g., the wristband no longer detects a pulse), then the wristband may transmit a signal to the casino server or to some other device. The signal may indicate that there has been a break in the biometric signal detected at the wristband. The casino server may, accordingly, instruct other devices not to follow commands or signals received from the wristband until the wristband has been reestablished on a player. In some embodiments, the wristband must be reestablished on the player in the presence of, or with the help of a casino representative before signals from the wristband will be honored by another device. In some embodiments, if there is a break in a biometric signal detected at a wristband, the wristband may send a signal summoning medical personnel. For example, the wristband may send a signal to the casino server indicating that a pulse is no longer detected.

Wristband Broadcasts Data that Identifies the User

[0098] In various embodiments, the wristband may transmit or broadcast data that identifies the player wearing the wristband. The wristband may broadcast a player tracking card number, a player name, a player alias, a player room number, a player credit card number, or any other information about a player that may be used to identify the player. In some embodiments, the wristband may transmit a signal derived from a biometric reading. For example, the wristband may broadcast a signal derived from a pulse or electro-cardiogram reading taken from the player. The biometric reading may serve to uniquely identify the player.

[0099] In various embodiments, a signal which is broadcast from a wristband and which identifies a player may allow the player wearing the wristband certain privileges. A player's hotel room door may be unlocked remotely (e.g., the door may unlock without requiring physical contact from a key or other device). The hotel room door may unlock once it receives the signal from the player's wristband identifying the player. The player may also be allowed to gamble at a particular gaming device. The player may be allowed to enter certain areas of the casino based on the identity provided from his wristband. In various embodiments, the wristband may provide a player identifier to allow a player to receive access to a balance of funds or to another financial account. The player may use the funds, for example, to gamble or to make purchases. For example, a player may approach a gaming device. The player may have an account with a positive balance of funds stored with the casino server. When the player's wristband transmits a player identifier to the slot machine, the slot machine may receive the identifier and transmit an indication of the identifier to the casino server. The casino server may then authorize the player to gain access to his funds. Some or all of the player's funds may then be made available for use on the gaming device (e.g., in the form of a credit balance). The player may then use the funds for gaming.

[0100] In various embodiments, a wristband may be power constrained due to the small available volume within the wristband within which to include a battery or other power source. The wristband may take various steps to conserve power. In some embodiments, the wristband may periodically transmit signals to another device, such as to a mobile gaming device or such as to a stationary gaming device. For example the wristband may transmit a signal to a mobile gaming device every 50 milliseconds, where the signal consists of a string of bits. The signal may include data or information descriptive of motions made by the wristband since the last signal transmission. In various embodiments, the time between signal transmissions may vary based on what data or information needs to be transmitted by the wristband. For example, if the wristband has been motionless, the time between signal transmissions may be extended to 200 milliseconds. If the wristband starts moving again, the time between signal transmissions may be reduced back to 50 milliseconds. Thus, in various embodiments, the time between when signals are transmitted by the wristband may vary based on the motion of the wristband and/or based on motion detected by the wristband. In various embodiments, the time between when signals are transmitted by the wristband may vary based on the amount of information the wristband has to communicate to another device. For example, if the player is actively involved in a game, the wristband may transmit signals frequently. If the player is not actively involved in a game (e.g., if the player has not initiated game play at a stationary gaming device or mobile gaming device; e.g., if the player is not in an area where gaming is permitted), then the wristband may transmit signals relatively less frequently. In various embodiments, when the wristband is not moving, the wristband may periodically send a short or concise signal indicating that the wristband is still operational or still available for use. However, the signal may indicate that the wristband is currently not in use or not being used for a game.

[0101] In various embodiments, the wristband may derive power or energy from motions of the wearer's arm, or from other motions of the wearer. The wristband may derive energy from its own motion, which may be caused by the motion of the arm to which it is attached. Devices for harnessing electrical energy from motion may include piezoelectric devices or mechanical rotary magnetic generators. Power sources such as those used in the Fossil kinetic watch or in the Ventura kinetic watch may also be used.

[0102] In various embodiments, the wristband may detect relative motion between it and another device. For example, a player may wear two wristbands. One wristband may transmit signals of a fixed strength to the other wristband. Based on the distance between the wristbands, the signal will appear relatively strong (e.g., if the wristbands are close) or relatively weak (e.g., if the wristbands are far) at the receiving wristband. In this way, it may be determined how close the wristbands are to one another. The relative motion of a wristband may be determined relative to any suitable device. A player may wear a device elsewhere on his body, such as a belt buckle which can transmit or receive signals. A wristband may transmit or receive signals to any fixed device external to the person, such as to a receiver attached to a wall, ceiling, floor, or gaming device.

[0103] In various embodiments, a wristband may detect a drinking motion. The wristband may detect a rotation in a wrist via orientation sensors in the wristband. If there is significant rotation of the wrist, it may be inferred that the player has almost finished a drink, thus requiring the player to tilt the drink significantly. Accordingly, a casino representative may be instructed to provide the player with a new drink, and/or the player may be asked if he would like another drink.

Technologies for Harvesting Energy for a Wristband

[0104] Various technologies for harvesting energy from the environment or from ambient conditions are described in the paper, "Energy Scavenging for Mobile and Wireless Electronics" by Joseph A. Paradiso and Thad Starner. As of May 11, 2007, the paper was available at http://www.media.mit.edu/resenv/pubs/papers/2005-02-E-HarvestingPervasivePprnt.pdf.

[0105] Radio frequency identification systems allow a tag to derive energy from a remote or non-contiguous source (e.g., the tag reader). The tag receives radio frequency energy from the tag reader inductively, capacitively, or radiatively.

[0106] Solar cells may allow a mobile device, such as a wristband, to derive energy from ambient light. An example technology includes crystalline silicon solar cells.

[0107] Thermoelectric generators may allow the derivation of energy from heat transfer. These generators may take advantage of temperature gradients, such as differences between human body temperature and the surrounding air temperature. The Seiko Thermic wristwatch uses thermoelectric generators to power its mechanical clock components. One thermoelectric technology is Applied Digital Solutions' Thermo Life.

[0108] Various technologies allow energy harvesting from vibration or motion. Motion may be used to move a mass in a preferred or biased direction. The movement of the mass may wind a spring. The energy in the spring may then be used to create direct mechanical energy (e.g., to move the hands of a watch), or may move a magnet, coil, or other component of a generator to create electricity. Exemplary technologies for harvesting energy from mechanical motion include the ETA Autoquartz, the Seiko AGS (automatic generating system), and Ferro Solutions' Harvester. Piezoelectric materials may deform in the presence of motion or vibration to produce electricity. Ocean Power Technologies, for example, has developed harvesters that are immersed in turbulent water and deform from the water currents to generate electricity. Some generators comprise capacitors with moving plates. On a charged capacitor, the induced motion of one of the plates can generate an electric current. Piezoelectric generators and capacitive generators may be used to harvest energy from shoes during walking, for example.

[0109] Some generators comprise turbines that may be driven by ambient airflows.

Gaming Devices as Antenna Array

[0110] In various embodiments, each of two or more stationary gaming devices may include a component of an antenna array. Acting in conjunction, the gaming devices may detect and interpret signals from mobile gaming devices or from wristbands. For example, each of two or more stationary gaming devices may have an antenna. The gaming devices may each pick up the signal emitted by a mobile gaming device or by a wristband. The signal picked up at each of the antennas at the two or more gaming devices may then be added up, perhaps with some time delay or phase shift added at one or more of the gaming devices. Adding up signals received at two or more antennas may reduce the signal to noise ratio, thus potentially allowing a signal from the mobile gaming device or wristband to be read with greater accuracy or at a greater distance, or thus allowing the mobile gaming device or wristband to transmit with less power and thus benefit from extended battery life.

New Batteries at the End of Every Shift

[0111] In various embodiments, the batteries or power sources in a wristband may be routinely replaced on a periodic basis. Batteries may be replaced: (a) once a day (e.g., at the end of the day); (b) once per shift (e.g., at the end of a casino attendant's shift; e.g., at the beginning of a casino attendant's shift); (c) once per hour; or on any other basis. In various embodiments, a wristband may include an indicator light or some other output device to indicate a low power level in its battery or power source. The battery may be changed or recharged when the indicator light comes on.

Wristband Gives Player Location Information

[0112] In various embodiments, a wristband may broadcast a signal. The signal may include a player identifier, such as a name or player tracking card number. The signal may include information about the player's location. For example, the wristband may gather positioning information from beacons or satellites, calculate its own position, and then transmit the position information to gaming devices or to any receivers.

[0113] In some embodiments, a wristband determines a change in its own position, but not an absolute position. A receiver that picks up the signal from the wristband may be able to determine the direction of the wristband from the receiver, but not the distance of the wristband. The player wearing the wristband may then walk some distance, and the position of the wristband may thereby change. The wristband may include accelerometers or other motion detectors which can be used to determine a change in a position, but not necessarily an absolute position. The wristband may also include sensors for determining an orientation, such as a compass. The wristband may thus determine a change in position in (e.g., measured in feet or meters) and broadcast this change to the receiver. The wristband may further determine the direction in which that change in position occurred and broadcast this direction to the receiver. Once again, the receiver may be able to determine the direction of the wristband from the receiver at the new location of the wristband, but not its distance from the receiver. Based on the two measurements of the wristband's direction from the receiver, and based on the distance moved by the wristband and based on the direction in which the wristband moved, the absolute position of the wristband may be determined. This is because in a triangle formed by the receiver, the wristband's initial position, and the wristband's final position, one side and the two adjacent angles will be known. The side is the path traveled by the wristband (assuming it took the shortest path), and the angles can be found based on the directions from which the receiver detected the wristband at its first and final positions, and based on the direction in which the wristband itself traveled.
Wristband used to Control a Mobile Gaming Device

[0114] In various embodiments, a wristband may be used to control a mobile gaming device. A wristband may transmit signals to a mobile gaming device where such signals provide instructions or commands as to how to proceed in a game. Such instructions may include instructions to initiate game play, instructions to hold a particular card, instructions to hit or stand (e.g., in blackjack), instructions to bet a particular pay-line, or any other instructions. A wristband may also transmit signals to a stationary gaming device, where such signals provide instructions to the stationary gaming device as to how to proceed in a game.

[0115] A wristband may determine its own motions through motion sensors, such as through accelerometers. The wristband may interpret such motion as commands to be used in a game. The wristband may transmit such commands to a mobile gaming device or to a stationary gaming device in order to control such devices. In some embodiments, the wristband records motion data, such as distances moved, accelerations, trajectories, velocities, or any other motion data. The motion data may be transmitted to a mobile gaming device or to a stationary gaming device. At the mobile gaming device or at the stationary gaming device, the motions may be translated into game commands. In various embodiments, the wristband may transmit either motion data or game commands to a casino server. The casino server may then transmit motion data or game commands to a mobile gaming device or to a stationary gaming device in order to control such devices.

[0116] In various embodiments, a wristband may be used to co[...] Petitioner Exhibit 1002-2395 commands to any device. Such devices may include point of sale terminals, vending machines, kiosks, automated teller machines (ATM), or any other devices. For example, a player may make a series of motions with his hand. The motions may be picked up by his wristband. The wristband may interpret the motions as instructions for an ATM. The wristband may transmit the instructions to the ATM. The ATM may then act in accordance with the instructions, e.g., by dispensing cash for the player.

Wristband for 2D Control

[0117] In various embodiments, a player may move his hand or arm in a plane. Such motions may direct a cursor on a screen to move in an analogous fashion. For example, if the player moves his hand first in one direction and then in the opposite direction, the cursor would also first move in one direction and then in the opposite direction. A player may rest his arm on a flat surface, such as on a table surface. The player may move his hand around on the table surface, thereby moving his hand in two dimensions. The wristband may thus be used to control the position of a cursor on a screen, such as the screen of a stationary gaming device, mobile gaming device, or other device.

String Provides Force Feedback

[0118] In various embodiments, a stationary gaming device may include a string, cable, wire, or other similar component. The string may be wound around a wheel, axle, spindle, shaft, or other device. The gaming device may include motors for rotating the wheel. The rotation of the wheel in one direction may release more string, while the rotation of the wheel in the other direction may pull string in.

[0119] In various embodiments, the player may attach one end of the string to the wristband. Depending on events in the game, the gaming device may either pull in on the string or let loose more string. This may have the effect of pulling and releasing the player's wrist. This may provide tactile feedback to the player. In some embodiments, the player may also purposefully pull on the string in order to make commands in the game. For example, the player may pull outwards on the string in order to cause reels of a slot machine game to spin. The faster or harder the player pulls the string, the faster the reels may spin.

Distinguishing Signals from Multiple Wristbands

[0120] In various embodiments, a gaming device may detect a signal from a wristband. The wristband may transmit a player identifier, so that the gaming device would be able to recognize the identity of the player. In various embodiments, when one gaming device detects a signal from a wristband, other gaming devices might also detect the same signal. Therefore, in various embodiments, a gaming device may determine whether it was the player's intention to communicate with it, or whether it was the player's intention to communicate with a different gaming device.

[0121] In various embodiments, a gaming device may recognize that someone is playing the gaming device. For example, the gaming device may detect actual button presses, a player tracking card may be inserted, currency may be inserted, and so on. At the same time, the gaming device may detect signals from a wristband. The gaming device may then display a message or otherwise ask the player currently playing the machine whether that player is the one whose wristband signal has been received. The gaming device may recognize a player identity from the wristband signal and may thus display the name of the player to the player physically present at the gaming device. If the player who is physically present recognizes his own name, then the player may confirm that in fact the gaming device is receiving wristband signals from him. The gaming device may then allow the player to use motion controls to proceed with play of the game.

[0122] In various embodiments, a gaming device may recognize that there is a wristband in the vicinity and also that the gaming device is being played by a player who is physically present. Thus, a game may be conventionally started, e.g., through the physical press of a button. The gaming device may then ask the player physically present if he is the same player indicated in a received signal from a wristband. If the player who is physically present answers in the affirmative, then the gaming device may ask the player whether he would like to proceed with play using motion control.

[0123] In various embodiments, a gaming device may differentiate between multiple signals coming from different wristbands as follows. Each wristband may be associated with a unique identifier. Each wristband may broadcast its own unique identifier. A gaming device may ask a player who is physically present which identifier corresponds to his wristband. In some embodiments, the gaming device may ask the player to enter the identifier of his wristband. If the identifier matches an identifier of a signal received from one of the wristbands, then the gaming device may thereupon react only to signals received from that wristband.

[0124] In various embodiments, a gaming device may ask a player to bring a wristband near a reader. The reader may be an optical reader, an RFID reader, a magnetic stripe reader, or any other reader. In this way the signal belonging to the player physically at the gaming device may become clearly the strongest signal received at the gaming device. The gaming device may then allow the player physically at the gaming device to proceed with play using his wristband. The player may then use some motion control or he may use motion control for every command at the gaming device.

Reference Lights at a Stationary Gaming Device

[0125] In various embodiments, a stationary gaming device may include one or more lights, beacons, transmitters, audio speakers, or other emitters. For example, a stationary gaming device may include two bright lights situated on top of the gaming device. The emitters may serve as reference points for a mobile gaming device and/or for a wristband. A wristband may, for example, detect the light or other signal from two emitters on a gaming device. The bracelet may use the two emitters as a fixed reference frame based on which to determine its own orientation. For example, if the two emitters appear side by side from the vantage point of the wristband, the wristband may determine that its orientation is normal. If, however, the two emitters appear one on top of the other, then the wristband may assume it has been rotated 90 degrees. In various embodiments, the emitters may output the same type signal, e.g., light of the same wavelength and amplitude. In some embodiments, different emitters may output different signals. This may allow a wristband or mobile gaming device to distinguish one emitter from the other in all orientations and to thereby make an even more accurate determination of its own orientation. In various embodiments, a stationary gaming device may have more than two emitters. For example, a stationary gaming device may have three, four, or five emitters. In various embodiments, emitters may be located in other places than just on a stationary gaming device. For example, emitters may be located on the ceiling, or on a wall.

[0126] In various embodiments, an emitter may emit light of a particular frequency. An emitter may emit red light, green light, infrared light, or light of some other frequency. An emitter may emit light at multiple frequencies. For example, an emitter may emit white light. An emitter may emit sound.

[0127] A wristband and/or a mobile gaming device may include sensors, cameras, microphones, or other detectors for detecting the output of the emitters. For example, a wristband may include a camera. The camera may detect light from emitters on a gaming device. Based on the position of the emitters in an image captured by the camera of the wristband, the wristband may determine its own orientation.

[0128] In various embodiments, a gaming device may not necessarily have dedicated emitters for detection by wristbands or mobile gaming devices. However, a wristband or mobile gaming device may detect particular features of the gaming device. For example, the gaming device may have a candle on top which is meant to light up when a casino attendant is summoned to the gaming device (e.g., when a player at the gaming device has won a jackpot). A sensor in a wristband or mobile gaming device may recognize the image of the candle. For example, the wristband may include a camera. The camera may capture images and attempt to match portions of the image to a pre-stored image of a candle on a gaming device. Based on the orientation of the candle from the captured image relative to the orientation of the candle in a stored, reference image, the wristband may determine its own orientation. E.g., if the captured image appears to be a version of the reference image that has been rotated 90 degrees, then the wristband may assume that it has been rotated 90 degrees.

[0129] In various embodiments, sensors in a mobile gaming device or wristband may detect other features of a stationary gaming device. Sensors may detect a pay table, a screen, a handle, betting buttons, a coin tray, graphics on the housing of the gaming device, a jackpot meter, or any other features of the gaming device. For any feature, the wristband or mobile gaming device may have stored reference images or reference signals. In order to detect or interpret a feature, the wristband or mobile gaming device may capture an image and attempt to match portions of the image to one or more reference images. In the matching process, the wristband or mobile gaming device may manipulate the captured image, adjusting the size or orientation of the captured image in an attempt to better match a reference image. When there is a match (e.g., a portion of the captured image matches a reference image of a coin tray), the wristband or mobile gaming device may determine the degree of rotation of the captured image that was required to make the match. The degree of rotation may then indicate the amount by which the wristband or mobile gaming device has been rotated.

[0130] In various embodiments, a gaming device may track the motion of a wristband or of a mobile gaming device. The wristband may include beacons or emitters, such as infrared emitters, light emitting diodes, or audio speakers. The wristband may include two or more emitters. The gaming device may include detectors, such as cameras, microphones, or antennas. The gaming device may determine the positions or relative positions of emitters on a wristband. For example, in a normal upright position, two emitters on a wristband may appear side by side. When the wristband is rotated 90 degrees, one emitter may appear above the other. Thus, based on the relative positions of two emitters on a wristband, the gaming device may be able to ascertain the orientation of the wristband. Also, the apparent distance between two emitters on a wristband may provide an indication of distance of the wristband itself from the gaming device. For example, if two emitters on a wristband appear close to one another, then it may be assumed that the wristband is far away. On the other hand, if two emitters on a wristband appear far from one another (at least relatively speaking), then the wristband may be assumed to be near. Through tracking the motion of the wristband or the mobile gaming device, a gaming device (e.g., a slot machine; e.g., a video poker machine) may ascertain commands that are intended by the player. The gaming device may execute those commands in a game that it conducts. The gaming device may also transmit those commands to another device, such as to another stationary gaming device or such as to a mobile gaming device.

Screen Direction for Motion Control

[0131] In various embodiments, a gaming device, such as a stationary gaming device, may provide instructions to a player as to how to use motion control. Instructions may indicate one or more available commands that the player can give. For example, the gaming device may list commands to: (a) start a game; (b) make a selection in a bonus round; (c) select a card to discard in a game of video poker; (d) select whether to hit or stand in a game of blackjack; (e) select a pay line to bet on; or to take any other action in a game or otherwise. The gaming device may also provide instructions as to how to issue commands. The gaming device may indicate which motions are necessary to issue commands. The gaming device may show small videos or animations of people motioning with their hand. Thus, a player may see next to a potential command a small video clip of a person moving his arm in a particular way. The video clip may repeat constantly or it may play on demand (e.g., upon touch by the player). The motions to be made in order to issue the command may also be spelled out in text form, such as "move your hand to the right twice and then up once". Instructions as to how to use motion control may be shown in many different forms.

[0132] In some embodiments, a person may be walked through tutorial or may have the opportunity to practice making motions. For example, instructions for making the motion corresponding to the "start game" command may be played in the form of a video clip. In other words, an animation of a person making a particular motion may be shown on the display screen of a gaming device. The player may be instructed to repeat the motion with his own wristband. The player may be instructed to follow along with the video of the motion being performed. If the gaming device recognizes the motion, the gaming device may ask the player to following along in making the motion for the next instruction. If the gaming device does not recognize the motion made by the player (e.g., if the player has made wrong motion), then the gaming device may ask the player to repeat making the motion until he gets it right.

[0133] In various embodiments, when a player is playing a game at a gaming device (e.g., at a slot machine), and when the player makes a motion to issue a command, the gaming device may provide feedback as to how the gaming device interpreted the player's motion. For example, the gaming device may display a text message, "you have motioned to start a new game".

Window of Time to Make a Motion

[0134] In various embodiments, there may be finite windows of time when a gaming device (e.g., a stationary gaming device) will accept motion commands. For example, there may be a 10 second window during which a gaming device will accept motion commands. During other times, the player may make motions, but they will not necessarily register as commands. This may allow the player some freedom to make motions unrelated to a game (e.g., hand gestures in a conversation) during times other than the window in which commands may register. A window of time for making motion commands may open and close periodically. For example, a window may open up for ten seconds, then close for twenty seconds, then open for another ten seconds, and so on. If a person makes a first motion command during the window of time, then the window of time may be extended. For example, the extension of the window of time may allow the person to complete a full game before the window for making motion commands closes. In some embodiments, a window of time for making motion commands may persist so long as a game is in progress. In some embodiments, a window of time for making motion commands may persist for a predetermined period of time after the last motion command made by a player. This may allow the player to continue making motion commands for as long as he wants to. In some embodiments, there may be an alert or other indicator that a gaming device (e.g., a stationary gaming device; e.g., a mobile gaming device) is receptive to motion commands. For example, an indicator light on the gaming device may come on, or the indicator light may change from one color to another. Thus, for example, a light may be blue when a gaming device is receptive to motion commands, and may be red when a gaming device is not receptive to motion commands. In some embodiments, a player may turn motion control on or off. For example, the player may instruct a gaming device to be receptive to motion commands, or may instruct the gaming device to ignore motion commands. A player may have to physically touch a gaming device in order to switch motion commands either on or off. In some embodiments, when a gaming device is not receptive to motion commands, the gaming device may still respond to a motion command which commands the gaming device to become receptive to other motion commands again. For example, the gaming device may then become receptive to motion commands again.

[0135] In various embodiments, a first set of motions may correspond to moving a cursor, mouse pointer, or other indicator. A second set of motions may correspond to making a selection. For example, once a cursor is resting over a card or an image of a button, making a motion of the second set of motions may correspond to selecting the card (e.g., selecting the card to be discarded), or to pressing the button. Motions from the second set of motions may be used, for example, to select an amount to bet, to select a pay line, to select a decision from a menu of decisions, or to make any other selection. Motions from the first set of motions may position a cursor for later selection, but may not yet commit a player to a course of action. In some embodiments, motions in the forward and back directions (e.g., from the player's perspective) may correspond to the second set of motions, e.g., to making a selection. Motions in other direction (e.g., up, down, left, right) may correspond to motions from the first set of motions, e.g., to positioning a cursor.

[0136] In various embodiments, a player may receive visual feedback as he makes a motion. A cursor may trace out on the screen of a gaming device (e.g., a stationary gaming device; e.g., a mobile gaming device) a trajectory made by the player's wristband as he moves his hand. To make a particular command, the player may have to keep the cursor within certain boundaries. For example, boundaries consisting of two concentric circles may be displayed on the display screen of the gaming device. The player may have to make a circle with the cursor while keeping the cursor outside of the inner circle but inside of the outer circle (i.e., between the two circles). In some embodiments, there are points or dots on the screen. The player may need to make a motion so that a cursor on the screen is moved between the two dots. In some embodiments, there may be several pairs of dots. The player must move the cursor between various pairs of dots in some particular order in order to issue a command. Different commands may require the cursor be moved between different pairs of dots, or between pairs of dots in different orders.

[0137] In various embodiments, a player may make motion commands to position a cursor over a button. The player may make further motion commands to select the button. Various buttons may correspond to different commands or actions in a game. Thus, by making motions to position a cursor over an appropriate button, the player may make a desired command in a game.

Wristband Senses Muscle Strain on Wrist Muscles in the Form of a Grabbing Motion

[0138] In various embodiments, a player wristband may include a strain gauge. The wristband may be made of a pliant material, such as rubber. The wristband may fit snugly to the player's wrist. When the player closes his fist, the player may tense certain wrist muscles. This may put additional strain on the wristband as the girth of the player's wrist may expand. The strain gauge may sense this extra strain on the wristband. The strain gauge may send a signal to the processor of the wristband indicating the strain that has been detected. The strain gauge may also send a signal via an antenna or other transmitter to another device, such as to a mobile gaming device, to a stationary gaming device, or to the casino server.

[0139] In various embodiments, a wristband may have one or more pressure sensors on the inside surface, e.g., the surface in contact with the wrist of the player. The pressure sensors may sense pressure from the player's wrist, indicating the possible tensing of the wrist or flexing of the wrist muscles.

[0140] In various embodiments, a wristband may have temperature sensors. The sensors may detect an increase in temperature at the wrist stemming from increased blood flow and/or from the more rapid burning of energy in wrist muscles. These sensor readings may correspond to a player's tensing of his wrist, such as when the player performs a grabbing motion.

[0141] In various embodiments, electrical activity of the nerves or muscles in the wrist may vary depending on whether the muscles are in a tensed or relaxed state. Sensors in the wristband, such as antennae, may pick up the electrical activity in the wrist and may interpret the electrical activity as an indication that the wrist muscles are tensed or not.

[0142] In various embodiments, a tensing of the wrist muscles may be interpreted as a command in a game. In various embodiments, a tensing of the wrist muscles may be interpreted as a selection of a button or a choice from among multiple options. In various embodiments, a tensing of the wrist muscles may correspond to virtually grabbing something in a game. For example, in a bonus round, a game character may grab the knob on one of three doors in order to open the knob. Since the tensing of wrist muscles may be caused by a player actually making a grabbing motion (e.g., in the real world), the player may use the grabbing motion as an intuitive way to select something or to grab something in a game. Thus, for example, the player may move a cursor through linear displacements of the hand, and may select something a cursor is on by making a grabbing motion.

[0143] In various embodiments, sensors or detectors could detect a grabbing motion or other hand or wrist motions even when such sensors do not lie within a wristband. For example, a camera may film the motions of a player's hand. Image processing algorithms may be used to recognize which motions have been made by the player's hand. These motions may be translated into commands in a game.

[0144] Thad Starner, Joshua Weaver, and Alex Pentland of the Massachusetts Institute of Technology have developed a camera-based system for recognizing American Sign Language. The system is describe in a paper entitled, "Real-Time American Sign Language Recognition Using Desk and Wearable Computer Based Video".

Receiver on Slot Machine

[0145] In various embodiments, a gaming device such as a slot machine may include a Bluetooth transceiver. The transceiver may be built into the device. The transceiver may also take the form of a Bluetooth dongle, which may be plugged into a universal serial bus (USB) port of the gaming device. In various embodiments, a gaming device may include a Wi-Fi transceiver. A gaming device may send and receive messages to and from a wristband or mobile gaming device using Bluetooth, Wi-Fi, or using any other communication protocols.

Components of a Message from a Wristband

[0146] The data content of a signal from a wristband may include one or more components. The signal may be understood to always include these components in a particular order, for example. For example, the first 3 bits of the signal may indicate the start of a new message. The next 4 bits may indicate the type of device providing the transmission (e.g., a wristband; e.g., a mobile gaming device). The next 30 bits may provide an identifier for the wristband. The next 100 bits of the signal may provide a player name. The next 20 bits may provide a command. The next 10 bits may indicate that the signal has ended. In some embodiments, a signal may include one or more of the following portions or regions: (a) a region indicating the start of the signal; (b) a region indicating a type of device transmitting a signal; (c) a region indicating the intended recipient of the signal (e.g., a unique identifier for a gaming device; e.g., an identifier for the casino server); (d) a region indicating a player identifier; (e) a region indicating a device identifier (e.g., a unique identifier for the particular device transmitting the signal); (f) a region indicating the end of the signal; (g) a region indicating a player name; (h) a region indicating a command to be used in a game; (i) a region indicating a game identifier (e.g., an identifier for a game to which a command will apply); (j) a region containing one or more error-checks; and any other region.

Confirmation of Player Presence and Identity at a Stationary Gaming Device

[0147] In various embodiments, a wristband may transmit a signal. The signal may be received by a stationary gaming device. The signal may include an identifier for the wristband. The gaming device may transmit the identifier of the wristband to the casino server. The casino server may look up the name of the player who has signed out the wristband (e.g., the player who is currently using the wristband). The casino server may transmit the name of that player to the gaming device. In some embodiments, the signal from the wristband may include a player identifier. The gaming device may transmit the player identifier to the casino server. The casino server may in turn transmit the name of the player back to the gaming device. In any event, the gaming device may determine the name of the player. The gaming device may display a message which indicates the name of the player. The message may be a greeting. For example, the message may say, "Hello, Sarah Jones!" The message may also ask a player to confirm his or her identity. A player may confirm his or her identity by answering a secret question, by providing a biometric (e.g., a fingerprint), by inserting a player tracking card, by inserting a credit card, by inserting a bank card, by inserting a driver's license, by flashing any of the aforementioned cards in front of a camera, or in any other fashion. In various embodiments, the player may confirm his identity through physical contact with the gaming device. For example, the player may answer a secret question by physically touching letters on a touch screen of the gaming device and spelling out the answer that way. When a player confirms his identity through physical contact with a gaming device, the gaming device can be more assured that a gaming device is not being controlled by motion-based or other wireless commands from a person other than the person sitting at the gaming device.

Prominent Screen for Playing with Motion Control Only

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[0148] In various embodiments, a casino or other venue may include a large display screen. The screen may display a game. The screen may show the progress and the action in a game, such as a game of slot machine or a game of video poker. Electronics or other devices associated with the screen may allow the screen to receive motion inputs for play of a game. For example, there may be antennae for receiving signals from a player's wristband, or a camera for reading a player's motion commands. A processor or other device may compute or determine game events or game outcomes. A player may provide value or currency for gambling by inserting a cashless gaming ticket. Thus, associated with the screen may be a ticket-in-ticket-out device for accepting and dispensing cashless gaming slips.

[0149] A player may play games at the large display screen. The player may make commands in the game using motion control. For example, a wristband on the player may detect motions made by the player's hand. An indication of the motions made may be transmitted to the large display screen. The large display screen may then steer the course of the game as dictated by the player's commands.

[0150] In various embodiments, a game with a large display screen and controlled by motions may be located at the end of each of two or more rows of slot machines. For example, at the end of each row of slot machines or other gaming devices may be a large display screen which features games with motion control. Such games may be visible to everyone in the row of slot machines. In this way, people playing slot machines may watch the games played at the large screen and may be tempted to try motion control themselves.

Toggle Button on Wrist Watch to Turn Functions On or Off

[0151] In various embodiments, a wristband may include a switch, button, toggle, or other device for selecting among two or more states. A switch may be used to enable or disable motion control. Thus, when the switch is in one location, the player wearing the wristband may be able to use motion control to control the action in a game. When the switch is in another location, the player may be unable to use motion control to control the action in a game. When the player does not desire to play a game at the moment, the player may flip the switch so that motion is disabled. The player will then be able to make wrist gestures without worry that such gestures would effect a game outcome. When a player wishes to play a game again and to use motion control in the game, the player may flip the switch to enable motion control once more.

[0152] In various embodiments, a player may use a switch or other device to switch on or off other features of a wristband. A player may switch haptic feedback on or off. For example, with a switch in one position, the wristband may provide force feedback or haptic feedback to a player. When the switch is in another position, the wristband may not provide such feedback. A player may wish to turn off haptic feedback in order to conserve battery power in the wristband, for example. In some embodiments, a player may switch sound on or off. For example, at least in one state, a wristband may emit audio signals. The audio signals may relate to a game (e.g., triumphant music may be emitted from a wristband when the player wins). The audio signals may relate to a player location. For example, the wristband may emit audio signals when a player enters a restricted area where gaming is not permitted. The audio signals may relate to an account balance. For example, the wristband may emit an audio signal when a player account balance reaches zero. There may be other reasons for audio signals to be emitted by wristbands.

[0153] In various embodiments, a wristband may include one or more buttons, one or more sensors, one or more piezoelectric sensors, a batter, a transmitter, a receiver, and an onboard processor. The buttons may allow a player to change a setting or state of the wristband (e.g., to turn sound on or off). The buttons may allow a player to provide commands for a game, where such commands are not motion based. Sensors may include motion sensors, such as accelerometers or gyroscopes. Sensors may include position sensors, such as GPS sensors. Sensors may include temperature sensors, pressure sensors, strain gauges, microphones, light sensors, or any other sensors. Sensors may perform various functions. Sensors may detect motions so that such motions can be translated into commands. Sensors may sense a player's position so that the player can be told if he is in a permitted gaming area or not. Sensors may be used to sense a tension or electrical activity in a player's muscles, e.g., to derive motion commands. The transmitter may be used to communicate with another device, such as a stationary gaming device, mobile gaming device, or casino server. The receiver may receive communications from another device, such as a mobile gaming device, a stationary gaming device, or a casino server. Communications received at the wristband may reprogram the wristband. Such communications may provide the wristband with commands, for example. For example, a communication received by the wristband may instruct the wristband to shut off, due to a player's account balance reaching zero.

Shaking Hands

[0154] In various embodiments, the wristbands of two players may interact. The interaction may occur when the wristbands are brought close to one another. For example, when two players shake hands with the hands wearing the wristbands, the two wristbands may interact.

[0155] In various embodiments, during an interaction, a wristband of a first player may receive information from the wristband of a second player. The wristband of the second player may receive information from the wristband of the first player.

[0156] In various embodiments, a mobile gaming device of a second player may receive information from the wristband of a first player. In various embodiments, a mobile gaming device of the first player may receive information from the wristband of the second player.

[0157] In various embodiments, shaking hands may cause a bet to be made or sealed between the two players shaking hands. Technically, in some embodiments, the bet may be made when the wristbands of the two players are within a predetermined distance (e.g., 5 inches) of one another for a predetermined amount of time (e.g., 5 seconds). In some embodiments, the bet may be made when the wristbands are within a predetermined distance of one another for a predetermined time and when there is a shaking motion of one or both wristbands. The shaking motion may correspond to the shaking of hands. The wristbands may even transmit to one another information about the timing of the shaking motion to ensure that the wristbands are shaking in sync, as would happen with a hand shake. In various embodiments, a first player may prearrange the terms of a bet using a stationary gaming device or other device. For example, the first player may arrange a bet such that the first player will win $1 from the second player if the a spin of a roulette wheel ends up black, while the second player will win $1 from the first player if the spin of the roulette wheel ends up red. Once the bet has been specified, the first player need only find a second player to shake hands with in order to seal the bet. In various embodiments, it is possible that the first player would mischaracterize the terms of the bet to the second player. Thus, in various embodiments, a first player may be allowed to prearrange only fair bets (e.g., bets where both sides have equal probabilities of winning and/or where both sides have equal expected winnings and/or where both sides have zero expected winnings and losses). In various embodiments, when players shake hands to make a bet, the terms of the bet may be displayed on one or both of the players' mobile gaming devices. Each player may have a window of time (e.g., thirty seconds) to cancel the bet. To cancel a bet, a player may press a "cancel" button on his mobile gaming device, for example. If neither player cancels the bet, an outcome may be generated and the bet may be resolved one way or the other.

[0158] In various embodiments, a first wristband may detect the proximity of another wristband. A wristband may be Bluetooth enabled so that the wristband can detect the proximity of another wristband transmitting with the Bluetooth protocol. In various embodiments, a wristband may be programmed or configured to send and receive signals of other protocols, such as Wi-Fi.

[0159] In various embodiments, two or more players may shake hands in order to make a bet with one another. The player who wins may depend on the outcome of some game, such as a game conducted or simulated by a gaming device. In some embodiments, in order for the bet to be resolved, the two players must be in proximity of a gaming device, such as a stationary gaming device. For example, in order for a bet to proceed, the two players may have to be standing in front of a slot machine. The players may be required to be within a predetermined distance of a particular gaming device, such as within two feet. The wristbands of one or both players may communicate with the gaming device indicating that the players have agreed to a bet. One or both wristbands may communicate to the gaming device the terms of the bet, such as which game the bet depends on. The gaming device may then conduct the appropriate game to satisfy the bet. For example, if the bet is on a game of video poker, then the gaming device may conduct a game of video poker. If the bet is on a game of blackjack, the gaming device may conduct a game of blackjack. In various embodiments, the wristbands may communicate to the gaming device which player will win under which circumstances. For example, the wristbands may communicate to the gaming device that "Joe Smith" will win if the house wins in a game of blackjack, while "Jane Smith" will win if the player wins in the game of blackjack. The player, in this case, may refer to a hypothetical player that is being simulated by a gaming device. The gaming device may play basic strategy or optimal strategy on behalf of the hypothetical player. In some embodiments, two players who make a bet on a game may play the game against one another using one or more gaming devices. The players may indicate strategic decisions at the gaming device(s). For example, if two players make a bet on a game of blackjack, the players may be effectively agreeing to play a game of blackjack against one another. The two players may play at a particular gaming device. During the course of the game, the players may provide decisions for the game. The players may provide decisions by physically pressing buttons on the gaming device or otherwise physically interacting with the gaming device. The players may also provide decisions by using motion controls, e.g., using their wristbands.

Incentives for Shaking Hands

[0160] In various embodiments, there may be incentives to shaking hands with people. A person's wristband may track the number of times a person has shaken hands with someone else, and/or the number of people with which the person has shaken hands. In some embodiments, after each handshake, a player's wristband may transmit a record or other indication of the handshake to the casino server. A wristband may transmit an identifier for the other player or the other wristband with which the player

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made contact. The casino server and/or a player's wristband may track the number of other players with which a player shook hands. The casino server and/or the player's wristband may also track the names or identifies of other players with whom a player shook hands. In various embodiments, the player who shook hands with the most other players in some period of time (e.g., in one day) may win a prize, such as $1000.

[0161] In some embodiments, a mixer may be held in a casino or related property or in any other venue. The mixer may be an opportunity for singles to meet, an opportunity for business people to make contacts, an opportunity for scientists to exchange ideas with colleagues, or any other type of mixer. During the mixer, people may shake hands with one another. The wristbands of the people may automatically exchange information, include names, contact information, email addresses, phone numbers, biographical information, pictures, credentials, place of residence, age, gender, marital status, or any other information which may be appropriate to the circumstances, or any other information.

[0162] The wristbands of people who have participated in a mixer may transmit to a casino server or other device information about people with whom they have shaken hands or otherwise made contact. A person who has been at a mixer may later log onto a web site to see a summary list of people he has met. The web site may include contact information for the people. In some embodiments, no contact information is provided. Rather, a person must select who he/she would like to make contact with. If the person selects another person, and that other person selects him/her, then the website may later provide both of them with each other's contact information.

[0163] In some embodiments, during a handshake, the wristband of one person may transmit information about that person (e.g., contact information) to a mobile device (e.g., a mobile gaming device; e.g., a personal digital assistant; e.g., a cellular phone) to the other person. In this way, at the end of a mixer, a person may have stored on a mobile device information about other people he has met during the mixer.

[0164] In various embodiments, at the end of a mixer, a person may view images of people he/she had met at the mixer. Viewing the images may jog the person's memory about people he/she has met. The person may select people he/she is interested in having further contact with. The person may then be given their contact information. In some embodiments, the person may be given their contact information only if they have also expressed interest in having further contact with the person.

[0165] In various embodiments, a mixer may be held at a bar, restaurant, lounge, gym, swimming pool, gambling floor, shop, or at any other lounge.

Make Payments by Shaking Hands

[0166] In various embodiments a player may make a payment through shaking hands. A player may pay for a drink, a foot item, a product at a retail establishment, or any other item through a handshake. In some embodiments, a casino employee or employee of a retail establishment may possess a wristband. When the employee shakes hands with a person (e.g., a customer; e.g., a player), the employee wristband may receive a communication from the player's wristband. The communication may include information about the player, such as a name, identifier, credit card identifier, financial account identifier, or any other information about the player. The employee's wristband may communicate the player's financial account identifier as well as other identifying information about the player to a point of sale terminal, to a retail server, to a casino server, or to any other device. The player may then be charged for a purchase through a credit card network or other financial network.

[0167] Having shaken hands with a casino employee, retail employee, salesperson, or other person, a player may have a limited period of time in order to review a transaction and cancel it. For example, a player's wristband may also store the details of a transaction following a handshake with a salesperson. The details of the transaction may include a purchase price, a product, a mode of delivery, and so on. The player may bring his wristband close to a mobile gaming device or to a stationary gaming device. The wristband may transfer transaction details to the mobile gaming device or to the stationary gaming device. The mobile or stationary gaming device may then display the transaction details for the player. The player may review them and decide whether or not to cancel. If the player wishes to cancel, the player may, in some embodiments, press a button or screen region on a mobile gaming device or on a stationary gaming device. The player may also be required to return to the place he bought the product and to return the product.

[0168] In various embodiments, a player may bring his wristband near to a reader as a way to pay for a transaction. The player may touch a pad with the wristband. For example, the player may put his hand on a pad to pay for a drink. The pad may contain an antenna or other type receiver to detect signals from the wristband. The signal detected may include a financial account identifier.

[0169] In various embodiments, a player may pay for a purchase or other transaction using a balance of gaming credits. The player may have an account with gaming credits that is stored and tracked with a casino server. When a player holds his wristband near a pad or reader in order to make a purchase, the reader may verify with the casino server whether the player has a sufficient account balance to complete the purchase. In various embodiments, a pad or reader may provide a first indicator if the player does have a sufficient account balance, and may provide a second indicator if the player does not have a sufficient account balance. The first indicator may be a green light, for example. The second indicator may be a red light, for example.

Wristband Becomes Unclasped

[0170] In various embodiments, if the wristband comes off the player (e.g., if the wristband becomes unclasped) then an alert may be sent to the casino server. The alert may indicate to the casino server that the wristband is no longer around the player's wrist. In various embodiments, once the wristband has been taken off, the wristband may cease to function for gaming purposes. For example, the wristband may no longer allow motion control. The wristband may also stop communicating a player identifier to a mobile gaming device. Thus, a mobile gaming device of the player may no longer allow the player to engage in gambling activities. Various other functions of the wristband may also cease once the wristband has been taken off.

[0171] In various embodiments, if a player wants to restore various functions of the wristband, the player may visit a special servicing area of a casino, such as a casino desk. There, a casino employee may put the wristband back on the player. The casino employee may transmit a special code to the wristband to activate it again. The casino employee may also check the identity of the player, such as by asking for a fingerprint or a driver's license, before reapplying the wristband.

[0172] In various embodiments, a wristband include one or more sensors for determining whether the wristband has come off the player, is unclasped, or has otherwise been tampered with or removed. For example a sensor may comprise an electrical circuit encircling the wristband. If the wristband comes off the circuit may be broken.

[0173] In various embodiments, a wristband or mobile gaming device may rely upon continuous or periodic contact with a casino server in order to function. If the wristband or mobile gaming device loses contact with the casino server then they may cease to function. In various embodiments, the wristband may communicate with the server on a periodic basis. Inputs that the wristband receives from the player may not be carried out until the next communication is received from the server. For example, if the player moves his hand to make a command, the wristband may store a record of the motion and/or may store a command which corresponds to the motion. However, the wristband may not transmit the command to another device, such as to a mobile gaming device or a gaming device that the player may be playing. Rather, the wristband may store the command until it again receives a communication signal from the server. In this way, the wristband may ensure that no commands or no gaming commands are performed while the wristband may not be in contact with the casino server. In some embodiments, a wristband may store up inputs received from a player. However, if the wristband does not receive a communication from the casino server within a predetermined period of time of receiving the inputs, then the wristband may discard the inputs. In this way, the player may not later be surprised when a large number of stored or saved commands are executed at once. In various embodiments, player who enters an elevator may not be able to play for some time as communication between his bracelet and the casino server may be cut off.

[0174] In various embodiments, instead of a wristband ceasing to function when it is opened or unclasped, the wristband could continue broadcasting "I've been opened up" to the server until the server confirms it. There may be a period of time after the wristband has been opened that it is trying to tell the server it has been opened. Then there may be a period of time when it stops broadcasting after receiving confirmation from the server. After the wristband has been opened, it may no longer allow some functions (e.g., payments to be made using the wristband), but may still allow other functions (e.g., motion control). So, in various embodiments, some functions are disabled upon the opening of the clasp or otherwise taking off of the wrist band.

Wristband and Mobile Gaming Device can Replicate Each Other's Functions

[0175] In various embodiments, any motion commands that can be made with a wristband may also be made with a mobile gaming device. For example, just as a wristband may include sensors to detect accelerations, changes in orientation, displacements, and any other motions, so may a mobile gaming device. Just as with a wristband, a mobile gaming device may include a processor for reading signals from motion sensors in a mobile gaming device and interpreting such motions as commands to be used in a game or as any other commands. In various embodiments, any commands that can be made through a mobile gaming device may also be made using a wristband. In various embodiments, a wristband may detect motions made by a player and transmit an indication of such motions to a mobile gaming device. The mobile gaming device may interpret the motions as a command in a game or as any other command. In various embodiments, the mobile gaming device may detect motions and transmit such motions to the wristband. The wristband may interpret the motions as commands in a game, for example. The wristband may then transmit an indication of the commands to a stationary gaming device. In various embodiments, any signals or alerts broadcast by a mobile gaming device based on the location of the mobile gaming device may just as well be broadcast by a wristband based on the location of the wristband. For example, if a player wanders out of a legal gaming zone,

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a mobile gaming device or a wristband could detect the position of the player and emit an audio alert for the player. In various embodiments, any haptic feedback that may be provided by a wristband may also be provided by a mobile gaming device. In various embodiments, any haptic feedback that may be provided by a mobile gaming device may also be provided by a wristband. In various embodiments, any information received, determined, or detected by a wristband may be communicated to a mobile gaming device, e.g., via wireless communication.

[0176] The following are embodiments, not claims. Various embodiments include:
A. A method comprising:

[0178] receiving a first wireless signal from a first device;

[0179] receiving a second wireless signal from a second device;

[0180] determining from the first wireless signal a first player identifier;

[0181] determining from the second wireless signal a second player identifier;

[0182] displaying a message that asks a player to identify himself;

[0183] receiving via tactile input an indication of a third player identifier;

[0184] determining that the third player identifier matches the first player identifier;

[0185] receiving a third wireless signal from the first device;

[0186] interpreting the third wireless signal as a command in a gambling game; and

[0187] carrying out the command in the gambling game.
Carrying out the command may include executing the command, following the command, acting in response to the command, and/or acting in accordance with the command.
B. The method of embodiment A in which the first device is one of: (a) a wristband; (b) a watch; (c) a bracelet; (d) an armband; and (e) a mobile gaming device.
C. The method of embodiment A in which determining from the first wireless signal a first player identifier includes determining from the first wireless signal a name of a first player. For example, the first wireless signal may encode a player name. In some embodiments, a player name may be found from a database which associates player other player identifiers (e.g., player tracking card numbers) with player names.
D. The method of embodiment A in which the first player identifier and the second player identifier correspond to different players.
E. The method of embodiment A in which receiving via tactile input an indication of a third player identifier includes receiving an indication of a third player identifier, in which the third player identifier has been inputted using buttons. For example, the someone may enter the third player identifier by physically pressing buttons (e.g., letter keys) on a gaming device.
F. The method of embodiment A in which receiving via tactile input an indication of a third player identifier includes receiving an indication of a third player identifier, in which the third player identifier has been inputted using a joystick.
G. The method of embodiment A in which receiving via tactile input an indication of a third player identifier includes receiving an indication of a third player identifier, in which the third player identifier has been inputted using a touch screen.
H. The method of embodiment A in which receiving via tactile input an indication of a

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third player identifier includes receiving an indication of a third player identifier, in which the third player identifier has been inputted using a track ball.
I. The method of embodiment A in which the third wireless signal encodes a set of motions made by the first device. For example, the third wireless signal may include a set of numbers representing positions, velocities, accelerations, displacements, angular displacements, or other components of motion. The numbers may be understood to represent degrees, centimeters, or other units of measurement. In some embodiments, the third wireless signal may include an identifier for one of a set of recognized motions (e.g., "Motion F"; e.g., "Zigzag motion").
J. The method of embodiment A in which interpreting the third wireless signal includes interpreting the third wireless signal as a command to discard a card in a game of video poker.
K. The method of embodiment A in which interpreting the third wireless signal includes interpreting the third wireless signal as a command to initiate a slot machine game.
L. An apparatus comprising:

[0199] a band formed into a loop;

[0200] a power source attached to the band;

[0201] a motion sensor attached to the band;

[0202] an electromagnetic transmitter attached to the band;

[0203] an audio speaker attached to the band;

[0204] a haptics transducer attached to the band;

[0205] a processor attached to the band; and

[0206] an electromagnetic receiver attached to the band.
The band may be a metal band, elastic band, chain link band, cloth band, leather band, or any other type of band. In some embodiments, the band can be made into a loop by clasping its two ends together. In some embodiments, the band is always in loop form, save for unintended tearing or ripping.
M. The apparatus of embodiment L in which the haptics transducer is operable to generate vibrations in response to an electric signal from the processor. For example, the processor may direct the haptics transducer to vibrate when a jackpot has been won in a game being played by the wearer of the apparatus.
N. The apparatus of embodiment L in which the motion sensor is an accelerometer.
O. The apparatus of embodiment L in which the processor is operable to:

[0210] receive a first electronic signal from the motion sensor;

[0211] determine a first command for a first gambling game based on the first electronic signal;

[0212] transmit the first command to the electromagnetic transmitter; and

[0213] direct the electromagnetic transmitter to transmit the first command to a first gaming device.
Thus, in various embodiments, the apparatus may detect a player's motions and interpret the motions as commands in gambling game, such as a slot machine game, video poker game, blackjack game, or any other game. The apparatus may then

transmit the command via to a gaming device, such as to a slot machine or to a mobile gaming device, so that the command may be executed in a game.
P. The apparatus of embodiment L in which the processor is operable to:

[0215] receive from the electromagnetic receiver instructions that have been received wirelessly by the electromagnetic receiver;

[0216] receive a second electronic signal from the motion sensor;

[0217] follow the instructions in order to determine a second command for a second gambling game based on the second electronic signal;

[0218] transmit the second command to the electromagnetic transmitter; and

[0219] direct the electromagnetic transmitter to transmit the second command to the gaming device.
Q. The apparatus of embodiment L further including a switch attached to the band,

[0221] in which the switch has two stable positions, and in which the processor is operable to detect the position of the switch and to direct the electromagnetic transmitter to transmit signals only if the switch is in a first of the two stable positions. In various embodiments, a player may turn some or all aspects of a wristband on or off. The player may do this by means of a switch, button, or other toggling device, or other device. With one state of the switch, the wristband may transmit motions or commands to be used in a game. With another state of the switch, no such motions or commands may be transmitted. For example, the player may wish to make motions without worry that such motions would be counted in a game.
R. The apparatus of embodiment L further including a piezoelectric sensor attached to the band. The piezoelectric sensor may detect flexing of a player's wrist muscles through the pressure they place on the wristband, for example.
S. An apparatus comprising:

[0224] a housing, the housing including a top surface that is parallel to the ground;

[0225] a coin hopper disposed within the housing;

[0226] a bill validator attached to the housing;

[0227] a display screen attached to the housing;

[0228] a processor disposed within the housing;

[0229] a wireless receiver attached to the housing;

[0230] a wireless transmitter attached to the housing;

[0231] a first light source attached to the top surface of the housing, in which the first light source is operable to emit light of a first frequency; and

[0232] a second light source attached to the top surface of the housing at least one foot from the first light source, in which the second light source is configured to emit light of a second frequency which is different from the first frequency.
The apparatus may represent a gaming device. The two light sources may provide fixed reference points relative to which a wristband or mobile gaming device may

determine its own position or orientation. For example, the first light source may be a green light and the second light source may be a red light. A wristband may detect the two lights sources by e.g., capturing an image which includes the light sources, determining the apparent distance of the light sources in the image, and determining its own distance from the light sources based on the known distance between the two light sources.
T. The apparatus of embodiment S in which the processor is operable to:

[0234] conduct gambling games; and

[0235] alter the course of a gambling game based on wireless signals received at the wireless receiver.
In various embodiments, altering the course of a gambling game may include taking one of two or more possible actions in a gambling game, such as choosing one or two possible cards to keep, or such as choosing one of two or more possible bets.

Sone Haptics Technology

[0236] The Impulse stick from Immersion is a joystick which provides force feedback and is marketed to be used in challenging environments, such as video arcades.

[0237] The VibeTonz(R) system by Immersion is a system that can endow mobile phones with haptic sensations. Such sensations may provide the feel from a repetition of a machine gun, from the shock and decay of an explosion, or from the thump of a foot kicking a ball.

[0238] A "haptic interface device" provides a haptic sensation (haptic display) to a user of the haptic interface device in response to the user's interaction with an environment with which the haptic interface device is associated. "Haptic" refers to the sense of touch: haptic interface display devices thus produce sensations associated with the sense of touch, such as texture, force (e.g., frictional force, magnetic repulsion or attraction), vibration, mass, density, viscosity, temperature, moisture, or some combination of such sensations. Haptic interface devices can be embodied in a variety of different apparatus, such as, for example, apparatus for conveying force and/or vibrotactile sensation (e.g., a stylus, a movable arm, a wheel, a dial, a roller, a slider or a vibratory surface), apparatus for conveying thermal sensation (e.g., a thermally-controlled surface or air volume), and apparatus for conveying the sensation of moisture (e.g., a moisture-controlled surface or air volume). Haptic interface devices can be used in a wide variety of applications. For example, some joysticks and mice used with computers incorporate force feedback to provide a haptic display to a user of the joystick or mouse. Some paging devices are adapted to vibrate when a paging signal is received. Some toys produce vibrations as part of the interaction with the toy. These examples give an indication of the range of applications for which a haptic interface device can be used.

[0239] In a conventional haptic interface device, the character of the haptic display experienced by a user is determined by a haptic model that links the state of one or more aspects of the environment to the haptic sensation provided to the user. A user uses an environment interaction control apparatus to interact with an environment via an environment interaction model (either directly or via a haptic model). The haptic model "interprets" the user interaction with the environment (based on information concerning the user interaction obtained either from the environment interaction model or the environment to cause a haptic display apparatus to produce a corresponding haptic display. The environment interaction model can also cause a non-haptic display apparatus to produce a non-haptic display (e.g., a visual display and/or an audio display). However, there need not necessarily be a non-haptic display.

[0240] The magnitude of the change in haptic sensation per unit change in the state of one or more aspects of the environment is referred to herein as the "resolution" of the haptic display. For example, in a haptic interface device used for video browsing and/or editing, a knob can be rotated to advance through the frames of a video recording, a force being applied in opposition to rotation of the knob, to simulate a detent, at predetermined transitions from one video frame to the next in the video recording. The resolution of the haptic display in that haptic interface device can be the frequency of occurrence of detents in the video recording (e.g., the number of video frames between each detent). (It can also be possible, as illustrated by an example discussed further below, to define the resolution of the haptic display of such a haptic interface device in terms of the frequency of detents per unit duration of time over which the video was obtained.)

[0241] Output produced by the haptic display apparatus can include, for example, sensations of texture, force (e.g., frictional force, magnetic repulsion or attraction), vibration, mass, density, viscosity, temperature, moisture, or some combination of such sensations. When the environment is a visual and/or an audio recording, for example, force can be applied in opposition to movement of an apparatus embodying the environment interaction control apparatus and the haptic display apparatus to simulate a detent as transition is made from one video frame (or other related set of visual recording data) to the next. Additionally the haptic model can replicate a variety of characteristics of a haptic sensation, such as inertia, damping and/or compliance. The haptic display apparatus can make use of a variety of devices to produce the haptic display. For example, if appropriate for the desired haptic display, devices for producing force and/or vibrotactile sensation can be used, such as, for example, DC servo motor(s), voice coil motor(s), linear actuator(s), hydraulic actuator(s), pneumatic actuator(s), shape memory alloy(s) (SMAs) and piezoelectric transducer(s). If appropriate for the desired haptic display, thermal devices can additionally or alternatively be used, such as, for example, thermoelectric module(s), or heater and fan combination(s). If appropriate for the desired haptic display, moisture devices and/or materials can additionally or alternatively be used, such as, for example, condenser(s), mister(s), moisture-permeable barrier(s) and anhydrous material(s).

[0242] The haptic display apparatus can be embodied by, for example, a force-actuated wheel, knob, handle or arm, a heat sourcing and/or sinking device, or a moisture generating and/or absorbing device.

[0243] Various devices actively respond to user input by providing tactile cues or responses to the user. The vibrator in a cell phone or pager is a good example. Other examples include an input key that provides a clicking sound when moved; a key or touch screen that moves suddenly or vibrates in an opposed direction to the input; and a key that moves suddenly or vibrates perpendicular to the direction of input in response to a transducer attached to the device housing.

[0244] An input mechanism such as a display and/or a key may be configured for providing active tactile force feedback. An electromechanical transducer, such as a voice-coil based linear vibration motor, a piezoelectric actuator or vibrator, or the like, is mechanically connected directly to the display, and an electromechanical transducer, such as a vibrator, or the like, is mechanically connected directly to the key.

[0245] In various embodiments, a haptic interface module is co[...]

of predetermined or user defined amplitude and duration in response to receiving a trigger signal from a phone processor. Alternatively, other interface logic (e.g., address decoding logic) is included between a digital signal bus, and a haptic interface module. The phone processor is programmed to trigger the haptic interface module in response to a predetermined state as determined by intelligent operations within the phone processor. Optionally, the triggering of the haptic interface module can selectively enabled or disabled in accordance with configuration settings that a user can edit. The haptic interface module is coupled to electromechanical transducers. The electromechanical transducers are driven by the output of the haptic interface module.

[0246] More generally, the electromechanical transducers are preferably driven by a signal that includes at least one approximation of a step function. (Note that a step function is a mathematical ideal that no real world circuit can achieve). A step function includes a broad range of frequencies. By using a driving signal that includes an approximation of a step function, the electromechanical transducer is caused to emit an impulse of mechanical energy that propagates to the haptic point and is felt by a user operating the cellular phone. In various embodiments, the electromechanical transducer is driven by a signal that includes one or more pulses. A pulse, e.g., a single pulse or a complex waveform, is generated in response to each detected state, where a state refers to a particular situation identified by the phone processor. Using a known pulse is advantageous in that a known pulse generates an impulse of mechanical energy that creates a tactile sensation that simulates the feel of previous states with which the user may be familiar.

[0247] A transceiver module, phone processor, AID, input decoder, D/A 510, haptic interface module, display driver, memory, and display driver are preferably part of an electric circuit that is embodied in the circuit components, and interconnecting traces of the circuit board.

[0248] Alternatively in lieu of using the phone processor, a different electric circuit may be used to drive the electromechanical transducer in order to generate tactile feedback to the haptic points.

[0249] The haptic interface module could alternatively be a pulse generator, generating digital pulses of various widths, heights, and/or frequencies based on instructions from the phone processor. Depending on the impedance match to the electromechanical transducer and current sourcing/sinking capability, an amplifier may be needed. Alternatively, the haptic interface module could simply be a current amplifier and pulses would be generated by the phone processor itself. Another possibility is that the haptic interface module comprises multiple DACs which apply analog signals as would be the case if additional audio channels were included.

[0250] Various situations could prompt different haptic responses. For example, in a pager or cell phone, a message or call from a spouse might cause all the haptic points to vibrate, or a message or call from a boss might cause the haptic points to vibrate in a circular motion around the electronic device, or a message or call from another might cause the haptic points to vibrate repeatedly up one side of the electronic device. The use of adjacent multiple vibrators in succession as described creates a perceptual illusion of movement (known as the cutaneous rabbit).

[0251] This illusion of movement could be used to give directional information for navigation. The movement along a side, around the electronic device, back and forth, can also be used to convey information, such as to gather attention, create emphasis, and general non-verbal information. The electronic device can [illegible]

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its status, such as out of range, low battery, and busy signal. Such information may be valuable while the user is holding the electronic device to his/her ear and cannot readily see information on the screen.

[0252] The multiple localized force feedback could also be used for sensorial communication. Instead of sending a voice or text message or a picture or a data file, one could send a particular haptic pattern to other users. The pattern could represent a reminder, a certain mood (e.g., thinking of you, love you, missing you, etc.), a particular sensation, or any other user defined contents.

[0253] Computer devices are widely used for entertainment activities such as playing games. Currently, popular gaming computer devices include game consoles connected to a home television set, such as the Nintendo(R) 64 from Nintendo Corp., the Playstation(R) from Sony Corp. and the Dreamcast(TM) from Sega Corp. Gaming computer devices also include personal computers, such as Windows PCs, Macintosh computers, and others. Also, portable computer devices are often used for entertainment purposes, such as Game Boy(R) from Nintendo, personal digital assistants such as PalmPilot(R) from Palm Computing, and laptop computers.

[0254] Users of these computer devices typically interact with a game or other application program using an interface device connected to the host computer (e.g. game console). Such interface devices may include joysticks, gamepads, mice, trackballs, styluses, steering wheels, or other devices. A user moves a user manipulatable object (manipulandum), such as a joystick, wheel, mouse, button, dial, or other object, which is sensed by the host computer and used to manipulate a graphical environment displayed by the host computer. Recently, haptic feedback in interface devices has become available as well, where the host computer and/or a microprocessor on the interface device controls one or more motors to output forces to the user. These forces are correlated with events or objects in the graphical environment to further immerse the user in the gaming experience or interface task. Herein, the term "haptic feedback" is intended to include both tactile (or vibrotactile) feedback (forces transmitted to user skin surfaces) and kinesthetic feedback (forces provided in degree(s) of freedom of motion of the manipulandum).

[0255] Existing force feedback "gamepad" controllers (or add-on hardware for gamepad controllers) that are used to interface with games running on game consoles include the Dual Shock(TM) from Sony Corp., the Rumble Pak(TM) from Nintendo Corp., and the Jump Pack from Sega Corp, as well as other types of handheld controllers such as the MadCatz Dual Force Racing Wheel. These devices are inertial tactile feedback controllers which employ one or more motors to shake the housing of the controller and thus provide output forces such as vibrations to the user which are correlated to game events and interactions. Typically, an eccentric rotating mass (ERM) motor, i.e., pager motor, is used to generate vibration on the controller and thus to the user. The motor is rigidly coupled to the controller housing and provides a mass on a rotating shaft offset from the axis of rotation, so that when the shaft is rotated, the inertial forces from the moving mass rock the motor and the gamepad housing back and forth.

[0256] To replicate texture, a force-feedback device is preferably used to allow users to touch and feel computer generated objects. The sense of touch is preferably simulated using a haptic (sensory/touch) interface. A haptic interface is a force reflecting device that allows a user to touch, feel, manipulate, create, and/or alter simulated three-dimensional objects in a virtual environment. There are various known haptic interface objects, including a flat surface area interface, joystick, glove, thimble, stick or pen, exo-skeletal structures, tread-mills, fans, magnetic. Hardware employed includes DC brushless motors, potentiometers, Silicon Graphics, Inc. IRIS Indigo computers, V25 board computers, 8086 compatible micro processors, CRT displays, stereo-imaging systems, magnetic and electromagnetic components, pulleys, steel belt drive trains, VME bus, encoders, potentiometers, motor controllers, encoders, cable reducers. The required software can be any of a variety of programming languages (e.g., C, C++) that are able to work with visual modeling programs.

[0257] Currently, there is no consensus on the "best" type of interface among experts. However, an example of a known haptic interface is the "Phantom Haptic Interface" developed at MIT's Artificial Intelligence Laboratory. The "Phantom Haptic Interface," delivers precise haptic stimulation to humans at a level of fidelity and convenience previously unattainable. The device built to deliver the forces that arise in "point contacts" gives the sensation of fingertip interactions with a wide variety of objects. Requiring only three motors and three sensors to accomplish this, the device provides a computationally and mechanically tractable way to enable haptic interaction with complex virtual objects.

[0258] Haptic interfaces permit user to touch and manipulate imaginary computer-generated objects in a way that evokes a compelling sense of tactile "realness." With this technology a user at a computer terminal can touch objects that exist only in the "mind" of the computer. By transmitting the correct digital signals to a master haptic interface device at a remote user location, the master device can be used to make users feel as though they were performing a real task. In reality, users would simply be interacting through motors with a computer program.

[0259] Various embodiments are optically based, and generally uses unobtrusive specialized datum's on, or incorporated within, an object whose 3D position and/or orientation is desired to be inputted to a computer. Typically such datums are viewed with a single TV camera, or two TV cameras forming a stereo pair. A location for the camera(s) may be proximate the computer display, looking outward therefrom, or to the top or side of the human work or play space.

[0260] Retroreflective glass bead tape, or beading, such as composed of Scotchlite 7615 by 3M co., provides a point, line, or other desirably shaped datum which can be easily attached to any object desired, and which has high brightness and contrast to surroundings such as parts of a human, clothes, a room etc, when illuminated with incident light along the optical axis of the viewing optics such as that of a TV camera. This in turn allows cameras to be used in normal environments, and having fast integration times capable of capturing common motions desired, and allows datums to be distinguished easily which greatly reduces computer processing time and cost.

FIG. 14a

[0261] FIG. 14a illustrates exemplary single camera based embodiments. In this case, a user C5, desires to point at an object C6 represented electronically on the screen C7 and cause the pointing action to register in the software contained in computer C8 with respect to that object (a virtual object), in order to cause a signal to be generated to the display C7 to cause the object to activate or allow it to be moved, (e.g. with a subsequent finger motion or otherwise). He accomplishes this using a single TV camera C10 located typically on top of the screen as shown or alternatively to the side (such as C11) to determine the position of his fingertip C12 in space, and/or the pointing direction of his finger C13.

[0262] It may be desirable to use retroreflective material on the finger, e.g., as either

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temporarily attached to the finger as in jewelry or painted on the finger using retro-reflective coating "nail polish" or adhered to the finger such as with adhesive tape having a retro-reflective coating. Such coatings may include those of Scotch-lite 7615 and its equivalent that have high specific reflectivity, contrasting well to their surroundings to allow easy identification. The brightness of the reflection allows dynamic target acquisition and tracking at lowest cost.

[0263] The use of retroreflective and/or highly distinctive targets (e.g. bright orange triangles) allows reliable acquisition of the target in a general scene, and does not restrict the device to pointing on a desktop application under controlled lighting. Active (self luminous) targets such as LEDS may also allow such acquisition.

[0264] If we consider camera system C10 sitting on top of the screen C7 and looking at the user or more particularly, the user's hand, in a normal case of Internet telephony there is a relatively large field of view so that the user's face can also be seen. This same field of view can be used for various embodiments but it describes a relatively large volume. For higher precision, add-on lenses or zoom lenses on the camera may be used to increase the resolution.

[0265] Or it is possible according to various embodiments to have a plurality of cameras, one used for the Internet and the other used for the input application here described. Indeed with the ever dropping prices, the price of the actual camera including the plastic lens on the CMOS chip is so low, it is possible perhaps even to have multiple cameras with fixed magnifications, each having a separate chip!

[0266] These can easily be daisy chained with either fire wire or USB such that they can either be selected at will electronically in fact by the different magnifications or pointing directions desired.

[0267] Let us now return now to the question of determining location or orientation of a human portion such as typically a hand, or finger-in this case, a finger. In various embodiments, low cost lighting may be used. The power for the lighting, such as LEDs can generally be conveyed over the USB or 1394 bus however.

[0268] The user can also point or signal with an object such as C15 having datum C16 on it, such as a retroreflective dot C16 or line target C17.

[0269] It is possible to expand the sensing of 2D positions described above into 3, 4, 5 and 6 dimensions (x, y plus z, pitch, yaw, roll). Two sensing possibilities of the many possible, are described in various embodiments herein.
1. The first, illustrated in FIG. 14a and b is to utilize a single camera, but multiple discrete features or other targets on the object which can provide a multidegree of freedom solution. In one example, the target spacing on the object is known a priori and entered into the computer manually or automatically from software containing data about the object, or can be determined through a taught determining step.
2. The second is a dual camera solution shown in FIGS. 14c and d that does not require a priori knowledge of targets and in fact can find the 3D location of one target by itself, useful for determining finger positions for example. For 6-degree freedom of information, at least three point, targets are required, although line targets, and combinations of lines and points can also be used.

[0272] FIG. 14b illustrates a 3-D (3 Dimensional) sensing embodiment using single camera stereo with 3 or more datums on a sensed object, or in another example, the wrist of the user.

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[0273] As shown the user holds in his right hand C29, object C30 which has at least 3 visible datums C32, C33, and C34 which are viewed by TV camera C40 whose signal is processed by computer C41 which also controls projection display C42. TV camera C40 also views 3 other datums C45, C46 and C47, on the wrist C48 of the users left hand, in order to determine its orientation or rough direction of pointing of the left hand C51, or its position relative to object C30, or any other data (e.g. relation to the screen position or other location related to the mounting position of the TV camera, or to the users head if viewed, or what ever. The position and orientation of the object and hand can be determined from the 3 point positions in the camera image using known photogrammetric equations (see Pinckney, reference U.S. Pat. No. 4,219,847 and other references in papers referenced).

[0274] Alternatively to the 3 discrete point target, a colored triangular target for example can be used in which the intersections of lines fitted to its sides define the target datums, as discussed below.

[0275] It is also possible to use the camera C40 to see other things of interest as well. For the direction of pointing of the user at an object C55 represented on display C42 is determine for example datum C50 on finger C52 of users left hand C51 (whose wrist position and attitude can be also determined).

[0276] Alternatively, the finger can be detected just from its general gray level image, and can be easily identified in relation to the targeted wrist location (especially if the user, as shown, has clenched his other fingers such that the finger C52 is the only one extended on that hand).

[0277] The computer can process the gray level image using known techniques, for example blob and other algorithms packaged with the Matrox brand Genesis image processing board for the PC, and determine the pointing direction of the finger using the knowledge of the wrist gained from the datums. This allows the left hand finger C50 to alternatively point at a point (or touch a point) to be determined on the object C30 held in the right hand as well.

FIG. 14c

[0278] FIG. 14c illustrates another version of the embodiments of FIGS. 14a and 14b, in which two camera "binocular" stereo cameras C60 and C61 processed by computer C64 are used to image artificial target (in this case a triangle, see also FIG. 2), C65, on the end of pencil C66, and optionally to improve pointing resolution, target C67 on the tip end of the pencil, typically a known small distance from the tip (the user and his hand holding the pencil is not shown for clarity. This imaging allows one to track the pencil tip position in order to determine where on the paper (or TV screen, in the case of a touch screen) the pencil is contacting.

[0279] It may be desirable to have independently controllable near coaxial light sources C62 and C63 are shown controlled by computer C64 to provide illumination of retroreflective targets for each camera independently. This is because at different approach angles the retroreflector reflects differently, and since the cameras are often angularly spaced (e.g. by non-zero angle A), they do not see a target the same.

[0280] Numerous other camera arrangements, processing, computation, and other issues are discussed in general relative to accurate determination of object positions using two or more camera stereo vision systems in the S.F. El Hakim paper [illegible]

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above and the additional references referred to therein.

[0281] The computer can also acquire the stereo image of the paper and the targets in its four corners, C71-C74. Solution of the photogrammetric equation allows the position of the paper in space relative to the cameras to be determined, and thence the position of the pencil, and particularly its tip, to the paper, which is passed to display means C75 or another computer program. Even with out the target on the end, the pointing direction can be determined from target C65 and knowing the length of the pencil the tip position calculated.

[0282] A line target C76 can also be useful on the pencil, or a plurality of line targets spaced circumferentially, can also be of use in defining the pencil pointing direction from the stereo image pair.

[0283] A working volume of the measurement system is shown in dotted lines C79-that is the region on and above the desk top in this case where the sensor system can operate effectively. Typically this is more than satisfactory for the work at hand. It is noted that due to possible compound inclination of the cameras, and other geometric considerations, the effective working volume for any given accuracy or resolution criteria, does not necessarily have parallel sides.

[0284] It is noted that the dual (Stereo pair) camera system of FIG. 14 has been extensively tested and can provide highly accurate position and orientation information in up to 6 degrees of freedom. One particular version using commercial CCD Black and white cameras and a Matrox "Genesis" framegrabber and image processing board, and suitable stereo photogrammetry software running in an Intel Pentium 300 MHZ based computer, has characteristics well suited to input from a large desktop CAD station for example. This provides 30 Hz updates of all 6 axes (x y z roll pitch and yaw) data over a working volume of 0.5 meter*0.5 meter in x and y (the desktop, where cameras are directly overhead pointing down at the desk) and 0.35 meters in z above the desk, all to an accuracy of 0.1 mm or better, when used with clearly visible round retroreflective (scotchlite 7615 based) datums approx. 5-15 mm in diameter on an object for example. This may be accurate enough for precision tasks such as designing objects in 3D cad systems.

[0285] The cameras in this example are mounted overhead. If mounted to the side or front, or at an angle such as 45 degrees to the desktop, the z axis becomes the direction outward from the cameras.

[0286] FIG. 14c additionally illustrates 2 camera stereo arrangement, used in this case to determine the position and orientation of an object having a line target, and a datum on a portion of the user. Here, cameras C60 and C61 are positioned to view a retro-reflective line target C80 in this case running part of the length of a toy sword blade C81. The line target in this case is made as part of the plastic sword, and is formed of molded in corner cube reflectors similar to those in a tail light reflector on a car. It may also be made to be one unique color relative to the rest of the sword, and the combination of the two gives an unmistakable indication.

[0287] There are typically no other bright lines in any typical image when viewed retroreflectively. This also illustrates how target shape (i.e. a line) can be used to discriminate against unwanted other glints and reflections which might comprise a few bright pixels worth in the image. It is noted that a line type of target can be cylindrical in shape if wrapped around a cylindrical object, which can be viewed then from multiple angles.

[0288] Matching of the two camera images and solution of the photogrammetric equations gives the line target pointing direction. If an additional point is used, such as C82 the full 6 degree of freedom solution of the sword is available. Also shown here is yet another point, C83, which serves two purposes, in that it allows an improved photogrammetric solution, and it serves as a redundant target in case C82 cant be seen, due to obscuration, obliteration, or what have you.

[0289] This data is calculated in computer C64, and used to modify a display on screen C75 as desired.

[0290] In one embodiment a matrox genesis frame processor card on an IBM 300 mhz PC was used to read both cameras, and process the information at the camera frame rate of 30 HZ. Such line targets are very useful on sleeves of clothing, seams of gloves for pointing, rims of hats, and other decorative and practical purposes for example for example outlining the edges of objects or portions thereof, such as holes and openings.

[0291] Typically the cameras C60 and C61 have magnifications and fields of view which are equal, and overlap in the volume of measurement desired. The axes of the cameras can be parallel, but for operation at ranges of a few meters or less, are often inclined at an acute angle A with respect to each other, so as to increase the overlap of their field of view-particularly if larger baseline distances d are used for increased accuracy (albeit with less z range capability.). For example for a cad drawing application, A can be 30-45 degrees, with a base line of 0.5 to 1 meter. Where as for a video game such as FIG. 5, where z range could be 5 meters or more, the angle A and the base line would be less, to allow a larger range of action.

Data Base

[0292] The datums on an object can be known a priori relative to other points on the object, and to other datums, by selling or other wise providing the object designed with such knowledge to a user and including with it a CD ROM disc or other computer interfacable storage medium having this data. Alternatively, the user or someone, can teach the computer system this information. This is particularly useful when the datums are applied by the user on arbitrary objects.

FIG. 14d

[0293] Illustrated here are steps used in various embodiments relating to detection of a single point to make a command, in this case; the position (or change of position, i.e. movement) of a finger tip having retroreflective target attached detected by a stereo pair of TV cameras using detection algorithm which in its simplest case is based on thresholding the image to see only the bright target indication from the finger (and optionally, any object associated therewith such as a screen to be touched for example).

[0294] If this is insufficient to unambiguously defined the datum on the finger, added algorithms may be employed which are themselves known in the art (many of which are commonly packaged with image analysis frame grabber boards such as the matrox genesis. The processes can include, for example:
a brightness detection step relative to surroundings, or to immediate surroundings (contrast);
a shape detection step, in which a search for a shape is made, such as a circle, ring, triangle, etc.;

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a color detection step, where a search for a specific color is made;
a movement step, wherein only target candidates which have moved from a location in a previous TV image are viewed.

[0299] Each step, may process only those passing the previous step, or each may be performed independently, and the results compared later. The orders of these steps can be changed but each adds to further identify the valid indication of the finger target.

[0300] Next the position of the targeted finger is determined by comparing the difference in location of the finger target in the two camera images of the stereo pair. There is no matching problem in this case, as a single target is used, which appears as only one found point in each image.

[0301] After the Image of finger (or other tool) tip is found, its location is computed relative to the screen or paper, and this data is inputted to the computer controlling the display to modify same, for example the position of a drawing line, an icon, or to determine a vector of movement on the screen.

Motion Detection.

[0302] The computer 8 can be used to analyze incoming TV image based signals and determine which points are moving in the image This is helpful to eliminate background data which is stationary, since often times only moving items such as a hand or object are of interest. In addition, the direction of movement is in many cases the answer desired or even the fact that a movement occurred at all.

[0303] A simple way to determine this is to subtract an image of retroreflective targets of high contrast from a first image-and just determine which parts are different-essentially representing movement of the points. Small changes in lighting or other effects are not registered. There are clearly more sophisticated algorithms as well.

[0304] Motion pre processing is useful when target contrast is not very high, as it allows one to get rid of extraneous regions and concentrate all target identification and measurement processing on the real target items.

[0305] Such processing is also useful when two camera stereo is used, as only moving points are considered in image matching-a problem when there are lots of points in the field.

[0306] Can it be assumed that the object is moving? The answer is yes if it's a game or many other activities. However there may be a speed of movement of issue. Probably frame to frame is the criteria, in a game, namely 30 Hz for a typical camera. However, in some cases movement might be defined as something much slower-e.g. 3 Hz. for a CAD system input using deliberate motion of a designer.

[0307] Once the moving datum is identified, then the range can be determined and if the object is then tracked even if not moving from that point onward, the range measurement gives a good way to lock onto the object using more than just 2 dimensions.

[0308] One might actually use an artificial movement of the target if one doesn't naturally exist. This could be done by causing it to vibrate. If one or more LEDs is used as a target, they can be made to blink, which also shows up in an image subtraction (image with led on, vs. image with led off). The same is true of a [illegible] target.

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color, showing up in subtraction of color images.

[0309] Image subtraction or other computer processing operations can also be useful in another sense. One can also subtract background, energizing the retroreflective illumination light with no retroreflective targets present, and then with them. One idea is simply to take a picture of a room or other work space, and then bring in the targeted object. That would seem pretty simple to subtract or whatever. And the net result is that any bright features in the space which are not of concern, such as bright door knobs, glasses, etc are eliminated from consideration.

[0310] This can also be done with colored targets, doing a color based image subtract-especially useful when one knows the desired colors a priori (as one would, or could, via a teach mode).
A flow chart is shown in FIG. 14d illustrating the steps as follows:
A. Acquire images of stereo pair;
B. Optionally preprocess images to determine if motion is present. If so, pass to next step otherwise do not or do anyway (as desired);
C. Threshold images;
D. If light insufficient, change light or other light gathering parameter such as integration time;
E. Identify target(S);
F. If not identifiable, add other processing steps such as a screen for target color, shape, or size;
G. Determine centroid or other characteristic of target point (in this case a retro dot on finger);
H. Perform auxiliary matching step if required;
I. Compare location in stereo pair to determine range z and x y location of target(s);
J. Auxiliary step of determining location of targets on screen if screen position not known to computer program. Determine via targets on screen housing or projected on to screen for example;
K. Determine location of target relative to screen;
L. Determine point in display program indicated;
M. Modify display and program as desired.

FIG. 14e

[0324] The following is a multi-degree of freedom image processing description of a triangular shaped color target (disclosed itself in several embodiments herein) which can be found optically using one or more cameras to obtain the 3 dimensional location and orientation of the target using a computer based method described below. It uses color processing to advantage, as well as a large number of pixels for highest resolution, and is best for targets that are defined by a large number of pixels in the image plane, typically because the target is large, or the cameras are close to the target, or the camera field is composed of a very large number of pixels.

[0325] The method is simple but unique in that it can be applied 1) in a variety of degrees to increase the accuracy (albeit at the expense of speed), 2) with 1 or more cameras (more cameras increase accuracy), 3) it can utilize the combination of the targets colors and triangles, (1 or more) to identify the tool or object. It utilizes the edges of the triangles to obtain accurate subpixel accuracy. A triangle edge can even have a gentle curve and the method will still function well. Other geometric shapes can also be processed similarly in some cases.

[0326] The method is based on accurately finding the 3 vertices of each triangle in the camera field by accurately defining the edges and then computing the intersection of these edge curves. This is generally more accurate, than finding 3 or 4 points from spot centroids. However, the choice of which to use, often comes down to which is more pleasing to the consumer, or more rugged and reliable in use.

[0327] The preferred implementation uses 1 or more color cameras to capture a target composed of a brightly colored right triangle on a rectangle of different brightly colored background material. The background color and the triangle color must be two colors that are easily distinguished from the rest of the image. For purposes of exposition we will describe the background color as a bright orange and the triangle as aqua.

[0328] By using the differences between the background color and the triangle color, the vertices of the triangle can be found very accurately. If there are more than one triangle on a target, a weighted average of location and orientation information can be used to increase accuracy.

[0329] The method starts searching for a pixel with the color of the background or of the triangle beginning with the pixel location of the center of the triangle from the last frame. Once a pixel with the triangle "aqua" color is found, the program marches in four opposite directions until each march detects a color change indicative of an edge dividing the triangle and the "orange" background. Next, the method extends the edges to define three edge lines of the triangle with a least squares method. The intersection points of the resulting three lines are found, and serve as rough estimates of the triangle vertices. These can serve as input for applications that don't require high accuracy.

[0330] If better accuracy is desired, these provisional lines are then used as a starting point for the subpixel refinement process. Each of these 3 lines is checked to see if it is mainly horizontal. If a line is mainly horizontal, then a new line will be determined by fitting a best fit of a curve through the pixel in each column that straddles the provisional line. If a line is mainly vertical, then the same process proceeds on rows of pixels.

[0331] The color of each pixel crossed by a line is translated into a corresponding numeric value. A completely aqua pixel is would receive the value 0, while a completely orange pixel would receive the value 1. All other colors produce a number between 0 and 1, based on their relative amounts of aqua and orange. This numeric value, V, assigned to a pixel is a weighted average of the color components (such as the R, G, B values) of the pixel. If the components of the calibrated aqua are AR, AG, AB and those of orange are OR, OG, OB, and the pixel components are PR, PG, PB, then the numeric value V is:
V=WR*CR+WG*CG+WB*CB
With WR, WG, WB being weighting constants between 0 and 1 and CR is defined as:
The same process can be used to define CG and CB.
This value V is compared with the ideal value U which is equal to the percentage of orangeness calculated assuming the angle of the provisional line is the same as that of the ideal line. For example, a pixel which is crossed by the line in the exact middle would have a U of 0.5, since it is 50% aqua and 50% orange. A fit of U-V in the column (or row) in the vicinity of the crossing of the provisional line gives a new estimate of the location of the true edge crossing. Finally, the set of these crossing points can be fit with a line or gentle curve for each of the three edges and the 3 vertices can be computed from the intersections of these lines or curves.

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[0334] We can now use these three accurate vertices in the camera plane (F0,G0,F1,G1,F2,G2) together with lens formula (here we will use the simple lens formula for brevity) to relate the x and y of the target to F and G

F=.lambda.X/Z; G=.lambda.Y/Z

.lambda. is the focal length and z is the perpendicular distance from the lens to a location on the target. A triangle on the target is initially defined as lying in a plane parallel to the lens plane. The preferred configuration has one right triangle whose right angle is defined at x0, y0, z0 with one edge (of length A) extending along the direction of the F axis of the camera and with the other edge (of length B) extending along the direction of the G axis of the camera. The actual target orientation is related to this orientation with the use of Euler Angles .phi., .theta., psi. Together with the lens equations and the Euler equations, the 6 derived data values of the 3 vertices (F0,G0,F1,G1,F2,G2) can be used to define 6 values of location and orientation of the target. The location and orientation of a point of interest on any tool or object rigidly attached to this target can be easily computed from calibration data and ordinary translation and rotation transformations. Refinements to handle lens distortions can be handled by forming a correction function with calibration data that modifies the locations of the F and G data. The Euler formulation is nonlinear. We linearize the equations by assuming initially that the angles have not changed much since the last video frame. Thus we replace .phi. with .phi. (old)+U1., .theta. with .theta.(old)+U2, .psi. with .psi.(old)+U3, and z0 with z0(old)+U4 or:

.phi.=.phi.+U1

.theta.=.theta.+U2

.psi.=.psi.+U3

z0=z0+U4

Substituting these into the Euler equations and applying the lens formulas leads to a matrix equation

SU=R

that can be solved for the U values with a standard methods such as Gauss Jordan routine. The angles and z0 can be updated iteratively until convergence is achieved. The coefficients of the matrix are defined as:

s11=-A(cos(.phi.)(F1/.lambda. cos(.psi.)+sin(.psi.))-sin(.phi.)cos(.theta.)(F1/.lambda. sin(.psi.)-cos(.psi.)))

s12=A sin(.theta.)cos(.phi.)(F1/.lambda. sin(.psi.)-cos(.psi.)

s13=A(sin(.phi.)(F1/.lambda. sin(.psi.)-cos(.psi.))-cos(.phi.)cos(-.theta.)(F1/.lambda. cos(.psi.)-sin(.psi.)))

s14=(F0-F1)/.lambda.

s21=A(G1/.lambda.(-cos(.phi.)*cos(.psi.)+sin(.phi.)sin(.psi.)cos(.theta.))+sin(.theta.)sin(.phi.))

s22=A cos(.phi.)(G1/.lambda. sin(.theta.)sin(.psi.)-cos(.theta.))

s23=G1/.lambda.A(sin(.psi.)sin(.phi.)-cos(.psi.)cos(.theta.)cos(.p-hi.))

s24=(G0-G1)/.lambda.

s31=0

s32=-B cos(.theta.)(F2/.lambda. sin(.psi.)-cos(.psi.))

s33=-B sin(.theta.)(F2/.lambda. cos(.psi.)+sin(.psi.))

s34=(F0-F2)/.lambda.

s41=0

s42=-B(G2/.lambda. sin(.psi.)cos(.theta.)+sin(.theta.))

s43=-BG2/.lambda. sin(.theta.)cos(.psi.)

s44=(G0-G2)/.lambda.

and the right hand side vector is defined as:

r1=(F1-F0)z0/.lambda.+A(F1/.lambda.(cos(.psi.)sin(.phi.)+cos(.thet-a.)cos(.phi.)sin(.psi.))+sin(.psi.)sin(.psi.)-cos(.theta.)cos(.phi.)cos(-psi.))

r2=(G1-G0)z0/.lambda.+A(G1/.lambda.

(cos(.psi.)sin(.phi.)+cos(.theta.)cos(.phi.)sin(.psi.))+sin(.theta.) cos(.phi.))
r3=(F2-F0)z0/.lambda.+B sin(.theta.)(F2/.lambda. sin(.psi.)-cos(.psi.))
r4=(G2-G0)z0/.lambda.+B(G2/.lambda. sin(.theta.)sin(.psi.)-cos(.theta.))
After convergence the remaining parameters x0 and y0 are defined from the equations:
x0=F0z0/.lambda.
Y0=G0z0/.lambda.
The transition of pronounced colors can yield considerably more information than a black white transition, and is useful for the purpose of accurately calculating position and orientation of an object. As color cameras and high capacity processors become inexpensive, the added information provided can be accessed at virtually no added cost. And very importantly, in many cases color transitions are more pleasing to look at for the user than stark black and white. In addition the color can be varied within the target to create additional opportunities for statistically enhancing the resolution with which the target can be found.

Problems in 3Dimensional Input to Computers

[0335] Today, input to a computer for Three Dimensional (3D) information is often painstakingly done with a 2 Dimensional device such as a mouse or similar device. This artifice, both for the human, and for the program and its interaction with the human is un-natural, and CAD designers working with 3D design systems require many years of experience to master the skills needed for efficient design using same.

[0336] A similar situation exists with the very popular computer video games, which are becoming ever more 3 Dimensional in content and graphic imagery, but with similar limitations. These games too heretofore have not been natural for the player(s).

[0337] "Virtual reality" too requires 3D inputs for head tracking, movement of body parts and the like. This has lead to the development of a further area of sensor capability which has resulted in some solutions which are either cumbersome for the user, expensive, or both.

[0338] The limits of computer input in 3D have also restricted the use of natural type situations for teaching, simulation in medicine, and the like. It further limits young children, older citizens, and disabled persons from benefiting from computer aided living and work.

[0339] Another aspect is digitization of object shapes. There are times that one would like to take a plastic model or a real world part as a starting point for a 3D design.

[0340] We propose one single inexpensive device that can give all of this control and also act as a drawing pad, or input a 3D sculptured forms or even allow the user to use real clay that as she sculptures it the computer records the new shape.

[0341] Various embodiments relate physical activities and physical objects directly to computer instructions. A novice user can design a house with a collection of targeted model or "toy" doors, windows, walls etc. By touching the appropriate toy component and then moving and rotating the user's hand she can place the component at the appropriate position. The user can either get his or her visual cue by looking at the position of the toy on the desk or by watching the corresponding scaled view on the computer display. Many other embodiments are also possible.

Object Tracking

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[0342] In one general aspect, a method of tracking an object of interest is disclosed. The method includes acquiring a first image and a second image representing different viewpoints of the object of interest, and processing the first image into a first image data set and the second image into a second image data set. The method further includes processing the first image data set and the second image data set to generate a background data set associated with a background, and generating a first difference map by determining differences between the first image data set and the background data set, and a second difference map by determining differences between the second image data set and the background data set. The method also includes detecting a first relative position of the object of interest in the first difference map and a second relative position of the object of interest in the second difference map, and producing an absolute position of the object of interest from the first and second relative positions of the object of interest.

[0343] The step of processing the first image into the first image data set and the second image into the second image data set may include determining an active image region for each of the first and second images, and extracting an active image data set from the first and second images contained within the active image region. The step of extracting the active image data set may include one or more techniques of cropping the first and second images, rotating the first and second images, or shearing the first and second images.

[0344] In one implementation, the step of extracting the active image data set may include arranging the active image data set into an image pixel array having rows and columns. The step of extracting further may include identifying the maximum pixel value within each column of the image pixel array, and generating data sets having one row wherein the identified maximum pixel value for each column represents that column.

[0345] Processing the first image into a first image data set and the second image into a second image data set also may include filtering the first and second images. Filtering may include extracting the edges in the first and second images. Filtering further may include processing the first image data set and the second image data set to emphasize differences between the first image data set and the background data set, and to emphasize differences between the second image data set and the background data set.

[0346] Processing the first image data set and the second image data set to generate the background data set may include generating a first set of one or more background data sets associated with the first image data set, and generating a second set of one or more background data sets associated with the second image data set.

[0347] Generating the first set of one or more background data sets may include generating a first background set representing a maximum value of data within the first image data set representative of the background, and generating the second set of one or more background data sets includes generating a second background set representing a maximum value of data within the second image data set representative of the background. Generating further may include, for the first and second background sets representing the maximum value of data representative of the background, increasing the values contained within the first and second background sets by a predetermined value.

[0348] Generating the first set of one or more background data sets may include generating a first background set representing a minimum value of data within the image data set representative of the background, and generating the second set of one or more background data sets may include generating a second background set representing a minimum value of data within the second image data set representative of the background. Generating further may include, for the first and second background sets representing the minimum value of data representative of the background, decreasing the values contained within the first and second background sets by a predetermined value.

[0349] Generating the first set of background data sets may include sampling the first image data set, and generating the second set of background data sets may include sampling the second image data set. Sampling may occur automatically at predefined time intervals, where each sample may include data that is not associated with the background.

[0350] Generating the first set of one or more background data sets may include maintaining multiple samples of the first image data set within each background data set, and generating the second set of one or more background data sets may include maintaining multiple samples of the second image data set within each background data set.

[0351] Generating each first background data set may include selecting from the multiple samples one value that is representative of the background for each element within the first image data set, and generating each second background data set may include selecting from the multiple samples one value that is representative of the background for each element within the second image data set. Selecting may include selecting the median value from all sample values in each of the background data sets.

[0352] In other implementations, generating may include comparing the first image data set to a subset of the background data set, and comparing the second image data set to a subset of the background data set.

[0353] In other implementations generating a first difference map further may include representing each element in the first image data set as one of two states, and generating a second difference map further may include representing each element in the second image data set as one of two states, where the two states represent whether the value is consistent with the background.

[0354] In still other implementations, detecting may include identifying a cluster in each of the first and second difference maps, where each cluster has elements whose state within its associated difference map indicates that the elements are inconsistent with the background.

[0355] Identifying the cluster further may include reducing the difference map to one row by counting the elements within a column that are inconsistent with the background. Identifying the cluster further may include identifying the column as being within the cluster and classifying nearby columns as being within the cluster. Identifying the column as being within the cluster also may include identifying the median column.

[0356] Identifying the cluster further may include identifying a position associated with the cluster. Identifying the position associated with the cluster may include calculating the weighted mean of elements within the cluster.

[0357] Detecting further may include classifying the cluster as the object of interest. Classifying the cluster further may include counting the elements within the cluster and

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classifying the cluster as the object of interest only if that count exceeds a predefined threshold. Classifying the cluster further may include counting the elements within the cluster and counting a total number of elements classified as inconsistent within the background within the difference map, and classifying the cluster as the object of interest only if the ratio of the count of elements within the cluster over the total number of elements exceeds a predefined threshold.

[0358] The step of detecting further may include identifying a sub-cluster within the cluster that represents a pointing end of the object of interest and identifying a position of the sub-cluster.

[0359] In the above implementations, the object of interest may be a user's hand, and the method may include controlling an application program using the absolute position of the object of interest.

[0360] The above implementations further may include acquiring a third image and a fourth image representing different viewpoints of the object of interest, processing the third image into a third image data set and the fourth image into a fourth image data set, and processing the third image data set and the fourth image data set to generate the background data set associated with the background. The method also may include generating a third difference map by determining differences between the third image data set and the background data set, and a fourth difference map by determining differences between the fourth image data set and the background data set, and detecting a third relative position of the object of interest in the third difference map and a fourth relative position of the object of interest in the fourth difference map. The absolute position of the object of interest may be produced from the first, second, third and fourth relative positions of the object of interest.

[0361] As part of this implementation, the object of interest may be a user's hand, and also may include controlling an application program using the absolute position of the object of interest.

[0362] In another aspect, a method of tracking an object of interest controlled by a user to interface with a computer is disclosed. The method includes acquiring images from at least two viewpoints, processing the acquired images to produce an image data set for each acquired image, and comparing each image data set to one or more background data sets to produce a difference map for each acquired image. The method also includes detecting a relative position of an object of interest within each difference map, producing an absolute position of the object of interest from the relative positions of the object of interest, and using the absolute position to allow the user to interact with a computer application.

[0363] Additionally, this method may include mapping the absolute position of the object of interest to screen coordinates associated with the computer application, and using the mapped position to interface with the computer application. This method also may include recognizing a gesture associated with the object of interest by analyzing changes in the absolute position of the object of interest, and combining the absolute position and the gesture to interface with the computer application.

[0364] In another aspect, a multiple camera tracking system for interfacing with an application program running on a computer is disclosed. The multiple camera tracking system includes two or more video cameras arranged to provide different viewpoints of a region of interest and are operable to produce a series of video images. A processor is operable to receive the series of video images and detect objects appearing in the region of interest. The processor executes a process to generate a background data set from the video images, generate an image data set for each received video image and compare each image data set to the background data set to produce a difference map for each image data set, detect a relative position of an object of interest within each difference map, and produce an absolute position of the object of interest from the relative positions of the object of interest and map the absolute position to a position indicator associated with the application program.

[0365] In the above implementation, the object of interest may be a human hand. Additionally, the region of interest may be defined to be in front of a video display associated with the computer. The processor may be operable to map the absolute position of the object of interest to the position indicator such that the location of the position indicator on the video display is aligned with the object of interest.

[0366] The region of interest may be defined to be any distance in front of a video display associated with the computer, and the processor may be operable to map the absolute position of the object of interest to the position indicator such that the location of the position indicator on the video display is aligned to a position pointed to by the object of interest. Alternatively, the region of interest may be defined to be any distance in front of a video display associated with the computer, and the processor may be operable to map the absolute position of the object of interest to the position indicator such that movements of the object of interest are scaled to larger movements of the location of the position indicator on the video display.

[0367] The processor may be configured to emulate a computer mouse function. This may include configuring the processor to emulate controlling buttons of a computer mouse using gestures derived from the motion of the object of interest. A sustained position of the object of interest for a predetermined time period may trigger a selection action within the application program.

[0368] The processor may be configured to emulate controlling buttons of a computer mouse based on a sustained position of the object of interest for a predetermined time period. Sustaining a position of the object of interest within the bounds of an interactive display region for a predetermined time period may trigger a selection action within the application program.

[0369] The processor may be configured to emulate controlling buttons of a computer mouse based on a sustained position of the position indicator within the bounds of an interactive display region for a predetermined time period.

[0370] In the above aspects, the background data set may include data points representing at least a portion of a stationary structure. In this implementation, at least a portion of the stationary structure may include a patterned surface that is visible to the video cameras. The stationary structure may be a window frame. Alternatively, the stationary structure may include a strip of light.

[0371] In another aspect, a multiple camera tracking system for interfacing with an application program running on a computer is disclosed. The system includes two or more video cameras arranged to provide different viewpoints of a region of interest and are operable to produce a series of video images. A processor is operable to receive the series of video images and detect objects appearing in the region of interest. The processor executes a process to generate a background data set from the video images, generate an image data set for each received video image, compare each image data set to the background data set to produce a difference map for each image data set, detect a relative position of an object of interest within each difference map, produce an absolute position of the object of interest from the relative positions of the object of interest, define sub regions within the region of interest, identify a sub region occupied by the object of interest, associate an action with the identified sub region that is activated when the object of interest occupies the identified sub region, and apply the action to interface with the application program.

[0372] In the above implementation, the object of interest may be a human hand. Additionally, the action associated with the identified sub region may emulate the activation of keys of a keyboard associated with the application program. In a related implementation, sustaining a position of the object of interest in any sub region for a predetermined time period may trigger the action.

[0373] The details of one or more implementations are set forth in the accompanying drawings and the description below.

[0374] FIG. 15 shows a multicamera motion tracking and control system D100 interfaced with an image viewing system. In this implementation two cameras D101 and D102 scan a region of interest D103. A controlled or known background D104 surrounds the region of interest D103. An object of interest D105 is tracked by the system when it enters the region of interest D103. The object of interest D105 may be any generic object inserted into the region of interest D103, and is typically a hand or finger of a system user. The object of interest D105 also may be a selection device such as a pointer.

[0375] The series of video images acquired from the cameras D101 and D102 are conveyed to a computing device or image processor D106. In this implementation, the computing device is a general-purpose computer that runs additional software that provides feedback to the user on a video display D107.

[0376] FIG. 16A illustrates a typical implementation of the multicamera control system D100. The two cameras D101 and D102 are positioned outside of the region of interest D103. The cameras are oriented so that the intersection D204 of their field of views (D205 for camera D101, D206 for camera D102) completely encompasses the region of interest D103. The orientation is such that the cameras D101, D102 are rotated on axes that are approximately parallel. In this example, a floor or window ledge and sidewalls provide a controlled background D104 having distinct edges. The corresponding view captured by camera D101 is shown in FIG. 16B. While not shown, it should be understood that the view captured by camera D102 is a mirror image of the view captured by camera D101. The controlled background D104 may not cover the camera's entire field of view D205. For each camera, an active image region D208 is found that is entirely contained within the controlled background D104, and also contains the entire region of interest D103. The background D104 is controlled so that a characteristic of the background can be modeled, and the object of interest D105, either in part or in whole, differs from the background D104 in that characteristic. When the object of interest D105 appears within the region of interest D103, the object 105 will occlude a portion of the controlled background D104 within the active image region D208 of each camera D101, D102. In the location of the occlusion, either as a whole or in parts, the captured images will, in terms of the selected characteristic, be inconsistent with the model of the controlled background D104.

[0377] In summary, the object of interest D105 is identified and, if found, its position within the active image region D208 of both cameras is calculated. Using the position data of each camera D101, D102, as well as the positions of the cameras the region of interest D103, and parameters describing the cameras, the position of the object of interest D105 within the region of interest D103 is calculated.

[0378] The processes performed by the image processor D106 (FIG. 15), which may be implemented through a software process, or alternatively through hardware, are generally shown in FIG. 17. The camera images are simultaneously conveyed from the cameras D101, D102 and captured by image acquisition modules D304, D305 (respectively) into image buffers D306, D307 (respectively) within the image processor D106. Image detection modules D308, D309 independently detect the object of interest D105 in each image, and determine its position relative to the camera view. The relative position information D310, D311 from both camera views is combined by a combination module D312 and optionally refined by a position refinement module D313, to determine at block D314, the global presence and position of the object of interest D105 within the region of interest D103. Optionally, specific gestures performed by the user may be detected in a gesture detection module D315. The results of the gesture detection process are then conveyed to another process or application D316, either on the same image processor D106 or to another processing device. The process of gesture detection is described in greater detail below.

[0379] Image detection modules D308 and D309 are identical in the processes that they execute. An implementation of these image detection modules D308, D309 is shown in FIG. 18. In block D402, the image processor D106 extracts, from the captured image data stored in the image buffers D306 or D307, the image data that corresponds to the active image region D208 (of FIG. 16B). The image may be filtered in a filtering process D403 to emphasize or extract the aspects or characteristics of the image where the background D104 and object of interest D105 differ, but are otherwise invariant within the background D104 over time. In some implementations, the data representing the active image region may also be reduced by a scaling module D404 in order to reduce the amount of computations required in later processing steps. Using the resulting data, the background D104 is modeled by one or more instances of a background model process at block D405 to produce one or more descriptions represented as background model data 406 of the controlled background D104. Therefore the background D104 is modeled in terms of the desired aspects or characteristics of the image. The background model(s) D406 are converted into a set of criteria in process D407. In a comparison process D408, the filtered (from process D403) and/or reduced (from module D404) image data is compared to those criteria (from process D407), and the locations where the current data is inconsistent with the background model data D406, that is where the criteria is not satisfied, are stored in an image or difference map D409. In detection module D410, the difference map D409 is analyzed to determine if any such inconsistencies qualify as a possible indication of an object of interest D105 and, if these criteria are satisfied, its position within the camera view (D205 or D206) is determined. The position of the object 105 may be further refined (optionally) at block D411, which produces a camera-relative presence and position output D310 or D311 associated with the object of interest D105 (as described above with respect to FIG. 17).

[0380] In block D402 of FIG. 18, image processor D106 extracts the image data that corresponds to the active image region D208 (of FIG. 16B). The image data may be extracted by cropping, shearing, rotating, or otherwise transforming the captured image data. Cropping extracts only the portion of the overall image that is within the active image region D208. Bounds are defined, and any pixels inside the bounds are copied, unmodified, to a new buffer, while pixels outside of the bounds are ignored. The active image region D208 may be of arbitrary shape. Shearing and rotation reorder the data into an order that is more convenient for further processing, such as a rectangular shape so that it may be addressed in terms of rows and columns of pixels.

[0381] Rotation causes the contents of an image to appear as if the image has been rotated. Rotation reorders the position of pixels from (x,y) to (x',y') according to the following equation: ".times. .times..theta..times. .times..theta..times. .times..theta..times. .times..theta..function. ##EQU00001## where .theta. is the angle that the image is to be rotated.

[0382] If the cameras D101 and D102 are correctly mounted with respect to the region of interest D103, the desired angle of rotation will typically be small. If the desired angle of rotation is small, shearing may be used to provide an approximation that is computationally simpler than rotation. Shearing distorts the shape of an image such that the transformed shape appears as if the rows and columns have been caused to slide over and under each other. Shearing reorders the position of pixels according to the following equations: ".function..times. .times..times. ".function..times. ##EQU00002## where sh.sub.x represents the amount of horizontal shear within the image, and sh.sub.y represents the amount of vertical shear within the image.

[0383] An implementation of the multicamera control system D100 applies in scenarios where the object of interest D105, either in whole or in part, is likely to have either higher or lower luminance than the controlled background D104. For example, the background D104 may be illuminated to create this scenario. A filtering block D403 passes through the luminance information associated with the image data. A single background model D406 represents the expected luminance of the background D104. In practice, the luminance of the controlled background D104 may vary within the active image region D208, therefore the background model D406 may store the value of the expected luminance for every pixel within the active image region D208. The comparison criteria generation process D407 accounts for signal noise (above that which may be accounted for within the background model) and minor variability of the luminance of the controlled background D104 by modifying each luminance value from the background model D406, thus producing the minimal luminance value that may be classified as being consistent with the background model D406. For example, if the luminance of the controlled background D104 is higher than the luminance of the object of interest D105, then processes block D407 decreases the luminance value of each pixel by an amount greater than the expected magnitude of signal noise and variability of luminance.

[0384] In some implementations of system D100, the region of interest D103 is sufficiently narrow such that it may to be modeled as a region of a plane. The orientation of that plane is parallel to the front and rear faces of the dotted cube that represents the region of interest D103 in FIG. 15. The active image region D208 may be reduced to a single row of pixels in the optional scaling module D404 if two conditions are satisfied: 1) the object of interest D105, when it is to be detected, will occlude the background D104 in all rows of some columns of the active image region D208, and 2) a single set of values in the background model D406 sufficiently characterizes an entire column of pixels in the active image region D208. The first condition is usually satisfied if the active image region D208 is thinner than the object of interest D105. The second condition is satisfied by the implementation of blocks D403, D405, D406 and D407 described above. Application of the scaling module D404reduces the complexity of processing that is required to be performed in later processes, as well as reducing the storage requirements of the background model(s) D406.

[0385] The particular implementation of the scaling module D404 depends on the specifics of processing blocks D403, D405, D406 and D407. If the luminance of the controlled background D104 is expected to be higher than that of the object of interest D105, as described above, one implementation of the scaling module D404 is to represent each column by the luminance of greatest magnitude within that column. That is to say, for each column, the highest value in that column is copied to a new array. This process has the added benefit that the high-luminance part of the controlled background D104 need not fill the entire controlled background D104.

[0386] An alternative implementation applies in scenarios where the controlled background D104 is static, that is, contains no motion, but is not otherwise limited in luminance. A sample source image is included in FIG. 19A as an example. In this case, the object of interest, as sensed by the camera, may contain, or be close in magnitude to, the luminance values that are also found within the controlled background D104. In practice, the variability of luminance of the controlled background D104 (for example, caused by a user moving in front of the apparatus thereby blocking some ambient light) may be significant in magnitude relative to the difference between the controlled background D104 and the object of interest D105. Therefore, a specific type of filter may be applied in the filtering process D403 that produces results that are invariant to or de-emphasize variability in global luminance, while emphasizing parts of the object of interest D105. A 3.times.3 Prewitt filter is typically used in the filtering process D403. FIG. 19B shows the result of this 3.times.3 Prewitt filter on the image in FIG. 19A. In this implementation, two background models D406 may be maintained, one representing each of the high and low values, and together representing the range of values expected for each filtered pixel. The comparison criteria generation process D407 then decreases the low-value and increases the high-value by an amount greater than the expected magnitude of signal noise and variability of luminance. The result is a set of criterion, an example of which, for the low-value, is shown in FIG. 19C, and an example of which, for the high-value, is shown in FIG. 19D. These modified images are passed to the comparison process D408, which classifies pixels as being inconsistent to the controlled background D104 if their value is either lower than the low-value criterion (FIG. 19C) or higher than the high-value criterion (FIG. 19D). The result is a binary difference map D409, of which example corresponding to FIG. 19B is shown in FIG. 19E.

[0387] The preceding implementation allows the use of many existing surfaces, walls or window frames, for example, as the controlled background D104 where those surfaces may have arbitrary luminance, textures, edges, or even a light strip secured to the surface of the controlled background D104. The above implementation also allows the use of a controlled background D104 that contains a predetermined pattern or texture, a stripe for example, where the above processes detect the lack of the pattern in the area where the object of interest D105 occludes the controlled background D104.

[0388] The difference map D409 stores the positions of all pixels that are found to be inconsistent with the background D104 by the above methods. In this implementation, the difference map D409 may be represented as a binary image, where each pixel may be in one of two states. Those pixels that are inconsistent with the background D104 are identified or "tagged" by setting the pixel in the corresponding row and column of the difference map to one of those states. Otherwise, the corresponding pixel is set to the other state.

[0389] An implementation of the detection module D410, which detects an object of interest D105 in the difference map D409, shown in FIG. 20. Another scaling module at block D603 provides an additional opportunity to reduce the data to a single dimensional array of data, and may optionally be applied to scenarios where the orientation of the object of interest D105 does not have a significant effect on the overall bounds of the object of interest D105 within the difference map D409. In practice, this applies to many scenarios where the number of rows is less than or similar to the typical number of columns that the object of interest D105 occupies. When applied, the scaling module at block D603 reduces the difference map D409 into a map of one row, that is, a single dimensional array of values. In this implementation, the scaling module D603 may count the number of tagged pixels in each column of the difference map D409. As an example, the difference map D409 of FIG. 21A is reduced in this manner and depicted as a graph D709 in FIG. 21B. Applying this optional processing step reduces the processing requirements and simplifies some of the calculations that follow.

[0390] Continuing with this implementation of the detection module D410, it is observed that the pixels tagged in the difference map (D409 in example FIG. 21A) that are associated with the object of interest D105 will generally form a cluster D701, however the cluster is not necessarily connected. A cluster identification process D604 classifies pixels (or, if the scaling module D603 has been applied, classifies columns) as to whether they are members of the cluster D701. A variety of methods of finding clusters of samples exist and may be applied, and the following methods have been selected on the basis of processing simplicity. It is noted that, when the object of interest D105 is present, it is likely that the count of correctly tagged pixels will exceed the number of false-positives. Therefore the median position is expected to fall somewhere within the object of interest D105. Part of this implementation of the cluster identification process D604, when applied to a map of one row (for example, where the scaling module at block D603 or D404 has been applied), is to calculate the median column D702 and tag columns as part of the cluster D701 (FIG. 21B) if they are within a predetermined distance D703 that corresponds to the maximum number of columns expected to be occupied. Part of this implementation of the cluster identification process D604, when applied to a map of multiple rows, is to add tagged pixels to the cluster D703 if they meet a neighbor-distance criterion.

[0391] In this implementation, a set of criteria is received by a cluster classification process D605 and is then imposed onto the cluster D701 to verify that the cluster has qualities consistent with those expected of the object of interest D105. Thus, process D605 determines whether the cluster D701 should be classified as belonging to the object of interest D105. Part of this implementation of the cluster classification process D605 is to calculate a count of the tagged pixels within the cluster D701 and to calculate a count of all tagged pixels. The count within the cluster D701 is compared to a threshold, eliminating false matches in clusters having too few tagged pixels to be considered as an object of interest D105. Also, the ratio of the count of pixels within the cluster D701 relative to the total count is compared to a threshold, further reducing false matches.

[0392] If the cluster D701 passes these criteria, a description of the cluster is refined in process block D606 by calculating the center of gravity associated with the cluster D701 in process D607. Although the median position found by the scaling module D603 is likely to be within the bounds defining the object of interest D105, it is not necessarily at the object's center. The weighted mean D710, or center of gravity, provides a better measure of the cluster's position and is optionally calculated within process D606, as sub-process D607. The weighted mean D710 is calculated by the following equation: .times..function..times..function. ##EQU00003## where: x is the mean c is the number of columns C[x] is the count of tagged pixels in column x.

[0393] The cluster's bounds D704 may also be optionally calcul... Petitioner Exhibit 1002-2434

D606, shown as process D608. The cluster D703 may include some false-positive outliers, so as part of this implementation, the bounds may be defined as those that encompass a predetermined percentile of the tagged pixels, or, in scenarios where relatively few pixels are expected to be tagged, encompasses those tagged pixels (or columns, if scaling module D603 is applied) that form tight sub-clusters, that is those tagged pixels (or columns) that have neighbors that are also tagged.

[0394] In addition to the middle and bound coordinates, the orientation of the object of interest D105 may optionally be inferred by calculation of the moments of the cluster. This calculation is represented by a cluster orientation calculation process at sub-process D609 within process D606.

[0395] In some applications of the system D100, the object of interest D105 is used as a pointer. In this case, the "pointing end" of the object D105 is desired and may also be determined by a pointing end calculation sub-process within process D606 if the region of interest D103 contains a sufficient number of rows and the number of rows has not been reduced. An example is depicted in FIG. 21C. The object of interest D105 will typically enter, or be constrained to enter, the active image region D208 from a known border of that region. The pointing end D705 (for example the user's fingertip) of the object of interest D105 is likely to be the portion of the cluster D701 that is furthest from the region of entry D706 into the active image region D208. The cluster D701 may include some false-positive outliers. As such, the pointing end D705 may be defined as the region D707 within the cluster D701 that encompasses multiple tagged pixels near the furthest bounding side of the cluster D701, or, in scenarios where relatively few pixels are expected to be tagged, encompasses the furthest tagged pixels that form a tight sub-cluster; that is those tagged pixels that have neighbors that are also tagged. This sub-cluster is identified by a sub-cluster pointing end process D610, and the position of the sub-cluster is found in process D611.

[0396] Continuing with this implementation, a process implemented by a smoothing module D612 may optionally be applied to any or all of the positions found in process D606. Smoothing is a process of combining the results with those solved previously so they move in a steady manner from frame to frame. The weighted mean coordinate D710, found by the center of gravity determination process D607, is dependent on many samples and therefore is inherently steady. The bound D704, found by the cluster bounding dimension determination process D608, and pointing end D705, found by D611, coordinates are dependent on relatively fewer members of the cluster, and the state of a single pixel may have a significant effect. Since the size of the region occupied by the object of interest 105 is expected to remain relatively steady, smoothing may be applied to the distance between the bounds D704 measured relative to the cluster's weighted mean coordinate D710. Since the shape and orientation of the object of interest D105 is expected to change less rapidly than the overall position object of interest D105, smoothing may be applied to the distance of the pointing end D705 measured relative to the cluster's weighted mean coordinate D710.

[0397] A process used in the center of gravity process D607 is Eq. 1 as follows:
s(t)=(a.times.r(t))+((1-a).times.s(t-1))
In Eq. 1, the smoothed value at time t (s(t)) is equal to one minus the scalar value (a) multiplied by the smoothed value at time minus one (t-1). This amount is added to the raw value at time t (r(t)) multiplied by a scalar (a) that is between zero and one.

[0398] Referring to FIG. 22, implementations of system D100 make use of, as described above, one or more background models D406 (FIG. 22).

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An implementation of the background model process or component D405 that generates the background model data D406 is shown in FIG. 22. This implementation of the background model component D405 automatically generates and dynamically updates the background model, allowing unattended operation of the system.

[0399] Input data D802 is provided by the output of scaling module 404 for this implementation of the background model component D405. Input is available every frame, and is sampled in a sampling process D803. The sample may contain the object of interest D105 occluding part of the controlled background D104. For each pixel, a range of values may be a better representative of the background D104 than a single value. By including the effects of this range in the background model, the expansion in process D407 may be made tighter. Contributing multiple frames of data to the sample allows this range to be observed, but also increases the portion of the background D104 that is occluded by the object of interest D105 if the object of interest D105 is in motion while the frames are being sampled. The optimal number of frames to use is dependent on the expected motion of the object of interest D105 in the particular application of the system. In practice, for systems that are tracking a hand, 10 frames, representing approximately 0.33 seconds, is sufficient to observe the majority of that range without allowing motion of the object of interest to occlude an undue portion of the background. If the particular background model is to be compared in comparison process D408 as the upper bound on values that are considered to be consistent with the background D104, then the maximum value of each pixel observed in the multiple frames may be recorded as the sample value. If the particular background model D406 is to be compared in process D408 as the lower bound on values that are considered to be consistent with the background D104, then the minimum value of each pixel observed in the multiple frames may be recorded as the sample value.

[0400] In this implementation of the background model component D405, samples from the sampling process D803 are added to a buffer D804 having storage locations to store n samples, where the oldest sample in the history is replaced. The history therefore contains n sampled values for each pixel. The span of time, d, represented in the buffer is dependent on the rate that new samples are acquired and added to the history, r, by Eq. 2, described as follows: ##EQU0004##

[0401] In this implementation, a median process block D805 selects, for each pixel, a value that it determines is representative of the controlled background D104 at the location represented by that pixel. One method of selecting a value representative of the controlled background D104 within process block D805 is to select the median value of the n samples of each pixel. For any pixel, a number of the n sampled values in the buffer D804 may represent the object of interest D105. Duration d is selected so that it is unlikely that the object of interest D105 will occlude any one pixel of the controlled background D104 for an accumulated duration of d/2 or longer within any time-span of d. Therefore, for any pixel, the majority of the sampled values will be representative of the background D104, and therefore the median of the sampled values will be a value representative of the background D104.

[0402] The background model component D405 is adaptive, and any changes to the background D104 will be reflected in the output of median process block D805 once they have been observed for time of d/2. This system does not require that the entire controlled background D104 be visible when initialized, the object of interest D105 may be present when initialized, however it does require that samples be observed for time of d before providing output. Optionally, the constraint may be applied that the object of interest D105 must be absent when the system is initialized, in which case the first observed sample values may be copied into all n samples of the buffer D804, allowing the system to produce an output sooner.

[0403] The duration that any one pixel of the controlled background D104 will be occluded by the object of interest D105, and therefore the duration d, is dependent on the particular application of the system. The number of samples, n, can be scaled for the memory buffer and processing power available.

[0404] The preceding discussion presents one implementation of obtaining the position of the object of interest D105 within and relative to the images acquired by the cameras D101 and D102. If the object of interest D105 was successfully detected and its coordinates found in both cameras views D205 and D206 by detection modules D308 and D309 of FIG. 17, then the combination of these coordinates is sufficient to recover the position of the object of interest D105 within the region of interest D103. In the implementation outlined in FIG. 17, the position of the object of interest D105 is calculated in combination module D312.

[0405] Turning to FIGS. 23A and 23B, an implementation of the combination module D312 is shown. For each camera D101 and D102, the position p D902 of the object of interest D105 on the camera's image plane D904 is converted to an angle D905, which is referred in this description as beta (.beta.), and is measured on the reference plane whose normal is defined by the axes of the rotations of the cameras D101, D102. (In practice, the axes are not precisely parallel and do not exactly define a single plane, however the process described herein is tolerant of that error). By approximating the camera D101, D102 as an ideal pinhole model of the camera, that angle (.beta.), relative to the vector D906 defining the orientation of the camera, is approximated.

[0406] Eq. 3, as shown in FIG. 23A, illustrates an approximation calculation as follows: .beta..times. ##EQU00005## To approximate the angle beta (.beta.), the inverse tangent is applied to the quantity of the focal length (f) divided by the position p on the image plane projected onto the intersection of the reference plane and the image plane.

[0407] For maximum precision, the intrinsic camera parameters (location of the principal point and scale of image) and radial distortion caused by the lens should be corrected for by converting the distorted position (as represented by the relative position information D310, D311) to the ideal position. More specifically, the ideal position is the position on the image plane D904 that the object D105 would be projected if the camera D101, D102 had the properties of an ideal pinhole camera, whereby Eq. 3 will produce the exact angle. One set of correction equations are presented in Z. Zhang, A Flexible New Technique for Camera Calibration, Microsoft Research, http://research.microsoft.com/.about.zhang, which is incorporated by reference. For many applications of the system, the approximation has been found to provide sufficient precision without this correction noted above.

[0408] Continuing with the description of combination module D312, a reference vector D907, as illustrated in FIG. 23B, is defined such that it passes through the positions of both cameras D101 and D102 on the reference plane where the reference plane is defined such that the axis of rotation of the cameras define the normal of the reference plane. The angles D908 that the cameras are rotated are measured relative to the reference vector D907.

[0409] A formula for measurement of the angles is shown in Eq. 4: .alpha.=.beta..sub.0+.beta. Measurement of the angle alpha (.alpha.) is equal to the angle beta_not (.beta..sub.0) and the angle beta (.beta.).

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[0410] Eq. 4 is applied to measure the angles D909 of the object of interest D105 relative to the reference vector D907. That angle is referred to by the alpha (.alpha.) symbol herein. The angle alpha D909 for each camera D101 and D102, and the length of the reference vector D907, are sufficient to find the position of the object of interest D105 on the reference plane, by Eq. 5 and Eq. 6.

[0411] Eq. 5 calculates the offset of the object of interest (y) by the formula: .times. .times..times. .times..alpha..times..times. .times..alpha. .times..times. .times..alpha..times. .times..alpha. ##EQU00006## The offset (y) is equal to the reciprocal of the tangent of the angle (.alpha..sub.A) for camera A 101 and the tangent of the angle (.alpha..sub.B) for camera B D102 multiplied by the vector length D907 (w), the tangent of the angle (.alpha..sub.A) for camera A D101 and the tangent of the angle (.alpha..sub.B) for camera B D102.

[0412] Eq. 6 calculates the offset of the object of interest (x.sub.A) as follows: .times. .times..alpha. ##EQU00007## In Eq. 6, the offset (x.sub.A) is measured by the offset from Eq. 5 (y) divided by the tangent of the angle (.alpha..sub.A) for camera A D101.

[0413] The position of the object D105 on the axis perpendicular to the reference plane may be found by Eq. 7, which is applied to the position in each image, using the distance of the object of interest D105 from the camera. .times. .times. ##EQU00008##

[0414] In Eq. 7, the position (z) is calculated as the position (p) on the image plane projected onto the vector of the image plane perpendicular to that use in Eq. 3 divided by the focal length (f) multiplied by the distance of the object of interest D105 from the camera (l).

[0415] These relations provide a coordinate of the object of interest D105 relative to Camera A D101. Knowing the position and size of the region of interest D103 relative to Camera A D101, the coordinate may be converted so that it is relative to the region of interest D103, D312 of FIG. 17.

[0416] Smoothing may optionally be applied to these coordinates in refinement module D313 of the implementation of this system shown in FIG. 17. Smoothing is a process of combining the results with those solved previously so that motion is steady from frame to frame. One method of smoothing for these particular coordinate values (x.sub.A, y, z found by combination module D312) is described herein. Each of the components of the coordinate values associated with the object of interest D105, that is x, y, and z, are smoothed independently and dynamically. The degree of dampening S is calculated by Eq. 8, where S is dynamically and automatically adjusted in response to the change in position is calculated as follows: .times. .times..ltoreq..alpha..times. .times..alpha..times..times. .times..times. .times..alpha..times. .times.<<.times. .times..gtoreq..times..times..function..function. ##EQU00009## In Eq. 8, s(t) is the smoothed value at time t, r(t) is the raw value at time t, D.sub.A and D.sub.B are thresholds, and S.sub.A and S.sub.B define degrees of dampening.

[0417] Two distance thresholds, D.sub.A and D.sub.B, as shown in FIG. 24, define three ranges of motion. A change in position that is less than D.sub.A, motion is heavily dampened D1001 by S.sub.A, thereby reducing the tendency of a value to switch back and forth between two nearby values (a side effect of the discrete sampling of the images). A change in position greater than D.sub.B is lightly dampened D1002 by S.sub.B, or not dampened. This reduces or eliminates lag and vagueness that is introduced in some other smoothing procedures. The degree of dampening is varied...

motion between D.sub.A and D.sub.B, the region marked as D1003, so that the transition between light and heavy dampening is less noticeable. The scalar a, which is applied to Eq. 1, is found by Eq. 9 as follows: .times. ##EQU00010## In Eq. 9, scalar (a) is bound such that equal to or greater than zero, and less than or equal to one, the dampening value of S is found by Eq. 8, and e is the elapsed time since the previous frame.

[0418] These coordinates D314 of the object of interest D105, if found, are typically conveyed to another process such as a user application program D316 for use. They may be conveyed to another process executing on the same image processor D106 as the above calculations where performed, or to another computing device. The method in which the data are conveyed to the application program D316 may include emulation of a traditional user input device (including mouse and keyboard), allowing the system to provide control of existing control functions within the application program D316. The coordinates D314 of the object of interest D105 may be calculated for every video frame captured by the cameras, where one video frame is typically captured 30 times or more every second. This results in little latency between the user's actions and the application's reactions.

[0419] In a typical implementation of the system, the application program D316 provides user feedback by displaying to the video display D107 a visual representation of an indicator. The indicator is caused to move such that its position and motion mimics the motion of the object of interest D105 (typically the user's hand).

[0420] In one variation of this form of user interface, the indicator, such as a mouse pointer, is shown in front of other graphics, and its movements are mapped to the two dimensional space defined by the surface of the screen. This form of control is analogous to that provided by a computer mouse, such as that used with the Microsoft(R) Windows(R) operating system. An example feedback image of an application that uses this style of control is shown as D1102 in FIG. 25A.

[0421] Referring to FIG. 25A (and briefly to FIG. 17), the image processor D106 also includes an optional coordinate re-mapping process D317 (FIG. 17). The coordinate re-mapping process D317 is operable to remap the global presence and position coordinates D314 (associated with the object of interest D105) into the position where the indicator D1101 (such as a cursor or mouse pointer) is overlaid onto the image D1102 by way of Eq. 10 for the x coordinate, and the equivalent of this equation for the y coordinate, as follows: <.ltoreq..ltoreq.>##EQU00011##

[0422] In Eq. 10, x.sub.h is the coordinate position D314 associated with the object D105, x.sub.c is the cursor position on the screen, mapped 0-1, and b.sub.l and b.sub.r are the positions of the left and right bounds of a sub-region within the region of interest D103. As illustrated in FIG. 25B, the entire region of the display D1102 is represented by a sub-region D1103 contained entirely within the region of interest D103. Positions (for example, position A D1105) within the sub-region D1103 are linearly mapped to positions (for example, D1106) within the display D1102. Positions (for example, position B D1107) outside the sub-region D1103 but still within the region of interest D103 are mapped to the nearest position (for example, D1108) on the border of the display region D1102. This reduces the likelihood of the user unintentionally removing the object of interest D105 (usually the user's hand or pointing finger) from the sub-region while attempting to move the indicator D1101 to a position near a border of the display.

[0423] In scenarios where the region of interest D103 is immediately in front of the video display D107, the sub-region D1103 may be defined to be aligned to the video display D107, so that the indicator D1101 will appear to be aligned with the object of interest D105. If the region of interest D103 is relatively thin, for example less that 5 cm, and the sub-region D1103 is defined in this way, then the system approximates, in terms of user-interaction, a "touch-screen" without limitations on the size of the video display D107, and without requiring direct contact between the user and video display's D107 surface (for example, the video display and user may be on opposite sides of a window). As will be appreciated, the system D100 can be used with a variety of video display sizes, and may include not only computer monitors (whether CRT or LCD type displays), but also may include rear projection style television monitors, large flat screen LCD monitors, and forward projection style presentation systems.

[0424] In scenarios where the region of interest D103 is not immediately in front of a large video display D107, and the active image region D208 is sufficiently deep that the orientation of the object of interest is found in the orientation calculation process D609, a vector may be extended from the object of interest's position to the video display D107 using the angle of orientation to detect the position on the video display that the user is "pointing to."

[0425] Most often, however, the active image region D208 is not sufficiently deep to accurately calculate the orientation in process block D609. In these scenarios, where the region of interest D103 is not immediately in front of a large video display D107 and the orientation is not calculated, Eq. 10 may be applied where the sub-region D1103 is smaller than the video display. The processor then maps the absolute position of the object of interest D105 to the position indicator such that movements of the object of interest D105 are scaled to larger movements of the location of the position indicator on the video display, which allows the entire area of the video display to be easily reached by the user (for example the sub region D1103may be defined to be at most 750 mm in width and proportional in height, a size that is easily reached by most users). When setup in this way, the system still provides the user the feeling of "pointing to the screen."

[0426] In another variation of this form of user interface, the user causes a representation of an indicator to move within a representation of a three dimensional virtual environment (examples are presented in FIG. 26A and FIG. 26B). The virtual environment may be rendered using projective transforms, so that the depths of the virtual environment are implied by the image presented on the video display D107. Techniques for rending this sort of virtual environment include OpenGL. Eq. 10 is used to remap the x, y, and z coordinates (the sub-region 1103 becomes, for example, a cube).

[0427] Applications that are controlled by a movable on screen indicator (for example, FIGS. 25A, 26A, and 26B), whose control has been discussed, typically present graphic representations of data or interactive elements (for example, a button D1109 or an object representation D1202). The user is expected to cause the indicator D1101 to be positioned over one of these objects, or if a three-dimensional virtual environment is presented, touches or interacts with the object. For a two-dimensional interface, this condition may be detected by comparing the remapped indicator position D1106 to the bounds (for example, D1110) of the graphic representation of the object, where this condition is true if the indicator position is within the object bounds. For the three-dimensional interface, this condition may be detected by comparing the bounds D1203 of either the entire indicator D1101, or if finer control is required, a part of the indicator, with the bounds D1204 of the object D1202. The user optionally receives feedback indicating that the cursor is positioned over an object. Feedback may be of a variety of