

Exhibit 2032



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

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



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***EX PARTE* REEXAMINATION COMMUNICATION TRANSMITTAL FORM**

REEXAMINATION CONTROL NO. 90/019,924 .

PATENT UNDER REEXAMINATION 7841729 .

ART UNIT 3993 .

Enclosed is a copy of the latest communication from the United States Patent and Trademark Office in the above identified *ex parte* reexamination proceeding (37 CFR 1.550(f)).

Where this copy is supplied after the reply by requester, 37 CFR 1.535, or the time for filing a reply has passed, no submission on behalf of the *ex parte* reexamination requester will be acknowledged or considered (37 CFR 1.550(g)).

Order Granting Request For Ex Parte Reexamination	Control No. 90/019,924	Patent Under Reexamination 7841729	
	Examiner Peter C English	Art Unit 3993	AIA (FITF) Status No

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

The request for *ex parte* reexamination filed 04/22/2025 has been considered and a determination has been made. An identification of the claims, the references relied upon, and the rationale supporting the determination are attached.

Attachments: a) PTO-892, b) PTO/SB/08, c) Other: _____

1. The request for *ex parte* reexamination is GRANTED.

RESPONSE TIMES ARE SET AS FOLLOWS:

For Patent Owner's Statement (Optional): TWO MONTHS from the mailing date of this communication (37 CFR 1.530 (b)). **EXTENSIONS OF TIME ARE GOVERNED BY 37 CFR 1.550(c).**

For Requester's Reply (optional): TWO MONTHS from the **date of service** of any timely filed Patent Owner's Statement (37 CFR 1.535). **NO EXTENSION OF THIS TIME PERIOD IS PERMITTED.** If Patent Owner does not file a timely statement under 37 CFR 1.530(b), then no reply by requester is permitted.

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cc:Requester (if third party requester)

DECISION GRANTING *EX PARTE* REEXAMINATION

1. A substantial new question of patentability (SNQ) affecting claims 1-9 of US Patent No. 7,841,729 B2 is raised by the present request for *ex parte* reexamination.

Listing of Prior Art

2. The following is a listing of the prior art documents addressed in this decision, together with the shorthand reference for each document (listed alphabetically):

“Bourn et al.”	US Patent No. 6,238,060 B1
“Cook”	US Publication No. 2006/0007666 A1
“Crete”	US Patent No. 3,604,913
“Du Breuil”	US Publication No. 2007/0139515 A1
“Holmes et al.”	US Publication No. 2004/0211868 A1
“Kwak”	KR Publication No. 20-0316985 Y1 (with translation)
“Lin”	DE Publication No. 203 10 780 U1 (with translation)
“Negishi”	US Patent No. 4,974,138
“Numao”	JP Publication No. 2001-027776 A (with translation)
“O’Neill et al.”	EP Publication No. 0 822 409 A2
“Watson”	US Publication No. 2005/0151042 A1

Claim Construction in Examination/Reexamination

3. During examination, the pending claims are normally interpreted according to the broadest reasonable interpretation standard (hereinafter, the “BRI standard”). That is, claims are given their broadest reasonable interpretation consistent with the specification, and limitations in the specification are not read into the claims. See MPEP 2111 et seq.

4. During reexamination of an unexpired patent, claims are interpreted under the BRI standard, and limitations in the specification are not read into the claims. See MPEP 2258, subsection I.G.

5. An exception to the BRI standard occurs when the applicant acts as their own lexicographer. For this exception to apply, the applicant must clearly set forth a special definition of a claim term in the specification that differs from the plain and ordinary meaning it would otherwise possess. See MPEP 2111.01, subsection IV.

6. Another exception or special case occurs when a claim recites a means-plus-function limitation that must be interpreted in accordance with 35 USC 112 ¶ 6, or 35 USC 112(f). See MPEP 2181. According to the guidance provided by *Williamson v. Citrix Online, LLC*, 792 F.3d 1339 (Fed. Cir. 2015) (*en banc*), 35 USC 112 ¶ 6 applies when the claim term fails to recite (i) sufficiently definite structure, and/or (ii) sufficient structure for performing the claimed function.

Examiner's Claim Construction

7. The following claim limitations are construed by the examiner to aid in reexamination:

Claim Limitation:	reflector having a circular configuration to conform to the toroidal shape of said bulb (claim 1)
Examiner's Construction:	A structure capable of reflecting electromagnetic waves such as light (i.e., a reflector), which structure has a circular portion defining at least a part of the shape of the structure, wherein the circular portion is similar in shape to at least a portion of a toroidal-shaped bulb.
Examiner's Explanation:	Claim 1 requires that the reflector has "a circular configuration to conform to the toroidal shape of said bulb". The patent specification does not describe the reflector 40 as having such a circular configuration. Rather, the patent specification merely states that the reflector 40 "surrounds or encases bulb 25" (col. 2, ll. 55-56). Based on the illustration in Figs. 1-2, the reflector 40 has what appears to be a generally circular outer perimeter and a generally circular inner perimeter, i.e., it appears the reflector 40 is generally toroidal like the bulb 25. However, it is impossible to determine the exact structure and shape of the reflector 40 since (i) the patent specification is silent as to its shape, and (ii) the drawings do not show a top view, bottom view, side view or rear view of the reflector 40. Thus, the claimed reflector is broadly considered to require a circular portion defining at least a part of the shape of the reflector, wherein the circular portion is similar in shape to at least a portion of a toroid bulb.

Claim Limitation:	said bulb is positionable relative to the web camera to provide optimal viewing of the user through the web camera (claim 1)
Examiner's Construction:	The bulb is capable of being placed in a specific location relative to the web camera in order to provide optimal viewing of the user through the web camera, wherein such placement in a specific location can occur (i) during manufacture of the claimed illuminator such that the bulb is specifically located relative to the web camera to serve its intended purpose, or (ii) during installation of the claimed illuminator such that the illuminator and its bulb are installed in a specific location relative to the web camera to serve their intended purpose, or (iii) during use of the claimed illuminator such that the bulb is capable of being moved relative to the web camera to serve its intended purpose.
Examiner's Explanation:	<p>The patent specification describes a preferred embodiment in which the flexible arm 30 permits adjustment of the location of the bulb 25 relative to the web camera 20 such that the illuminator 10 can be moved from a position away from the web camera 20 (shown in Fig. 1) to an in-use position surrounding and in front of the web camera 20 (shown in Fig. 2). See col. 2, ll. 39-41, 48-51 and 64-65. The patent specification explains that, in this preferred embodiment, the ability to move the illuminator 10 allows the user to adjust how they want to be seen, with different in-use positions creating different looks and effects. See col. 3, ll. 10-14. The patent specification describes another preferred embodiment in which the user is able to position the illuminator on a flat surface (such as a table surface) relative to the web camera. See Fig. 6; col. 4, ll. 24-29.</p> <p>The "positionable relative to" limitation of claim 1 is not specific to any preferred embodiment. Rather, it broadly encompasses any manner or capability of positioning the bulb relative to the web camera to provide optimal viewing of the user through the camera. Thus, a preferred embodiment (such as the use of a flexible arm that allows the user to adjust the location of the bulb by moving the illuminator relative to the camera, the ability to move the illuminator to adjust how the user is seen, and the positioning of the illuminator on a flat surface relative to the camera) will not be read into claims that do not require any particulars of such a preferred embodiment.</p>
Claim Limitation:	said arm is a flexible arm that permits said bulb to be positioned relative to the web camera (claim 4)
Examiner's Construction:	The arm is capable of bending without breaking (i.e., flexible) and allows (i.e., permits) the bulb to be placed in a specific location relative to the web camera , wherein such placement in a specific location can occur (i) during manufacture of the claimed illuminator such that the bulb is specifically located relative to the web camera, or (ii) during installation of the claimed illuminator such that the illuminator and its bulb are installed in a specific location relative to the web camera, or (iii) during use of the claimed

	illuminator such that the bulb is capable of being moved relative to the web camera
Examiner's Explanation:	As explained above with respect to the "positionable relative to" limitation of claim 1, the "positioned relative to" limitation of claim 4 is not specific to any preferred embodiment. Rather, it broadly encompasses any manner or capability of positioning the bulb relative to the web camera. While claim 4 does specify the use of a flexible arm, it does not require the arm to be used to move the bulb/illuminator relative to the camera. Instead, claim 4 only broadly requires the flexible arm to allow/permit placement of the bulb in a specific location relative to the camera.

Standard for Granting Request for Ex Parte Reexamination

8. Under 35 USC 304, the Office must determine whether an SNQ affecting any claim of the patent has been raised. Pursuant to 37 CFR 1.510(b)(1), the request must set forth in detail what the requester considers the SNQ(s) to be in view of prior patents and printed publications. The request must also point out how any questions of patentability raised are substantially different from those raised in any previous examination or review of the patent before the Office. See MPEP 2216.

9. It is not sufficient that a request for reexamination merely proposes one or more rejections of a patent's claims as a basis for reexamination. It must first be demonstrated that a patent or printed publication that is relied upon in a proposed rejection presents ***a new, non-cumulative technological teaching that was not previously considered and discussed on the record*** during the prosecution of the application that resulted in the patent for which reexamination is requested, and during the prosecution of any other prior proceeding involving the patent for which reexamination is requested. See MPEP 2216.

10. A prior art patent or printed publication raises an SNQ where there is a substantial likelihood that a reasonable examiner would consider the prior art patent or printed publication important in deciding whether or not the claim is patentable. If the prior art patents and/or publications would be considered important, then the examiner should find an SNQ ***unless the same question of patentability has already been decided*** as to the claim in (i) a final holding of invalidity by the Federal court system, (ii) a previous examination by the Office, or (iii) a previous review of the patent by the PTAB. For example, the same question of patentability may

have already been decided by the Office where the examiner finds the newly provided prior art patents or printed publications are *merely cumulative to similar prior art already fully considered* by the Office in a previous examination or review of the claim. See MPEP 2242.

11. An SNQ is not raised by prior art presented in a reexamination request if the Office has previously considered, in an earlier examination or review of the patent, the same question of patentability as to a patent claim favorable to the patent owner based on the same prior art patents or printed publications. However, in a decision to order reexamination made on or after November 2, 2002, reliance on patents and/or printed publications already cited/considered in an earlier examination or review, i.e., “old art”, does not necessarily preclude the existence of an SNQ that is based exclusively on that old art. For example, an SNQ may be based solely on old art where the old art is being *presented/viewed in a new light, or in a different way*, as compared with its use in the earlier examination or review, in view of a material new argument or interpretation presented in the request. See MPEP 2242.

12. Thus, in this case, reexamination will only be ordered if the prior art cited by the requester raises an SNQ which differs from the patentability questions decided during the original examination.

Substantial New Questions of Patentability Proposed by Requester

13. The request indicates that the third party requester considers the following SNQs to be raised by the request for *ex parte* reexamination:

- #1. An SNQ as to claims 1-7 based upon Kwak taken together with Bourn et al. and Watson. (*Request, pp. 11-22; claim chart, pp. 1-10*).
- #2. An SNQ as to claims 8 and 9 based upon Kwak taken together with Bourn et al. and Watson and further taken together with Cook (*Request, pp. 22-23; claim chart, pp. 10-12*).

Patentability Questions Addressed during Original Examination

14. Application No. 12/011,090, which later issued as US Patent No. 7,841,729 B2, was filed on 24 January 2008 with original claims 1-16. Claims 1 and 13 were independent.

15. In the Office action mailed on 27 November 2009, the previous examiner rejected (i) claims 1-10 as anticipated by Crete, (ii) claims 11 and 12 as obvious over Crete in view of Cook, and (iii) claims 13-16 as anticipated by Du Breuil.

16. In the amendment filed on 01 March 2010, applicant responded to the previous examiner's rejections by (i) amending independent claim 1 to require the bulb "having a toroidal shape" and the reflector "having a circular configuration to conform to the toroidal shape of" the bulb, (ii) canceling dependent claims 3 and 5 (which originally defined the shapes of the bulb and reflector more broadly), (iii) amending dependent claim 4 to depend from claim 1, (iv) amending independent claim 13 to require that "one of said plurality of bulbs surrounds the webcam", (v) arguing that the amendment to claim 1 defined over Crete because Crete does not disclose a bulb having a toroidal shape or a reflector having a circular shape that conforms to the toroidal shape of the bulb, and (vi) arguing that the amendment to claim 13 defined over Du Breuil because Du Breuil does not disclose an embodiment in which one of the bulbs surrounds the web camera.

17. Having determined that the claims as amended were allowable, the previous examiner issued the Notice of Allowability on 12 May 2010. The examiner's reasons for allowance read:

Claim 1 of instant application has an illuminator device for illuminating one or more users in front of a web camera and a communication terminal comprising a bulb having a toroidal shape for emitting light, a reflector having a circular configuration to conform to toroidal shape of bulb for projecting emitted light, an arm disposed between bulb and terminal for connection to terminal and bulb is positionable relative to web camera to provide optimal viewing of user through web camera.

The combination of limitations claimed is not found, taught or suggested by the prior art.

Claims 2, 4 and 6 - 12 depend directly or indirectly from claim 1, add further limitations and are allowable for the same reasons.

Claim 13 of instant application has an illuminator device for illuminating one or more users in front of a webcam and a communications terminal having a frame, a screen comprising a plurality of bulbs, plurality of bulbs are disposed in frame of terminal and one of plurality of bulbs surrounds webcam.

The combination of limitations claimed is not found, taught or suggested by the prior art.

Claim 14 -16 depend directly from claim 13, add further limitations and are allowable for the same reasons.

18. Upon allowance, claims 4-16 were renumbered in the same order as originally presented.

19. Applicant responded to the Notice of Allowability by filing an amendment under 37 CFR 1.312 on 12 August 2010. Dependent claim 2 was canceled, and minor changes were made to claims 7 and 10-13.

20. The previous examiner entered the amendment under 37 CFR 1.312. In light of the cancellation of claim 2, claims 4-16 were once again renumbered in the same order as originally presented. Thus, the patent issued with independent claims 1 and 10, and dependent claims 2-9 and 11-13.

21. Accordingly, the following claimed subject matter was found to be lacking from the prior art and, thus, was considered to be patentable during the original examination:

Patent claim 1	the bulb having a toroidal shape, and the reflector having a circular configuration to conform to the toroidal shape of the bulb
Patent claim 10	one of said plurality of bulbs surrounds the web camera

New Teachings Forming Bases of SNQs

22. The request for *ex parte* reexamination cites the teachings of Bourn et al. as the basis of asserted SNQs.

23. Bourn et al. teaches a ring-shaped illumination source 200 for illuminating an object 160 in front of a video camera 140 used in a machine-vision system 100. See Fig. 1A; col. 6, l. 27 to col. 7, l. 8. The ring-shaped illumination source 200 comprises an LED light source 230 having a row of LEDs 231 arranged in a circle (i.e., in a ring, annular or toroidal shape), and a reflector 220/221 having a circular configuration conforming to the shape of the row of LEDs 231 such that the reflector 220/221 surrounds/encases the LEDs 231. See Figs. 2A-2B; col. 7, l. 9 to col. 8, l. 46. In an alternative embodiment, Bourn et al. discloses a ring-shaped light source 236 comprising a bulb 237 in the form of a circular xenon flashtube, a circular incandescent tube, or

a circular fluorescent tube (i.e., having a toroidal shape), which is used in place of the row of LEDs 231 of the first embodiment. See Figs. 2F-2H; col. 10, ll. 10-49.

24. Thus, Bourn et al. teaches an illuminator comprising a toroidal bulb 237, and a reflector 220/221 having a circular portion that is similar in shape to at least a portion of the toroidal bulb. Accordingly, Bourn et al. teaches subject matter of patent claim 1 that was considered to be patentable during the earlier-concluded examination.

25. This decision granting the request cites the teachings of Negishi and O'Neill et al. as the bases of SNQs.

26. Negishi teaches an illuminator (see Figs. 9-11) for illuminating an object in front of a camera C used in photography. See Figs. 9-11; col. 7, ll. 3-15. The illuminator comprises a stroboscope flash light (i.e., bulb) L having a ring or doughnut shape (i.e., having a toroidal shape), and either one reflector R (see Fig. 10) or two reflectors R, r (see Fig. 11) having a circular configuration conforming to the shape of the toroidal bulb L such that at least the reflector R surrounds/encases the bulb L. See Figs. 10-11; col. 7, ll. 16-46. The principle of Negishi's illuminator can be applied to other various lighting devices. See col. 7, ll. 47-48.

27. Thus, Negishi teaches an illuminator comprising a toroidal bulb L, and at least one reflector R, r having a circular portion that is similar in shape to at least a portion of the toroidal bulb. Accordingly, Negishi teaches subject matter of patent claim 1 that was considered to be patentable during the earlier-concluded examination.

28. O'Neill et al. teaches an illuminator for illuminating an object in front of a CCD camera 17 used in an automated measurement (i.e., machine-vision) system. See Figs. 1-4; col. 1, ll. 7-13; col. 4, l. 52 to col. 5, l. 28; col. 5, ll. 37-52. The illuminator comprises a lower light source 25 having a ring-shaped (i.e., toroidal) fluorescent lamp (i.e., bulb) 26, and a reflector 27 having a circular configuration conforming to the shape of the toroidal bulb 26 such that the reflector 27 surrounds/encases the bulb 26. See Figs. 3-5(a); col. 5, ll. 32-36; col. 6, ll. 3-28. O'Neill et al. additionally teaches that (i) the camera 17 is mounted in a vertically adjustable manner, and (ii)

the height of the lower light source 25 (i.e., the height of the toroidal bulb 26) can be adjusted (relative to the camera 17) in order to allow flexible use of the system, increase the number of pixels per view, and improve performance. See col. 1, ll. 57-58; col. 2, ll. 45-48; col. 5, ll. 24-28; col. 7, ll. 8-17.

29. Thus, O'Neill et al. teaches an illuminator comprising a toroidal bulb 26, and a reflector 27 having a circular portion that is similar in shape to at least a portion of the toroidal bulb. Accordingly, O'Neill et al. teaches subject matter of patent claim 1 that was considered to be patentable during the earlier-concluded examination.

30. The above-discussed teachings of Bourn et al., Negishi and O'Neill et al. form the bases of SNQs raised by the present request for *ex parte* reexamination and this decision granting the request, which SNQs affect claims 1-9 of US Patent No. 7,841,729 B2.

Additional Teachings Relied Upon

31. The request for *ex parte* reexamination relies upon the teachings of Kwak, Watson and Cook to establish that certain claim limitations were known in the art at the time the invention was made. However, the reexamination request fails to establish that Kwak, Watson and Cook teach subject matter indicated/considered to be patentable during the earlier-concluded examination.

32. Kwak teaches an illuminator 40 used with a webcam 50, wherein the illuminator 40 comprises a lamp 41 and a reflector 42. See Figs. 1-3; p. 3, ll. 22-29 and 45-47.¹ However, the lamp 41 does not have a toroidal shape, and the reflector 42 does not have a circular configuration that conforms to a toroidal shape of the lamp 41.

33. Watson teaches an illuminator 22 used with a webcam 12, wherein the illuminator 22 comprises a bulb 44. See Figs. 1-4 and 6; ¶¶ 0029, 0033. The bulb 44 appears to be surrounded/encased by a reflector (see Figs. 1-4 and 6). However, the bulb 44 does not have a

¹ All citations are to the English translation.

toroidal shape, and the reflector does not have a circular configuration that conforms to a toroidal shape of the bulb 44.

34. Cook discloses a light modifier 10 for modifying the light produced by a light source 49, which is used by photographers and image makers. See Figs. 1-5; ¶¶ 0001, 0013-0014. The light modifier 10 includes a layer of fabric netting 73 that diffuses the light produced by the light source 49, wherein the fabric netting 73 is made of cotton, nylon, polyester or similar fabric. See Figs. 4 and 6; ¶ 0015.

35. This decision granting the request relies upon the teachings of Holmes et al., Lin and Numao to establish that certain claim limitations were known in the art at the time the invention was made. However, this decision does not establish that Holmes et al., Lin and Numao teach subject matter indicated/considered to be patentable during the earlier-concluded examination.

36. Holmes et al. teaches a webcam mount comprising a flexible arm 20 coupled to a base 10 that functions as a clamp to support the webcam mount on a flat surface (e.g., table) adjacent to a computer. See Figs. 1 and 3; ¶¶ 0001, 0008, 0015-0017.

37. Lin teaches an illuminator comprising a lamp (i.e., bulb) 105 coupled to one end of a flexible arm 103, with the other end of the flexible arm 103 coupled to a base 101 having a clamp 102 that clamps to an edge of an LCD of a laptop computer. See Fig. 1; ¶¶ 0003-0005.²

38. Numao teaches a photography box 10 for use by photographers. See Figs. 1-4; ¶¶ 0001, 0009.³ The photography box 10 includes a diffusion sheet 26 for diffusing the light produced by a light source 44, wherein the diffusion sheet 26 is made of linen or silk cloth. See Figs. 1-3; ¶¶ 0013, 0017.

39. Accordingly, the teachings of Kwak, Watson, Cook, Holmes et al., Lin and Numao (taken individually) do not form the basis of an SNQ in this reexamination proceeding. Nevertheless, these references can be relied upon during reexamination as teaching additional

² All citations are to the English translation.

³ All citations are to the English translation.

claim limitations that were not identified during the earlier-concluded examination as lacking from the prior art.

Substantial New Questions of Patentability Raised by Requester

40. **SNQ 1:** It is agreed that consideration of Kwak taken together with Bourn et al. and Watson raises an SNQ as to claims 1-7 of US Patent No. 7,841,729 B2.

41. See the detailed discussion of the teachings of each of Kwak, Bourn et al. and Watson above.

42. As explained above, Bourn et al. teaches an illuminator comprising a toroidal bulb 237, and a reflector 220/221 having a circular portion that is similar in shape to at least a portion of the toroidal bulb. Accordingly, Bourn et al. teaches subject matter of patent claim 1 that was considered to be patentable during the earlier-concluded examination.

43. With respect to claim 1, Kwak teaches a mounting component 30 coupled to an arm 20, with the mounting component 30 housing the lamp 41 at a predetermined position relative to the webcam 50 so that the user can be clearly viewed/imaged by the webcam 50. See Figs. 2-3; p. 3, ll. 22-29; p. 3, l. 41 to p. 4, l. 10.

44. With respect to claim 2, the reflector 42 of Kwak is positioned proximate the lamp 41 to project light towards a face of the user. Similarly, the reflector 220/221 of Bourn et al. is positioned proximate the bulb 237 (used in place of the LEDs 231 of the first embodiment) to project light towards the object 160 in front of the video camera 140.

45. With respect to claim 3, Bourn et al. teaches that the ring-shaped reflector 220/221 can be lined/plated with a reflective coating. See col. 11, ll. 16-31.

46. With respect to claim 4, Kwak teaches flexible arm 20, which permits the lamp 41 to be moved to a desired position. See Figs. 2-3; p. 3, ll. 22-29 and 39-40. Kwak's arm 20 also allows the lamp 41 to be placed in a specific location relative to the webcam 50 during installation and

use of the webcam. Watson teaches flexible arm 42, which permits the bulb 44 to be positioned relative to the web camera 12. See Figs. 1-4 and 6; ¶ 0033.

47. With respect to claim 5, the arm 20 of Kwak connects to a computer display 1 via adhesive tape 11. See Figs. 1 and 3; p. 3, ll. 22-24 and 30-33. The arm 42 of Watson connects to a laptop display monitor 62 by clips (i.e., clamps) 60. See Fig. 3; ¶ 0035.

48. With respect to claim 6, the arm 20 of Kwak can be secured at various positions along a top edge of the computer display 1 via the adhesive tape 11. The clamps 60 of Watson can be secured at various positions along a top edge of the laptop display monitor 62 and, thus, are capable of being moved along the top edge to adjust the location of the bulb.

49. With respect to claim 7, the arm 20 of Kwak has a base 10 that can be attached to any support structure/surface and, thus, can be used to support the illuminator on a flat surface adjacent to the computer display 1. See Figs. 2-3; p. 3, ll. 30-33; p. 4, ll. 26-29. The arm 42 of Watson is coupled to a base 68 and/or 70 that supports the illuminator on a flat desktop surface adjacent to a computer display. See Fig. 4; ¶ 0036.

50. For these reasons, there is a substantial likelihood that a reasonable examiner would consider the teachings of Kwak, Bourn et al. and Watson important in deciding whether or not claims 1-7 are patentable. Accordingly, Kwak taken together with Bourn et al. and Watson raises an SNQ as to claims 1-7, which question has not been decided in a previous examination.

51. **SNQ 2:** It is agreed that consideration of Kwak taken together with Bourn et al. and Watson (SNQ 1) and further taken together with Cook raises an SNQ as to claims 8 and 9 of US Patent No. 7,841,729 B2.

52. See the detailed discussion of the teachings of each of Kwak, Bourn et al., Watson and Cook above.

53. As explained above, Bourn et al. teaches an illuminator comprising a toroidal bulb 237, and a reflector 220/221 having a circular portion that is similar in shape to at least a portion of

the toroidal bulb. Accordingly, Bourn et al. teaches subject matter of patent claim 1 that was considered to be patentable during the earlier-concluded examination.

54. With respect to claims 8 and 9, Cook teaches the light-diffusing fabric netting 73 made of cotton, nylon, polyester or similar fabric. See Figs. 4 and 6; ¶ 0015.

55. For these reasons, there is a substantial likelihood that a reasonable examiner would consider the teachings of Kwak, Bourn et al., Watson and Cook, important in deciding whether or not claims 8 and 9 are patentable. Accordingly, Kwak taken together with Bourn et al. and Watson and further taken together with Cook raises an SNQ as to claims 8 and 9, which question has not been decided in a previous examination.

Substantial New Questions of Patentability Raised by Examiner

56. In addition to the SNQs raised by the requester, the following SNQs are raised by the examiner in this decision granting the request for *ex parte* reexamination.

57. **SNQ 3:** Consideration of Kwak taken together with Negishi and O'Neill et al. raises an SNQ as to claims 1, 2 and 4 of US Patent No. 7,841,729 B2.

58. See the detailed discussion of the teachings of each of Kwak, Negishi and O'Neill et al. above.

59. As explained above:

- Negishi teaches an illuminator comprising a toroidal bulb L, and at least one reflector R, r having a circular portion that is similar in shape to at least a portion of the toroidal bulb. Accordingly, Negishi teaches subject matter of patent claim 1 that was considered to be patentable during the earlier-concluded examination.
- O'Neill et al. teaches an illuminator comprising a toroidal bulb 26, and a reflector 27 having a circular portion that is similar in shape to at least a portion of the toroidal bulb. Accordingly, O'Neill et al. teaches subject matter of patent claim 1 that was considered to be patentable during the earlier-concluded examination.

60. With respect to claim 1, Kwak teaches a mounting component 30 coupled to an arm 20, with the mounting component 30 housing the lamp 41 at a predetermined position relative to the webcam 50 so that the user can be clearly viewed/imaged by the webcam 50. See Figs. 2-3; p. 3, ll. 22-29; p. 3, l. 41 to p. 4, l. 10. Negishi teaches that (i) the toroidal bulb L is placed in a specific location relative to the camera C in order to provide optimal viewing of the person or object to be photographed by the camera, and (ii) the principle of Negishi's illuminator can be applied to other various lighting devices. O'Neill et al. teaches that (i) the toroidal bulb 26 is placed in a specific location relative to the CCD camera 17 in order to provide optimal viewing of the object to be imaged by the camera, (ii) the camera 17 is mounted in a vertically adjustable manner, and (iii) the height of the lower light source 25 (i.e., the height of the toroidal bulb 26) can be adjusted (relative to the camera 17) in order to allow flexible use of the system, increase the number of pixels per view, and improve performance.

61. With respect to claim 2, the reflector 42 of Kwak is positioned proximate the lamp 41 to project light towards a face of the user. Similarly, the reflectors R, r of Negishi are positioned proximate the toroidal bulb L to project light towards the person or object to be photographed by the camera C. Likewise, the reflector 27 of O'Neill et al. is positioned proximate the toroidal bulb 26 to project light towards the object to be imaged by the CCD camera 17.

62. With respect to claim 4, Kwak teaches flexible arm 20, which permits the lamp 41 to be moved to a desired position. See Figs. 2-3; p. 3, ll. 22-29 and 39-40. Kwak's arm 20 also allows the lamp 41 to be placed in a specific location relative to the webcam 50 during installation and use of the webcam.

63. For these reasons, there is a substantial likelihood that a reasonable examiner would consider the teachings of Kwak, Negishi and O'Neill et al. important in deciding whether or not claims 1, 2 and 4 are patentable. Accordingly, Kwak taken together with Negishi and O'Neill et al. raises an SNQ as to claims 1, 2 and 4, which question has not been decided in a previous examination.

64. **SNQ 4:** Consideration of Kwak taken together with Negishi and O'Neill et al. (SNQ 3) and further taken together with Bourn et al. raises an SNQ as to claim 3 of US Patent No. 7,841,729 B2.

65. See the detailed discussion of the teachings of each of Kwak, Negishi, O'Neill et al. and Bourn et al. above.

66. As explained above:

- Negishi teaches an illuminator comprising a toroidal bulb L, and at least one reflector R, r having a circular portion that is similar in shape to at least a portion of the toroidal bulb. Accordingly, Negishi teaches subject matter of patent claim 1 that was considered to be patentable during the earlier-concluded examination.
- O'Neill et al. teaches an illuminator comprising a toroidal bulb 26, and a reflector 27 having a circular portion that is similar in shape to at least a portion of the toroidal bulb. Accordingly, O'Neill et al. teaches subject matter of patent claim 1 that was considered to be patentable during the earlier-concluded examination.

67. With respect to claim 3, Bourn et al. teaches that the ring-shaped reflector 220/221 can be lined/plated with a reflective coating. See col. 11, ll. 16-31.

68. For these reasons, there is a substantial likelihood that a reasonable examiner would consider the teachings of Kwak, Negishi, O'Neill et al. and Bourn et al. important in deciding whether or not claim 3 is patentable. Accordingly, Kwak taken together with Negishi and O'Neill et al. and further taken together with Bourn et al. raises an SNQ as to claim 3, which question has not been decided in a previous examination.

69. **SNQ 5:** Consideration of Kwak taken together with Negishi and O'Neill et al. (SNQ 3) and further taken together with Lin and Watson raises an SNQ as to claims 5 and 6 of US Patent No. 7,841,729 B2.

70. See the detailed discussion of the teachings of each of Kwak, Negishi, O'Neill et al., Lin and Watson above.

71. As explained above:

- Negishi teaches an illuminator comprising a toroidal bulb L, and at least one reflector R, r having a circular portion that is similar in shape to at least a portion of the toroidal bulb. Accordingly, Negishi teaches subject matter of patent claim 1 that was considered to be patentable during the earlier-concluded examination.
- O'Neill et al. teaches an illuminator comprising a toroidal bulb 26, and a reflector 27 having a circular portion that is similar in shape to at least a portion of the toroidal bulb. Accordingly, O'Neill et al. teaches subject matter of patent claim 1 that was considered to be patentable during the earlier-concluded examination.

72. With respect to claim 5, the arm 20 of Kwak connects to a computer display 1 via adhesive tape 11. See Figs. 1 and 3; p. 3, ll. 22-24 and 30-33. The arm 103 of Lin connects to an edge of an LCD of a laptop computer by clamp 102. See Fig. 1; ¶¶ 0003-0005. The arm 42 of Watson connects to a laptop display monitor 62 by clips (i.e., clamps) 60. See Fig. 3; ¶ 0035.

73. With respect to claim 6, the arm 20 of Kwak can be secured at various positions along a top edge of the computer display 1 via the adhesive tape 11. The clamp 102 of Lin can be secured at various positions along an edge of the laptop display and, thus, is capable of being moved along the edge to adjust the location of the bulb. The clamps 60 of Watson can be secured at various positions along a top edge of the laptop display monitor 62 and, thus, are capable of being moved along the top edge to adjust the location of the bulb.

74. For these reasons, there is a substantial likelihood that a reasonable examiner would consider the teachings of Kwak, Negishi, O'Neill et al., Lin and Watson important in deciding whether or not claims 5 and 6 are patentable. Accordingly, Kwak taken together with Negishi and O'Neill et al. and further taken together with Lin and Watson raises an SNQ as to claims 5 and 6, which question has not been decided in a previous examination.

75. **SNQ 6:** Consideration of Kwak taken together with Negishi and O'Neill et al. (SNQ 3) and further taken together with Holmes et al. and Watson raises an SNQ as to claim 7 of US Patent No. 7,841,729 B2.

76. See the detailed discussion of the teachings of each of Kwak, Negishi, O'Neill et al., Holmes et al. and Watson above.

77. As explained above:

- Negishi teaches an illuminator comprising a toroidal bulb L, and at least one reflector R, r having a circular portion that is similar in shape to at least a portion of the toroidal bulb. Accordingly, Negishi teaches subject matter of patent claim 1 that was considered to be patentable during the earlier-concluded examination.
- O'Neill et al. teaches an illuminator comprising a toroidal bulb 26, and a reflector 27 having a circular portion that is similar in shape to at least a portion of the toroidal bulb. Accordingly, O'Neill et al. teaches subject matter of patent claim 1 that was considered to be patentable during the earlier-concluded examination.

78. With respect to claim 7, the arm 20 of Kwak has a base 10 that can be attached to any position and, thus, can be used to support the illuminator on a flat surface adjacent to the computer display 1. See Figs. 2-3; p. 3, ll. 30-33; p. 4, ll. 26-29. The arm 20 of Holmes et al. is coupled to a base 10 that functions as a clamp to support the webcam mount on a flat surface (e.g., table) adjacent to a computer. See Figs. 1 and 3; ¶¶ 0001, 0008, 0015-0017. The arm 42 of Watson is coupled to a base 68 and/or 70 that supports the illuminator on a flat desktop surface adjacent to a computer display. See Fig. 4; ¶ 0036.

79. For these reasons, there is a substantial likelihood that a reasonable examiner would consider the teachings of Kwak, Negishi, O'Neill et al., Holmes et al. and Watson important in deciding whether or not claim 7 is patentable. Accordingly, Kwak taken together with Negishi and O'Neill et al. and further taken together with Holmes et al. and Watson raises an SNQ as to claim 7, which question has not been decided in a previous examination.

80. **SNQ 7:** Consideration of Kwak taken together with Negishi and O'Neill et al. (SNQ 3) and further taken together with Cook raises an SNQ as to claim 8 of US Patent No. 7,841,729 B2.

81. See the detailed discussion of the teachings of each of Kwak, Negishi, O'Neill et al. and Cook above.

82. As explained above:

- Negishi teaches an illuminator comprising a toroidal bulb L, and at least one reflector R, r having a circular portion that is similar in shape to at least a portion of the toroidal bulb. Accordingly, Negishi teaches subject matter of patent claim 1 that was considered to be patentable during the earlier-concluded examination.
- O'Neill et al. teaches an illuminator comprising a toroidal bulb 26, and a reflector 27 having a circular portion that is similar in shape to at least a portion of the toroidal bulb. Accordingly, O'Neill et al. teaches subject matter of patent claim 1 that was considered to be patentable during the earlier-concluded examination.

83. With respect to claim 8, Cook teaches the light-diffusing fabric netting 73 made of cotton, nylon, polyester or similar fabric. See Figs. 4 and 6; ¶ 0015.

84. For these reasons, there is a substantial likelihood that a reasonable examiner would consider the teachings of Kwak, Negishi, O'Neill et al. and Cook important in deciding whether or not claim 8 is patentable. Accordingly, Kwak taken together with Negishi and O'Neill et al. and further taken together with Cook raises an SNQ as to claim 8, which question has not been decided in a previous examination.

85. **SNQ 8:** Consideration of Kwak taken together with Negishi, O'Neill et al. and Cook (SNQ 7) and further taken together with Numao raises an SNQ as to claim 9 of US Patent No. 7,841,729 B2.

86. See the detailed discussion of the teachings of each of Kwak, Negishi, O'Neill et al., Cook and Numao above.

87. As explained above:

- Negishi teaches an illuminator comprising a toroidal bulb L, and at least one reflector R, r having a circular portion that is similar in shape to at least a portion of the toroidal bulb. Accordingly, Negishi teaches subject matter of patent claim 1 that was considered to be patentable during the earlier-concluded examination.
- O'Neill et al. teaches an illuminator comprising a toroidal bulb 26, and a reflector 27 having a circular portion that is similar in shape to at least a portion of the toroidal bulb. Accordingly, O'Neill et al. teaches subject matter of patent claim 1 that was considered to be patentable during the earlier-concluded examination.

88. With respect to claim 9, Cook teaches the light-diffusing fabric netting 73 made of cotton, nylon, polyester or similar fabric. See Figs. 4 and 6; ¶¶ 0015. Numao teaches the diffusion sheet 26 made of linen or silk cloth. See Figs. 1-3; ¶¶ 0013, 0017.

89. For these reasons, there is a substantial likelihood that a reasonable examiner would consider the teachings of Kwak, Negishi, O'Neill et al., Cook and Numao important in deciding whether or not claim 9 is patentable. Accordingly, Kwak taken together with Negishi, O'Neill et al. and Cook and further taken together with Numao raises an SNQ as to claim 9, which question has not been decided in a previous examination.

Conclusion

90. For the reasons given above, the present request for *ex parte* reexamination raises a substantial new question of patentability (SNQ) affecting claims 1-9 of US Patent No. 7,841,729 B2. Accordingly, claims 1-9 will be reexamined.

Not All Claims Reexamined

91. Since requester did not request reexamination of claims 10-13 and did not assert the existence of a substantial new question of patentability (SNQ) for such claims (see 35 U.S.C. § 302; see also 37 CFR 1.510b and 1.515), such claims will not be reexamined. This matter was squarely addressed in *Sony Computer Entertainment America Inc., et al. v. Jon W. Dudas*, Civil

Action No. 1:05CV1447 (E.D.Va. May 22, 2006), Slip Copy, 2006 WL 1472462. The District Court upheld the Office's discretion to not reexamine claims in a reexamination proceeding other than those claims for which reexamination had specifically been requested. The Court stated:

“To be sure, a party may seek, and the PTO may grant... review of each and every claim of a patent. Moreover, while the PTO in its discretion may review claims for which... review was not requested, nothing in the statute compels it to do so. To ensure that the PTO considers a claim for... review, [the statute] requires that the party seeking reexamination demonstrate why the PTO should reexamine each and every claim for which it seeks review. Here, it is undisputed that **Sony** did not seek review of every claim under the '213 and '333 patents. Accordingly, **Sony** cannot now claim that the PTO wrongly failed to reexamine claims for which **Sony** never requested review, and its argument that AIPA compels a contrary result is unpersuasive.”

35 USC 325(d)

92. A review of the post grant history for the instant patent indicates that there have been no other Office post grant challenges made to the patent (Reexamination Proceedings or Inter Partes Review, Post Grant Review, Covered Business Method trials). Accordingly, a discretionary denial of reexamination pursuant to 35 USC 325(d) is not applicable.

Remarks

93. Extensions of time under 37 CFR 1.136(a) will not be permitted in these proceedings because the provisions of 37 CFR 1.136 apply only to “an applicant” and not to parties in a reexamination proceeding. Additionally, 35 U.S.C. 305 requires that *ex parte* reexamination proceedings “will be conducted with special dispatch” (37 CFR 1.550(a)). Extensions of time in *ex parte* reexamination proceedings are provided for in 37 CFR 1.550(c).

94. All correspondence relating to this *ex parte* reexamination proceeding should be directed:
By Patent Center⁴: Registered users may submit via the Patent Center at:
<https://patentcenter.uspto.gov/>

⁴ Visit <https://www.uspto.gov/patents/apply/patent-center> for more information about Patent Center and <https://www.uspto.gov/patents/docx> for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

By Mail to: Mail Stop *Ex Parte* Reexam
Attn: Central Reexamination Unit
Commissioner for Patents
United States Patent & Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

By FAX to: (571) 273-9900
Attn: Central Reexamination Unit

By hand: Customer Service Window
Knox Building
501 Dulany Street
Alexandria, VA 22314

95. Any proposed amendment filed in this reexamination proceeding must be made in accordance with 37 CFR 1.530(d)-(j) and comply with the formal requirements of 37 CFR 1.52(a) and (b). See MPEP 2250.

96. Any document filed by either the patent owner or third party requester *must be served* on the other party in the reexamination proceeding in the manner provided by 37 CFR 1.248. See 37 CFR 1.550(f) and MPEP 2266.03.

97. The patent owner is reminded of the continuing responsibility under 37 CFR 1.565(a) to apprise the Office of any litigation activity, or other prior or concurrent proceeding, involving the patent throughout the course of this reexamination proceeding. The third party requester is also reminded of the ability to similarly apprise the Office of any such activity or proceeding throughout the course of this reexamination proceeding. See MPEP 2207, 2282 and 2286.

98. Any inquiry concerning this communication or earlier communications from the Reexamination Examiner should be directed to Peter English whose telephone number is (571)272-6671. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:00 pm EST). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eileen Lillis, can be reached at 571-272-6928.

99. For general information regarding reexamination proceedings please call the Central Reexamination Unit at 571-272-7705. For guidance on reexamination practice and procedure please call the Office of Patent Legal Administration at 571-272-7703.

/PETER C ENGLISH/
Reexamination Specialist, Art Unit 3993

Conferees:
/GLENN K DAWSON/
Reexamination Specialist, Art Unit 3993

/EILEEN D LILLIS/
SPRS, Art Unit 3993

Notice of References CitedApplication/Control No.
90/019,924Applicant(s)/Patent Under
Reexamination
7841729Examiner
Peter C EnglishArt Unit
3993

Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Name	CPC Classification	US Classification
*	A	US-3604913-A	1971-09-14	Crete	G03B15/06	362/8
*	B	US-4974138-A	1990-11-27	Negishi	G02B19/0047	362/346
*	C	US-6238060-B1	2001-05-29	Bourn et al.	G01N21/9036	362/3
*	D	US-20040211868-A1	2004-10-28	Holmes et al.	F16M13/022	248/231.71
*	E	US-20050151042-A1	2005-07-14	Watson	F16M11/40	348/E7.079
*	F	US-20060007666-A1	2006-01-12	Cook	G03B15/02	362/16
*	G	US-20070139515-A1	2007-06-21	Du Breuil	H04N7/142	348/E7.079
	H					
	I					
	J					
	K					
	L					
	M					


FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Country	Name	CPC Classification
	N	EP-0822409-A2	1998-02-04	EP	O'Neill et al.	
	O	JP-2001027776-A	2001-01-30	JP	Numao	
*	P	KR-200316985-Y1	2003-06-19	KR	Kwak	
	Q	DE-20310780-U1	2004-01-29	DE	Lin	
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title, Date, Publisher, Edition or Volume, Pertinent Pages
	U	English translation of JP-2001027776-A retrieved from EPO's Espacenet website.
	V	English translation of DE-20310780-U1 retrieved from EPO's Espacenet website.
	W	
	X	

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


Reexamination 	Application/Control No. 90/019,924	Applicant(s)/Patent Under Reexamination 7841729
	Certificate Date	Certificate Number

Requester Correspondence Address: <input type="checkbox"/> Patent Owner <input checked="" type="checkbox"/> Third Party
Zhong Law, LLC 51 JFK Parkway 1st Floor West Short Hills NJ 07078

LITIGATION REVIEW <input checked="" type="checkbox"/>	<i>/PE/</i> (examiner initials)	13 May 2025 (date)
Case Name	Director Initials	
NONE		

COPENDING OFFICE PROCEEDINGS	
TYPE OF PROCEEDING	NUMBER
NONE	N/A

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Search Notes 	Application/Control No. 90/019,924	Applicant(s)/Patent Under Reexamination 7841729
	Examiner Peter C English	Art Unit 3993

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
Reviewed IFW for PAT 7,841,729	05/13/2025	/PE/
Used PDP and P-TACTS to search for other post-grant proceedings for PAT 7,841,729 - none found	05/13/2025	/PE/
Used Westlaw to search for litigation involving PAT 7,841,729	05/13/2025	/PE/
PE2E SEARCH - Prior Art (see printout)	05/14/2025	/PE/

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

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CONFIRMATION NO. 7059

SERIAL NUMBER 90/019,924	FILING or 371(c) DATE 04/22/2025 RULE	CLASS 362	GROUP ART UNIT 3993	ATTORNEY DOCKET NO. EXRE_PI_729		
APPLICANTS Splashlight Studios (PO), Residence Not Provided; Zhong Law, LLC, Short Hills,, NJ; INVENTORS 7841729, Residence Not Provided; Zhong Law, LLC, Residence Not Provided; Henry Geddes, Delray Beach,, FL;						
** CONTINUING DATA ***** This application is a REX of 12/011,090 01/24/2008 PAT 7841729 which claims benefit of 60/897,600 01/26/2007						
** FOREIGN APPLICATIONS ***** ** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **						
Foreign Priority claimed <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No 35 USC 119(a-d) conditions met <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Verified and Acknowledged <u>/Peter C English/</u> <small>Examiner's Signature</small>		<input type="checkbox"/> Met after Allowance <small>Initials</small>	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS 13	INDEPENDENT CLAIMS 1
ADDRESS Finn IP Law, PC 11400 W. Olympic Boulevard, 9th Floor Los Angeles, CA 90064 UNITED STATES						
TITLE WEBCAM ILLUMINATOR DEVICE						
FILING FEE RECEIVED 0.00	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit			

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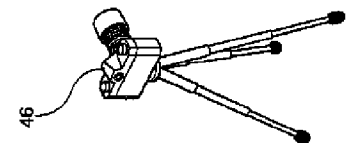
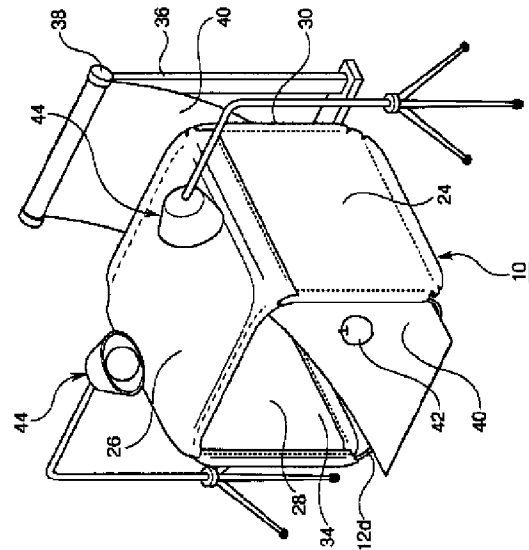
Fターム(参考) 3K060 AA04 AA05 CA05 CD00 EA01

(54)【発明の名称】 撮影用システムボックス

(57)【要約】

【課題】 スタジオなどにおいて、人物、静物などの写真撮影を行う際に、被写体に適切なライティングを行うために、ディフューザーなどの配置、ならびにバック紙として機能する部材を簡単に所定位置に配置できるとともに、撮影終了後にこれらを簡単に撤去可能で、運搬の際にも高張らない拡開設営ならびに折り畳み収納自在に構成された撮影用システムボックスを提供する。

【解決手段】 多面体を構成するフレーム枠部材と、フレーム枠部材の少なくとも後方側面部を除いた側面部に張設した光を反射する側方反射シート部材と、フレーム枠部材の上面部に張設した照明光を透過拡散可能な上部拡散シート部材とを備え、フレーム枠部材が、折曲可能で且つ元の形状に伸張復帰自在な部材からなり、撮影システムボックスが拡開設営ならびに折り畳み収納自在に構成されている。



【特許請求の範囲】

【請求項1】 多面体を構成するフレーム枠部材と、前記フレーム枠部材の側面部に張設した光を反射する側方反射シート部材と、前記フレーム枠部材の上面部に張設した照明光を透過拡散可能な上部拡散シート部材とを備え、前記フレーム枠部材が、折曲可能で且つ元の形状に伸張復帰自在な部材からなり、撮影システムボックスを拡開設営ならびに折り畳み収納自在に構成されていることを特徴とする撮影用システムボックス。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、スタジオなどにおいて、写真撮影の際に、被写体に適切なライティングを行うために使用する撮影用システムボックスに関する。

【0002】

【従来の技術】従来、写真スタジオなどで、人物、静物などの被写体を撮影する場合には、被写体に照射する光のトーンを和らげ、均一に照明光をあてるために、以下のような撮影セットの設営準備をするのが一般的である。すなわち、図8に示したように、スタジオ内に固定したロール104から黒ケント紙などのバック紙106を床108まで垂れ下がるように張設し、その上に被写体102が配置される。そして、その両側部には、白レフ板などの反射板110、112を配置するとともに、その上面に乳白フィルム、トレーシングペーパーなどの光を透過して拡散するディフューザー114を設置し、その上方に照明116、118を配置して、このディフューザー114を介して、被写体102上に均一な拡散光を照射して、撮影用カメラ120にて撮影するようにしている。

【発明が解決しようとする課題】しかしながら、撮影の度に、このように、バック紙106、反射板110、112、ならびにディフューザー114を所定の位置に設置し、また、撮影が終了する度にこれを撤去しなければならず、煩雑で手間のかかる作業が必要で、設営のための時間あるいはスタッフを多数必要とし、コストが高くなることにもつながっていた。

【0003】本発明は、このような現状に鑑みて、写真スタジオなどで、人物、静物を撮影する場合に、従来の反射板、ディフューザー、ならびにバック紙と機能する部材を簡単に所定位置に配置できるとともに、撮影終了後にこれらを簡単に撤去可能で、運搬の際にも嵩張らない拡開設営ならびに折り畳み収納自在に構成された撮影用システムボックスを提供することを目的とする。

【0004】

【課題を解決するための手段】本発明は、前述したような従来技術における課題および目的を達成するために発明なされたものであって、本発明の撮影用システムボックスは、多面体を構成するフレーム枠部材と、前記フレ

ーム枠部材の側面部に張設した光を反射する側方反射シート部材と、前記フレーム枠部材の上面部に張設した照明光を透過拡散可能な上部拡散シート部材とを備え、前記フレーム枠部材が、折曲可能で且つ元の形状に伸張復帰自在な部材からなり、撮影システムボックスが拡開設営ならびに折り畳み収納自在に構成されていることを特徴とする。

【0005】このように構成されることによって、本発明の撮影用システムボックスは、コンパクトに折り畳み収納した状態から、撮影に使用する際に、拡げることによってフレーム枠部材が自動的に拡開して、元の形状に伸張復帰して多面体が構成される。これにより、側面部に光を反射する側方反射シート部材が位置し、上面部に照明光を透過拡散可能な上部拡散シート部材がセットされた状態となり、その内部に撮影空間が形成される。

【0006】そして、底部前方のフレーム枠部材から立ち上がって、後方上部のフレーム枠部材に至るバックシート部材を後方側面部を介して張設配置することもできる。このバックシート部材の上面に人物、静物などの被写体を配置し、上部拡散シート部材の外側上方から、照明光を照射することにより、上部拡散シート部材を透過した照明光が、柔らかい光となるとともに、撮影空間内部において均一に拡散され、また、側部の側方反射シート部材によって反射され、被写体全面に照明光が均一に拡散照射されて、極めて良好な撮影状態が維持された撮影セットが設営されることになる。

【0007】一方、撮影が終了した後は、バックシート部材を取り除き、フレーム枠部材を折り畳むだけで、簡単に撮影用システムボックス全体をコンパクトに収納することができる。

【0008】

【発明の実施の形態】以下、本発明の実施の形態（実施例）を図面に基づいてより詳細に説明する。図1は、本発明の撮影用システムボックスの第1の実施例の分解斜視図、図2は、図1の撮影用システムボックスの拡開した状態を説明する斜視図、図3は、本発明の撮影用システムボックスの使用状態を説明する概略斜視図、図4は、本発明の撮影用システムボックスの収納方法を説明する概略図である。

【0009】図1～図4において、10は、全体で本発明の撮影用システムボックスを示している。図1に示したように、撮影用システムボックス10は、4つの略矩形形状のフレーム枠部材12、14、16、18からなるフレーム枠部材20を備えており、これにより六面体を構成するようになっている。

【0010】すなわち、フレーム枠部材20は、前方の側面部に配置した前方フレーム枠部材12と、一對の左右側面部に配置した側方フレーム枠部材14、16と、後方の側面部に配置した後方フレーム枠部材18とから構成されている。そして、左右の側方フレーム枠部材1

4、16にはそれぞれ、左右の側方反射シート部材22、24が取付されている。

【0011】具体的には、これらの側方反射シート部材22、24は、図1に示したように、略矩形形状の側方反射シート部材本体22a、24aを有し、その4辺にそれぞれ縫い代部22b~22e、24b~24eが形成されている。そして、左側の側方反射シート部材22では、図1の①で示したように、上部縫い代部22bが、左側の側方フレーム枠部材14の上部フレーム14bを包むように外方より折り返して縫いつけられる。また、前部縫い代部22cが、左側の側方フレーム枠部材14の前方フレーム14cと前方フレーム枠部材12の左側フレーム12cとを包むように外方より折り返して縫いつけられる。下部縫い代部22dが、左側の側方フレーム枠部材14の下方フレーム14dを包むように外方より折り返して縫いつけられる。さらに、後部縫い代部22eが、左側の側方フレーム枠部材14の後方フレーム14eと後方フレーム枠部材18の左側フレーム18eとを包むように外方より折り返して縫いつけられる。

【0012】一方、右側の側方反射シート部材24では、図1の②で示したように、上部縫い代部24bが、右側の側方フレーム枠部材16の上部フレーム16bを包むように外方より折り返して縫いつけられる。また、前部縫い代部24eが、右側の側方フレーム枠部材16の前方フレーム16eと前方フレーム枠部材12の右側フレーム12eとを包むように外方より折り返して縫いつけられる。下部縫い代部24dが、右側の側方フレーム枠部材16の下方フレーム16dを包むように外方より折り返して縫いつけられる。さらに、後部縫い代部24cが、右側の側方フレーム枠部材16の後方フレーム16cと後方フレーム枠部材18の右側フレーム18cとを包むように外方より折り返して縫いつけられる。

【0013】さらに、フレーム枠部材12、14、16、18からなるフレーム枠部材20から構成される六面体の上面の位置には、上部拡散シート部材26が、これらのフレーム枠部材に取付されている。すなわち、上部拡散シート部材26は、図1に示したように、略矩形形状の側方反射シート部材本体26aを有し、その4辺にそれぞれ縫い代部26b~26eが形成されているとともに、四隅に縫い代部26f~26iが形成されている。

【0014】そして、図1の③で示したように、前方縫い代部26bが、前方フレーム枠部材12の上部フレーム12bを包むように外方より折り返して縫いつけられる。また、後部縫い代部26eが、後方フレーム枠部材18の上部フレーム18bを包むように外方より折り返して縫いつけられる。そして、左側縫い代部26eが、左側の側方フレーム枠部材14の上部フレーム14bを外方より越えて、左側の側方反射シート部材22の上部縫い代部22b近傍に縫いつけられる。同様にして、右

側縫い代部26cが、右側の側方フレーム枠部材16の上部フレーム16bを外方より越えて、右側の側方反射シート部材24の上部縫い代部22b近傍に縫いつけられる。さらに、四隅に形成した縫い代部26f~26iをそれぞれ、フレーム枠部材20の、フレーム枠部材12、14、16、18の接合部上部に縫いつける。

【0015】このようにして、図1及び図2に示したように、前面に前面開口部28が、後面に後面開口部30が、底面に底面開口部32を有し、内部に撮影空間34が形成されることになる。ところで、左右側面部の側方反射シート部材22、24は、その側方反射シート部材本体22a、24aの内面が、光を均一に反射する反射面となっている。また、これらの側方反射シート部材22、24の外側面は、遮光性を有するように構成されている。

【0016】このような反射面を形成する方法としては、特に限定されるものではなく、例えば、側方反射シート部材22、24の内面に、銀を蒸着したもの、または、不織布などの白布を貼着したもの、側方反射シート部材22、24自体をこれらの白布としたもの、さらに、側方反射シート部材22、24自体を、反射フィルムで構成するなど種々の方法が採用可能である。

【0017】なお、これら側方反射シート部材22、24を通常のシート部材として、その内面に上記したような反射材膜を脱着自在に取付するようにしても勿論構わない。また、上部拡散シート部材26は、その上方から照明光を照射した際に、照明光を透過するとともに拡散可能な部材から構成されている。このような部材としては、特に限定されるものではなく、例えば、麻布、絹布などのシート部材、合成樹脂ビーズ粒子を含有した拡散フィルムなど種々のものが採用可能である。

【0018】さらに、フレーム枠部材20を構成するフレーム枠部材12、14、16、18は、折曲可能で且つ元の形状に伸張復帰自在な部材から構成される。このような材料としては、特に限定されるものではなく、ある程度バネ性を有する、例えば、スチール線材、ワイヤ材、プラスチック線材などが採用可能である。また、上記実施例では、縫い代部を設けてフレーム枠部材20を覆うように縫いつけたが、勿論シート部材22、24、26が合成樹脂などでできている場合には、溶着で取付するようにすることも勿論可能である。

【0019】なお、上記実施例では、前方フレーム枠部材12の下方フレーム12dならびに後方フレーム枠部材18の下方フレーム18dが、シート材で被覆されていないことになるが、このままでもよいが、シートがこれらの下方フレーム12d、18dが露出することによって、破損しないように、図示しないが、被覆することも可能である。

【0020】このようにフレーム枠部材20を構成することによって、撮影に使用する際に、抜けることによ

てフレーム枠部材 20 が自動的に拡開して、元の形状に伸張復帰して多面体が構成される。一方、撮影が終了した後は、フレーム枠部材を折り畳むだけで、簡単に撮影用システムボックス全体をコンパクトに収納することができる。

【0021】このように構成される撮影用システムボックス 10 の使用方法について、図 3 および図 4 に基づいて説明する。まず、図 4 (a) ~ (d) のように、予め折り畳んでコンパクトに収納した状態の撮影用システムボックスを、撮影の準備の際に、図 4 (d) → 図 4

(a) のように、拡げることによってフレーム枠部材 20 のフレーム枠部材 12、14、16、18 が自動的に拡開して、元の形状に伸張復帰して、六面体が構成される。これにより、側面部に光を反射する側方反射シート部材 22、24 が位置し、上面部に照明光を透過拡散可能な上部拡散シート部材 26 がセットされた状態となり、図 2 に示したように、前面に前面開口部 28 が、後面に後面開口部 30 が、底面に底面開口部 32 を有し、内部に撮影空間 34 が形成されることになる。

【0022】そして、図 3 に示したように、バック布ロール架台 36 に配置したバック布ロール 38 から、バックシート部材 40 を繰り出して、前方フレーム枠部材 12 の底部前方の下方フレーム 12d から立ち上がり、後方上部の後方フレーム枠部材 18 の上部フレーム 18b 至るように、後面開口部 30 を介してバックシート部材 40 を張設して配置する。

【0023】このバックシート部材 40 の上面に人物、静物などの被写体 42 を配置するとともに、上部拡散シート部材 26 の外側上方より、照明スタンド 44 から照明光を照射する。これにより、上部拡散シート部材 26 を透過した照明光が、撮影空間 34 内にて柔らかい光となるとともに、撮影空間 34 内部において均一に拡散され、また、側部の側方反射シート部材 22、24 の反射面によって反射され、被写体 42 の全面に照明光が均一に拡散照射され、極めて良好な撮影状態が維持された撮影セットが設営されることになる。そして、前面開口部 28 を介して、撮影用カメラ 46 にて撮影を開始する。

【0024】一方、撮影が終了した後は、バックシート部材 40 を取り除き、フレーム枠部材 20 を、図 4 (a) ~ (d) のように、折り畳むだけで、簡単に撮影用システムボックス 10 全体をコンパクトに収納することができる。図 5 は、本発明の撮影用システムボックスの第 2 の実施例を示す斜視図である。図 1 に示した実施例の撮影用システムボックスと同様な構成部材には、同じ参照番号を付してその詳細な説明を省略する。

【0025】この実施例では、六面体の前方面に配置した前方フレーム枠部材 12 に、左右側面部の側方反射シート部材 22、24 と同様に、光を均一に反射する反射面を有する反射シートからなる前方カバーシート部材 50 を取付してある。このカバーシート部材 50 は、上部

フレーム 12b の上方部 54 より下方に垂下するように取付した脱着自在な覆い部材 56 と、同様に、フレーム枠部材 12 の下方フレーム 12d から上方に延びるように取付した被い部材 56' とから構成されている。これらの被い部材 56 の間には、中間に開口用の隙間 54 が形成されており、この隙間 54 を介して写真機によって内部を撮影できる。また、この前方カバーシート部材 50 (56、56') が、撮影空間内において前方へ向かう光を反射して、撮影空間内に前方から光りをあてることになるので、さらに良好な撮影環境を保持できるようになっている。

【0026】このように前方フレーム枠部材 12 の上下に被い部材 56、56' を設ける代わりに、図 6 に示したように、左右に被い部材 56、56' を設けてもよいことは勿論である。図 7 は、本発明の撮影用システムボックスの第 3 の実施例を示す斜視図である。図 1 に示した実施例の撮影用システムボックスと同様な構成部材には、同じ参照番号を付してその詳細な説明を省略する。

【0027】この実施例のように、バックシート部材 60 が、前方フレーム枠部材 12 の底部前方の下方フレーム 12d から立ち上がり、後方上部の後方フレーム枠部材 18 の上部フレーム 18b 至るように、予め張設するように取付してもよい。このように構成することによって、撮影する際には、撮影用システムボックス 10 を拡開するだけで、側面部に光を反射する側方反射シート部材 22、24 が位置し、上面部に照明光を透過拡散可能な上部拡散シート部材 26 が位置し、その内部に撮影空間 34 が形成されるとともに、底部前方のフレーム枠部材 12d から立ち上がり、後方上部の上部フレーム 18b に至るバックシート部材が、後方側面部を介して張設されセットされた状態となる。

【0028】また、撮影が終了した後は、フレーム枠部材を折り畳むだけで、簡単に撮影用システムボックス全体をコンパクトに収納することができる。以上、本発明の撮影用システムボックスの実施例について説明したが、本発明は何らこれらに限定されるものでない。例えば、上記実施例では、フレーム枠部材で六面体を形成したが、8面体などの多面体を構成することも、長方形、台形で多面体を構成することも勿論可能である。また、上記実施例では、側方反射シート部材 22、24、ならびに上部拡散シート部材 26 をそれぞれの縫い代部を折り返して縫製して、フレーム枠部材 20 のフレーム枠部材 12、14、16、18 に取付したが、別途フレーム枠部材の形状に合わせた接合布を用意して、これにより、各シート部材を各フレーム枠部材 12、14、16、18 に取付することも可能であるなど種々の変更が可能である。

【0029】

【発明の効果】本発明の撮影用システムボックスによれば、コンパクトに折り畳み収納した状態から、撮影に使

用する際に、拡げることによってフレーム枠部材が自動的に拡開して、元の形状に伸張復帰して多面体が構成される。これにより、側面部に光を反射する側方反射シート部材が位置し、上面部に照明光を透過拡散可能な上部拡散シート部材がセットされた状態となり、その内部に撮影空間が形成される。

【0030】そして、底部前方のフレーム枠部材から立ち上がって、後方上部のフレーム枠部材に至るバックシート部材を後方側面部を介して張設配置できる。このバックシート部材の上面に人物、静物などの被写体を配置するとともに、上部拡散シート部材の外側上方より、照明光を照射することにより、上部拡散シート部材を透過した照明光が、柔らかい光となるとともに、撮影空間内部において均一に拡散され、また、側部の側方反射シート部材によって反射され、被写体全面に照明光が均一に拡散照射され、極めて良好な撮影状態が維持された撮影セットが設営されることになる。

【0031】一方、撮影が終了した後は、バックシート部材を取り除き、フレーム枠部材を折り畳むだけで、簡単に撮影用システムボックス全体をコンパクトに収納することができる。従って、本発明によれば、写真スタジオなどで、人物、静物を撮影する場合に、従来のような反射板、ディフューザー、ならびにバック紙などの機能をもった撮影ボックスを、を簡単に所定位置に配置できるとともに、撮影終了後にこれらを簡単に撤去可能で、運搬の際にも嵩張らない拡開設営ならびに折り畳み収納自在に構成された極めて便利な撮影用システムボックスを提供することができる。

【図面の簡単な説明】

【図1】図1は、本発明の撮影用システムボックスの第1の実施例の分解斜視図である。

【図2】図2は、図1の撮影用システムボックスの拡開した状態を説明する斜視図である。

【図3】図3は、本発明の撮影用システムボックスの使用状態を説明する概略斜視図である。

【図4】図4は、本発明の撮影用システムボックスの収納方法を説明する概略図である。

【図5】図5は、本発明の撮影用システムボックスの第2の実施例を示す斜視図である。

【図6】図6は、本発明の撮影用システムボックスの図5の別の実施例を示す斜視図である。

【図7】図7は、本発明の撮影用システムボックスの第3の実施例を示す斜視図である。

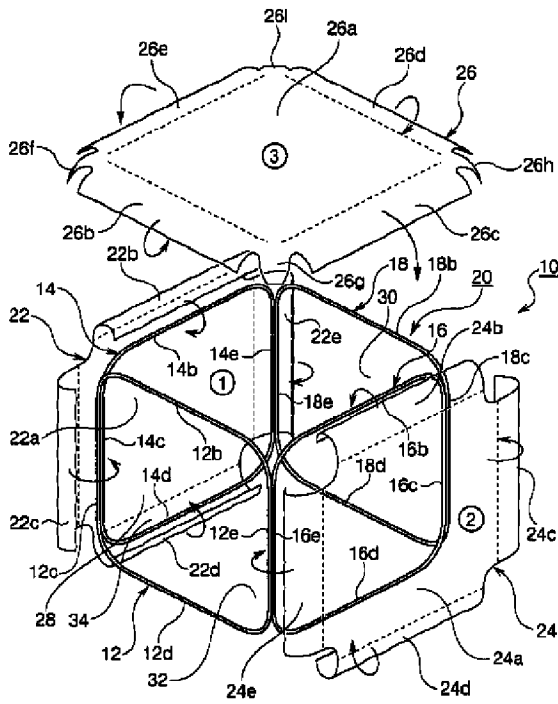
【図8】図8は、従来の撮影の際のセットの状態を説明

する斜視図である。

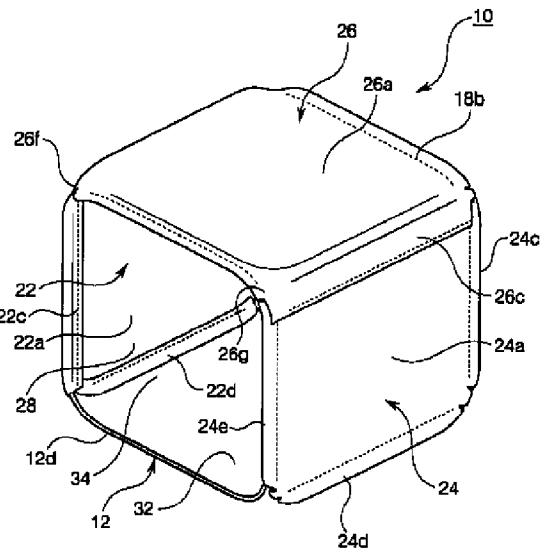
【符号の説明】

- 10 撮影用システムボックス
- 12 フレーム枠部材
- 12d フレーム枠部材
- 12d 下方フレーム
- 12c 左側フレーム
- 12b 上部フレーム
- 12 前方フレーム枠部材
- 14 側方フレーム枠部材
- 14b 上部フレーム
- 14c 前方フレーム
- 14d 下方フレーム
- 16 側方フレーム枠部材
- 16b 上部フレーム
- 16c 後方フレーム
- 16d 下方フレーム
- 18 後方フレーム枠部材
- 18b 上部フレーム
- 18c 右側フレーム
- 20 フレーム枠部材
- 22 側方反射シート部材
- 22a 側方反射シート部材本体
- 22b～22d 縫い代部
- 24 側方反射シート部材
- 24b～24d 縫い代部
- 26 上部拡散シート部材
- 26a 側方反射シート部材本体
- 26b、26c 縫い代部
- 28 前面開口部
- 30 後面開口部
- 32 底面開口部
- 34 撮影空間
- 36 バック布ロール架台
- 38 バック布ロール
- 40 バックシート部材
- 42 被写体
- 44 照明スタンド
- 46 撮影用カメラ
- 50 前方カバーシート部材
- 52 前方カバー布周囲部材
- 56 扉部材
- 60 バックシート部材

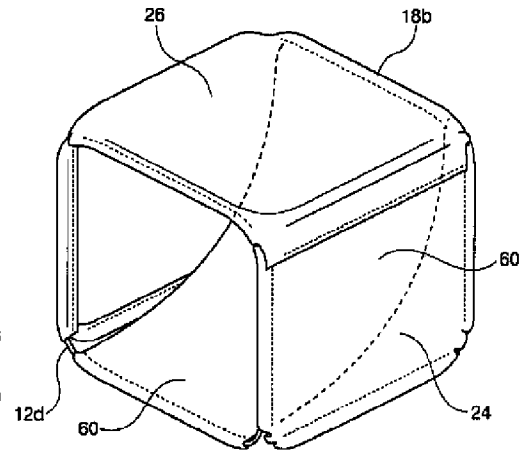
【图 1】



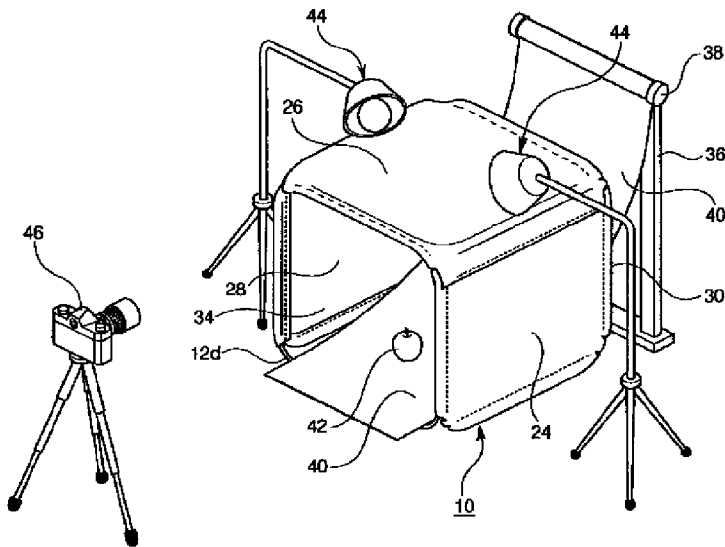
【图 2】



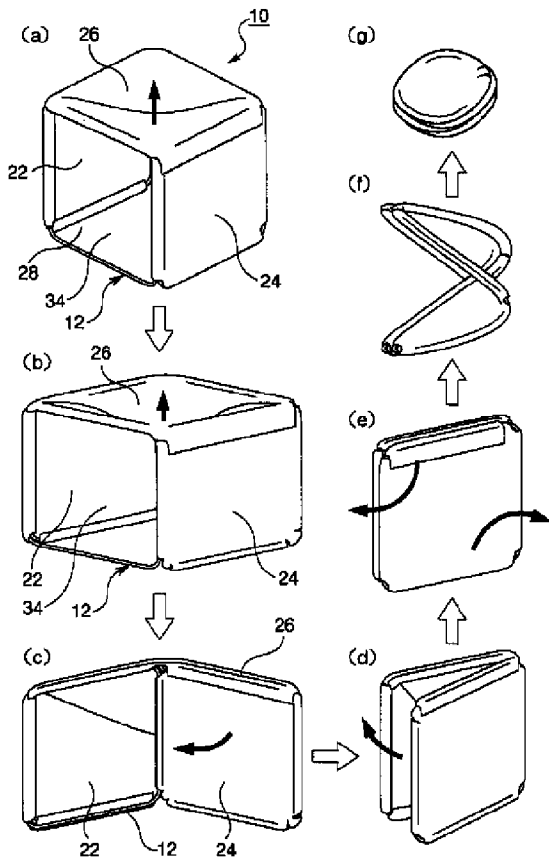
【图 7】



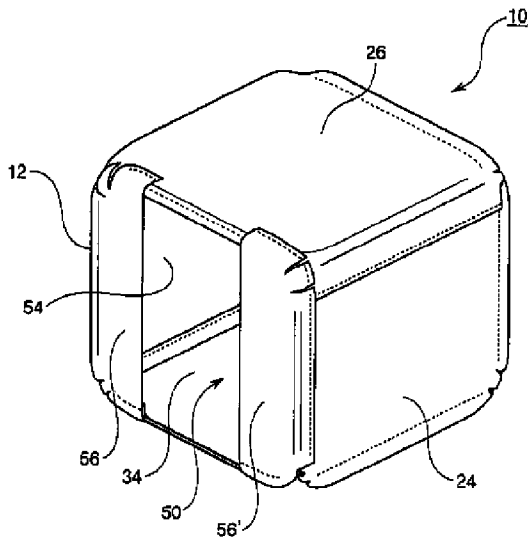
【图 3】



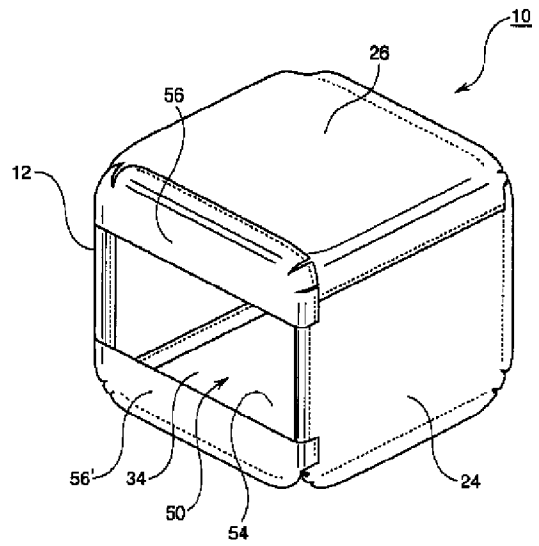
【图4】



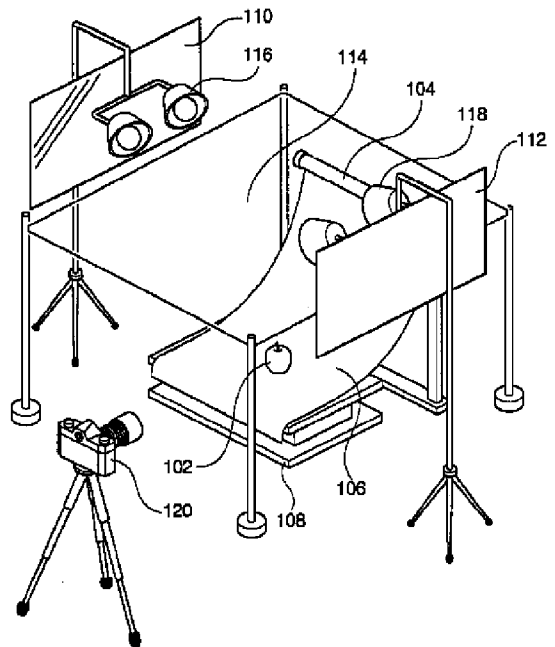
【图6】



【图5】



【图8】



PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	1	"7841729".pn.	(USPAT)	ADJ	ON	ON	2025/05/08 08:54 AM
L2	4	("3604913" "20060007666" "20070121343" "20070139515").pn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	ADJ	ON	ON	2025/05/08 08:56 AM
L3	2	("20050151042" OR "6238060").pn.	(US-PGPUB; USPAT)	ADJ	ON	ON	2025/05/08 08:58 AM
L4	2	KR200316985\$.did.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/08 09:00 AM
L5	1	"49334948".fmid.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/08 09:00 AM
L6	8	((US-7841729-B2 OR US-3604913-A OR US-6238060-B1).did. AND USPT.dbnm.) OR ((US-20070139515-A1 OR US-20070121343-A1 OR US-20060007666-A1 OR US-20050151042-A1).did. AND PGPB.dbnm.) OR ((KR-200316985-Y1).did. AND FTDB.dbnm.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2025/05/08 11:38 AM
L7	7	("4974138" "5179474" "5457492" "5745176" "5825495" "5828449" "6084631").pn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	ADJ	ON	ON	2025/05/08 11:46 AM
L8	13	((US-7841729-B2 OR US-3604913-A OR US-6238060-B1 OR US-5828449-A OR US-5457492-A OR US-5179474-A OR US-4974138-A OR US-	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT;	ADJ	ON	ON	2025/05/08 01:55 PM

L9	12	5825495-A).did. AND USPT.dbnm.) OR ((US-20070139515-A1 OR US-20070121343-A1 OR US-20060007666-A1 OR US-20050151042-A1).did. AND PGPB.dbnm.) OR ((KR-200316985-Y1).did. AND FTDB.dbnm.) 8 AND reflect\$4	IBM_TDB) (US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/08 01:56 PM
L10	13	((US-7841729-B2 OR US-3604913-A OR US-6238060-B1 OR US-5828449-A OR US-5457492-A OR US-5179474-A OR US-4974138-A OR US-5825495-A).did. AND USPT.dbnm.) OR ((US-20070139515-A1 OR US-20070121343-A1 OR US-20060007666-A1 OR US-20050151042-A1).did. AND PGPB.dbnm.) OR ((KR-200316985-Y1).did. AND FTDB.dbnm.)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2025/05/12 10:56 AM
L11	42	(Artificial Intelligence) More like doc: <u>KR-200316985-Y1</u> Text: (KR-200316985-Y1 OR KR-20050036745-A OR CN-1667492-A OR US-7751092-B2 OR EP-1524836-A1 OR KR-100587862-B1 OR CN-108322627-A OR JP-2005143091-A OR JP-H11146241-A OR US-20050088528-A1 OR US-20050054227-A1 OR KR-20050056795-A OR JP-H1184491-A OR JP-2020073985-A OR US-20050140813-A1 OR FR-2642535-A1 OR JP-S6159973-A OR	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2025/05/12 10:56 AM

L12	40	EP-1524836-B1 OR CN-108989622-B OR JP-2004186774-A).did. (Artificial Intelligence) More like doc: US-20050151042-A1 Text: (US-3575098-A OR US-3863882-A OR US-4210784-A OR US-4341452-A OR US-4398815-A OR US-4475226-A OR US-5184160-A OR US-5921523-A OR US-5833186-A OR US-5677669-A OR US-6487298-B1 OR US-6316706-B1 OR CA-2454751-A1 OR US-20050151042-A1 OR US-5929903-A OR EP-1241517-B1 OR US-9413930-B2 OR CN-110365874-B OR US-11089232-B2 OR JP-6755995-B2).did.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2025/05/12 11:03 AM
L13	64	("2005/0151042").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	ADJ	ON	ON	2025/05/12 11:10 AM
L14	39	(Artificial Intelligence) More like doc: US-7631979-B1 Text: (US-6260984-B1 OR US-6273581-B1 OR US-20040218089-A1 OR CA-2454751-A1 OR US-7631979-B1 OR US-20090310329-A1 OR US-D1058882-S OR US-20130194775-A1 OR CA-2385646-C OR US-9818314-B2 OR US-D1023378-S OR US-6634763-B1 OR EP-0491717-B1 OR US-20030012012-A1 OR US-5722754-A OR WO-2014105101-A2 OR CA-3182907-A1 OR WO-2021226697-A1 OR US-11543119-B2 OR US-6767107-B1).did.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2025/05/12 11:13 AM
L15	23	("4258387" "5010412"	(US-PGPUB; USPAT;	ADJ	ON	ON	2025/05/12

		"5379201" "5475441" "5684530" "6273581" "6344874" "D455855" "6435692" "6646672" "6877878" "6979093" "7225414" "20030227770" "20040140459" "20040218089" "20050151042" "20050207170" "20060095297" "20060181862" "20070081094" "20070103918" "20070138360").pn. AND (PGPB USPT USOC).dbnm.	USOCR)				11:13 AM
L16	46	("4258387" "5010412" "5379201" "5475441" "5684530" "6273581" "6344874" "D455855" "6435692" "6646672" "6877878" "6979093" "7225414" "20030227770" "20040140459" "20040218089" "20050151042" "20050207170" "20060095297" "20060181862" "20070081094" "20070103918" "20070138360").pn. OR ("7631979").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	ADJ	ON	ON	2025/05/12 11:13 AM
L17	36	(Artificial Intelligence) More like doc: US-9071740-B1 Text: (US-6441854-B2 OR US-6271752-B1 OR US-D433432-S OR US- D426249-S OR US- 20020056794-A1 OR US-7253840-B2 OR US-20030210340-A1 OR US-20040211868- A1 OR KR-100965876- B1 OR CA-2454751-A1 OR JP-2005236513-A OR TW-I236285-B OR US-7126816-B2 OR TW-M256458-U OR US-20050247845-A1	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2025/05/12 11:15 AM

L18	72	OR US-20060109375-A1 OR US-20060109613-A1 OR US-20060282866-A1 OR US-20070001087-A1 OR US-8401869-B2).did. ("20020186317" "20040211868" "20050151042" "20050230583" "20060109375" "20060109613" "20060282866" "20070001087" "20070222888" "20080186150" "20080291260").pn. OR ("9071740").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	ADJ	ON	ON	2025/05/12 11:15 AM
L19	38	(Artificial Intelligence) More like doc: US-20030227770-A1 Text: (US-1027634-A OR US-1692394-A OR US-3322944-A OR US-4432042-A OR FR-2572163-A1 OR US-4598340-A OR US-5379201-A OR US-5695271-A OR US-6186636-B1 OR US-6575593-B2 OR US-6680844-B2 OR US-20020014960-A1 OR US-20030227770-A1 OR US-20040264170-A1 OR US-20120008312-A1 OR US-20010028562-A1 OR US-7004596-B2 OR US-20020057566-A1 OR US-7938563-B2 OR AU-3890101-A).did.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2025/05/12 11:34 AM
L20	18	("2003/0227770").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	ADJ	ON	ON	2025/05/12 11:34 AM
L21	37	(Artificial Intelligence) More like doc: US-20050207170-A1 Text: (US-6575593-B2 OR US-6666563-B2 OR US-20040047152-A1	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS,	ADJ	ON	ON	2025/05/12 11:35 AM

		OR US-20050007778-A1 OR US-20050207170-A1 OR US-10551043-B1 OR JP-20120515423-A5 OR US-20080030977-A1 OR US-20200170370-A1 OR US-9739468-B2 OR KR-20090000227-U OR US-5408764-A OR US-4321657-A OR CA-2631244-A1 OR JP-2512528-Y2 OR WO-2023273830-A1 OR CA-2124107-C OR TW-M320644-U OR US-7527392-B2 OR US-7429118-B1).did.	IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L22	7	("2005/0207170").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	ADJ	ON	ON	2025/05/12 11:35 AM
L23	38	(Artificial Intelligence) More like doc: US-20060181862-A1 Text: (US-4043662-A OR GB-2123539-B OR US-4816854-A OR US-4777566-A OR US-5010412-A OR JP-H03223972-A OR US-5226708-A OR US-5440385-A OR US-5311409-A OR US-5580163-A OR US-5713661-A OR US-5739639-A OR JP-H10206942-A OR US-6022124-A OR US-6528954-B1 OR FI-106770-B OR US-6454437-B1 OR US-6246184-B1 OR US-6556067-B2 OR US-7202613-B2).did.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2025/05/12 11:37 AM
L24	8	("2006/0181862").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	ADJ	ON	ON	2025/05/12 11:37 AM
L25	37	(Artificial Intelligence) More like doc: US-5010412-A Text: (US-3737722-A OR US-3800204-A OR US-4164008-A OR US-	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS,	ADJ	ON	ON	2025/05/12 11:39 AM

L26	128	4161018-A OR US-4211955-A OR JP-S556687-A OR US-4264845-A OR US-4459645-A OR US-4677533-A OR US-4882498-A OR US-5010412-A OR US-20070247528-A1 OR US-7898593-B2 OR US-4647795-A OR KR-970071111-A OR JP-2006319996-A OR US-3327219-A OR FR-2474688-A1 OR US-5223932-A OR JP-H05266687-A).did. ("3737722" "3800204" "4161018" "4164008" "4211955" "4264845" "4298869" "4459645" "4677533" "4882498").pn. OR ("5010412").urpn. AND (PGPB USPT USOC).dbnm.	IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2025/05/12 11:40 AM
L27	41	(Artificial Intelligence) More like doc: US-5379201-A Text: (US-2329556-A OR US-2561744-A OR US-2597662-A OR US-4432042-A OR US-4626965-A OR US-4893222-A OR US-4949230-A OR US-5130907-A OR US-5165779-A OR US-5117339-A OR WO-9201193-A1 OR US-5077643-A OR US-5122941-A OR US-5035392-A OR US-5183325-A OR US-5055977-A OR US-5192046-A OR US-5379201-A OR WO-2013026490-A1 OR US-20080123262-A1).did.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2025/05/12 11:41 AM
L28	110	("2329556" "2561744" "2597662" "4432042" "4626965" "4893222" "4949230" "5035392" "5055977" "5077643" "5091832" "5117339"	(US-PGPUB; USPAT; USOCR)	ADJ	ON	ON	2025/05/12 11:41 AM

L29	38	<p> "5122941" "5130907" "5165779" "5183325" "5192046").pn. OR ("5379201").urpn. AND (PGPB USPT USOC).dbnm.</p> <p>(Artificial Intelligence) More like doc: US-6273581-B1</p> <hr/> <p>Text: (US-4091246-A OR US-4959810-A OR DE-59006945-D1 OR US-4949230-A OR JP-2598568-B2 OR US-5055977-A OR US-5539801-A OR CA-2174831-C OR CN-2247830-Y OR US-5868487-A OR US-6074228-A OR US-6273581-B1 OR US-6354713-B1 OR US-6361182-B1 OR WO-0196782-A1 OR US-20010050849-A1 OR US-6533431-B2 OR US-6767107-B1 OR US-20030012012-A1 OR RU-2004103273-A).did.</p>	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2025/05/12 11:42 AM
L30	33	<p>("4949230" "5055977" "5091832" "5117339" "5119239" "5130907" "5165779" "5325280" "5868487" "6186636").pn. OR ("6273581").urpn. AND (PGPB USPT USOC).dbnm.</p>	(US-PGPUB; USPAT; USOCR)	ADJ	ON	ON	2025/05/12 11:42 AM
L31	39	<p>(Artificial Intelligence) More like doc: US-6435692-B1</p> <hr/> <p>Text: (JP-2525699-Y2 OR US-5122941-A OR US-5183325-A OR US-5136477-A OR US-5122937-A OR DE-4202776-A1 OR US-5247314-A OR US-5379201-A OR US-5615945-A OR FR-2754588-A3 OR US-6435692-B1 OR US-6481866-B2 OR US-6505949-B2 OR US-</p>	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2025/05/12 11:43 AM

L32	22	6318873-B1 OR US-6851819-B2 OR US-6561669-B2 OR US-20010026445-A1 OR US-6422715-B2 OR US-6186636-B1 OR US-20020067609-A1).did. ("4312507" "5091832" "5122937" "5122941" "5136477" "5172974" "5183325" "5203622" "5379201" "5486986" "5590950" "5615945" "5707137" "5803572" "5868487" "5899553" "6273581").pn. OR ("6435692").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	ADJ	ON	ON	2025/05/12 11:43 AM
L33	44	(Artificial Intelligence) More like doc: US-6979093-B2 Text: (US-5592066-A OR JP-3762853-B2 OR JP-2004153571-A OR US-20050128747-A1 OR US-6979093-B2 OR KR-20150025382-A OR US-7379117-B2 OR KR-20100004340-U OR US-7385641-B2 OR KR-101502227-B1 OR JP-H11284560-A OR KR-20040026297-A OR JP-2005093277-A OR US-D350726-S OR KR-20090109023-A OR IT-201900006610-A1 OR JP-2005189406-A OR US-5977747-A OR CN-1629715-A OR FR-2822325-A3).did.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2025/05/12 11:44 AM
L34	7	("5592066" "20040085745").pn. OR ("6979093").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	ADJ	ON	ON	2025/05/12 11:44 AM
L35	93	("2205860" "4052607" "4446506" "4490776" "4504888" "4616293" "4807089" "5023756" "5023757" "5154503").pn. OR ("5311409").urpn. AND	(US-PGPUB; USPAT; USOCR)	ADJ	ON	ON	2025/05/12 03:59 PM

L36	1	(PGPB USPT USOC).dbnm. 35 AND (silk OR muslin)	(US-PGPUB; USPAT; USOCR)	ADJ	ON	ON	2025/05/12 03:59 PM
L37	38	(fabric near7 diffus\$3) SAME (silk OR muslin)	(US-PGPUB; USPAT; USOCR)	ADJ	ON	ON	2025/05/12 04:01 PM
L38	73	(fabric WITH diffus\$3) SAME (silk OR muslin)	(US-PGPUB; USPAT; USOCR)	ADJ	ON	ON	2025/05/12 04:01 PM
L39	35	38 NOT 37	(US-PGPUB; USPAT; USOCR)	ADJ	ON	ON	2025/05/12 04:11 PM
L40	565	diffus\$3 near7 (silk OR muslin)	(US-PGPUB; USPAT; USOCR)	ADJ	ON	ON	2025/05/12 04:16 PM
L41	313932	diffus\$3 WITH (light OR illumination OR luminaire OR bulb)	(US-PGPUB; USPAT; USOCR)	ADJ	ON	ON	2025/05/12 04:17 PM
L42	30180	diffus\$3 SAME camera	(US-PGPUB; USPAT; USOCR)	ADJ	ON	ON	2025/05/12 04:17 PM
L43	13	40 AND 41 AND 42	(US-PGPUB; USPAT; USOCR)	ADJ	ON	ON	2025/05/12 04:17 PM
L44	3638	diffus\$3 near7 (silk OR muslin)	(FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/12 04:20 PM
L45	1464076	diffus\$3 WITH (light OR illumination OR luminaire OR bulb)	(FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/12 04:20 PM
L46	122365	diffus\$3 SAME camera	(FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/12 04:20 PM
L47	67	44 AND 45 AND 46	(FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/12 04:21 PM
L48	49	((US-7841729-B2 OR US-3604913-A OR US-6238060-B1 OR US-5828449-A OR US-5457492-A OR US-5179474-A OR US-4974138-A OR US-5825495-A OR US-7631979-B1 OR US-9071740-B1 OR US-	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2025/05/12 04:42 PM

L49	7	<p>5010412-A OR US-5379201-A OR US-6273581-B1 OR US-6435692-B1 OR US-6979093-B2 OR US-5722754-A OR US-6575593-B2 OR US-6974223-B2 OR US-5311409-A OR US-4677533-A OR US-6040895-A OR US-7136582-B2 OR US-6711006-B2 OR US-6799861-B2).did. AND USPT.dbnm.) OR ((US-20070139515-A1 OR US-20070121343-A1 OR US-20060007666-A1 OR US-20050151042-A1 OR US-20040211868-A1 OR US-20050230583-A1 OR US-20060282866-A1 OR US-20070001087-A1 OR US-20030227770-A1 OR US-20040218089-A1 OR US-20050207170-A1 OR US-20060181862-A1 OR US-20070103918-A1 OR US-20020014960-A1 OR US-20080079906-A1).did. AND PGPB.dbnm.) OR ((KR-200316985-Y1 OR JP-H03223972-A OR JP-H0465200-A OR JP-H05280946-A OR JP-2001027776-A).did. AND FTDB.dbnm.) OR ((US-20010043468-A1 OR US-20010048409-A1 OR EP-1072884-A2).did. AND DWPI.dbnm.) OR ((US-1633315-A OR US-1510049-A).did. AND USOC.dbnm.)</p> <p>48 AND (silk OR muslin)</p>	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/12 04:43 PM
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L50	711985	(ring OR annular OR torus OR toroid\$4) near5 (light OR illumination OR luminaire OR bulb)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 07:38 AM
L51	70408	50 SAME camera	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 07:38 AM
L52	56826	50 SAME sensor	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 07:38 AM
L53	1325025	camera WITH (adjust\$4 OR reposition\$4 OR (re-position\$4))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 07:39 AM
L54	3817902	sensor WITH (adjust\$4 OR reposition\$4 OR (re-position\$4))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 07:39 AM
L55	25995	51 AND 53	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 07:40 AM
L56	16242	52 AND 54	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 07:41 AM
L57	1820	50 SAME ((computer OR laptop OR tablet) near5 (display OR screen OR touchscreen))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 07:42 AM

L58	381	55 AND 57	JPO; DERWENT) (US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 07:42 AM
L59	155	56 AND 57	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 07:42 AM
L60	2997	50 SAME ((machine vision) OR (vision near3 inspect\$3))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 07:44 AM
L61	743	55 AND 60	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 07:44 AM
L62	123	56 AND 60	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 07:44 AM
L63	691	61 NOT 58	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 07:44 AM
L64	88	59 NOT (58 OR 61)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 07:45 AM
L65	36	62 NOT (58 OR 59 OR 61)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU,	ADJ	ON	ON	2025/05/13 07:45 AM

L66	36	58 AND (@pd<"20070126" OR @prad<"20070126" OR @ad<"20070126")	SU, WO); FPRS; EPO; JPO; DERWENT) (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 07:48 AM
L67	33	63 AND (@pd<"20070126" OR @prad<"20070126" OR @ad<"20070126")	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 07:48 AM
L68	16	64 AND (@pd<"20070126" OR @prad<"20070126" OR @ad<"20070126")	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 07:48 AM
L69	10	65 AND (@pd<"20070126" OR @prad<"20070126" OR @ad<"20070126")	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 07:48 AM
L70	19475	50 SAME (webcam\$4 OR (web camera) OR (computer near3 camera) OR (video camera) OR videocamera OR CCD)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 08:27 AM
L71	6788	70 AND (@pd<"20070126" OR @prad<"20070126" OR @ad<"20070126")	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 08:27 AM
L72	144525	50 SAME reflect\$3	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 08:28 AM
L73	7323	70 AND 72	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR,	ADJ	ON	ON	2025/05/13 08:28 AM

L74	3549	73 AND (@pd<"20070126" OR @prad<"20070126" OR @ad<"20070126")	GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT) (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 08:28 AM
L75	3699629	(light OR illumination OR luminaire OR bulb) near5 (adjust\$4 OR reposition\$4 OR (re- position\$4) OR move OR moving OR movable OR moveable)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 08:30 AM
L76	3262	73 AND 75	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 08:30 AM
L77	1510	76 AND (@pd<"20070126" OR @prad<"20070126" OR @ad<"20070126")	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 08:31 AM
L78	139	77 AND ((computer OR laptop OR tablet) near5 (display OR screen OR touchscreen))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 08:46 AM
L79	61	77 AND ((machine vision) OR (vision near3 inspect\$3))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 08:46 AM
L80	55	((US-7841729-B2 OR US-3604913-A OR US- 6238060-B1 OR US- 5828449-A OR US- 5457492-A OR US- 5179474-A OR US- 4974138-A OR US- 5825495-A OR US- 7631979-B1 OR US- 9071740-B1 OR US-	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2025/05/13 09:40 AM

L81	0	<p>5010412-A OR US-5379201-A OR US-6273581-B1 OR US-6435692-B1 OR US-6979093-B2 OR US-5722754-A OR US-6575593-B2 OR US-6974223-B2 OR US-5311409-A OR US-4677533-A OR US-6040895-A OR US-7136582-B2 OR US-6711006-B2 OR US-6799861-B2).did. AND USPT.dbnm.) OR ((US-20070139515-A1 OR US-20070121343-A1 OR US-20060007666-A1 OR US-20050151042-A1 OR US-20040211868-A1 OR US-20050230583-A1 OR US-20060282866-A1 OR US-20070001087-A1 OR US-20030227770-A1 OR US-20040218089-A1 OR US-20050207170-A1 OR US-20060181862-A1 OR US-20070103918-A1 OR US-20020014960-A1 OR US-20080079906-A1 OR US-20080174691-A1).did. AND PGPB.dbnm.) OR ((KR-200316985-Y1 OR JP-H03223972-A OR JP-H0465200-A OR JP-H05280946-A OR JP-2001027776-A OR CN-1084808-A OR GB-2316168-A OR JP-WO2003010525-A1 OR JP-2002310626-A OR EP-0822409-A2).did. AND FTDB.dbnm.) OR ((US-20010043468-A1 OR US-20010048409-A1 OR EP-1072884-A2).did. AND DWPI.dbnm.) OR ((US-1633315-A OR US-1510049-A).did. AND USOC.dbnm.)</p>	(US-PGPUB; USPAT;	ADJ	ON	ON	2025/05/13
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		lining) near3 reflect\$6)	USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)				03:27 PM
L82	3	80 AND ((film OR paint) near3 reflect\$6)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 03:27 PM
L83	0	80 AND ((liner OR lining) WITH reflect\$6)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 03:27 PM
L84	6	80 AND (coat\$3 near3 reflect\$6)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/13 03:29 PM
L85	3	DE20310780\$.did.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT)	ADJ	ON	ON	2025/05/14 08:12 AM
L86	43	(Artificial Intelligence) More like doc: DE-20310780-U1 Text: (DE-20310780-U1 OR JP-2005050729-A OR JP-2008204739-A OR CN-104976593-A OR JP-H03167711-A OR CN-102454946-A OR TW-M392910-U OR CN-204242995-U OR JP-H06131908-A OR KR-100874760-B1 OR CN-101122379-A OR TW-200836431-A OR TW-M362938-U OR WO-0123802-A1 OR CN-117108966-A OR JP-4635623-B2 OR JP-H06168614-A OR CN-102454946-B OR JP-	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2025/05/14 08:13 AM

L87	31	H02227907-A OR CN-101901730-A).did. ("5103384" "5379201" "5619395" "5855343" "6222501" "6239841" "6481681" "6591001").pn. OR ("6711006").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	ADJ	ON	ON	2025/05/14 08:22 AM
L88	68	("1208344").pn. OR ("5855343").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	ADJ	ON	ON	2025/05/14 08:23 AM
L89	43	(Artificial Intelligence) More like doc: US-5855343-A Text: (US-1208344-A OR US-5855343-A OR US-20220117104-A1 OR JP-2005085260-A OR US-20050206615-A1 OR US-8499940-B2 OR WO-2008083170-A2 OR WO-2023018495-A1 OR US-5307209-A OR JP-5275497-B2 OR US-6795717-B1 OR JP-2012182838-A OR JP-2014011485-A OR US-10051751-B2 OR US-20080198324-A1 OR US-20120086913-A1 OR KR-20240120597-A OR US-7406257-B2 OR CN-105164600-B OR NL-2007427-C2).did.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2025/05/14 08:23 AM
L90	44	("5260731" "5855343").pn. OR ("6239841").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	ADJ	ON	ON	2025/05/14 08:24 AM
L91	45	(Artificial Intelligence) More like doc: US-6239841-B1 Text: (US-5260731-A OR US-5855343-A OR US-6239841-B1 OR CN-213705328-U OR CN-100537158-C OR CN-1810465-A OR JP-2009159505-A OR CN-112996245-A OR CN-221677000-U OR JP-	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA,	ADJ	ON	ON	2025/05/14 08:24 AM

L92	38	2017037219-A OR CN-210241010-U OR US-20200044430-A1 OR TW-200934355-A OR TW-201218918-A OR JP-S6343916-B2 OR TW-I323649-B OR CN-216556328-U OR US-20250081362-A1 OR JP-H0710991-U OR JP-3723558-B2).did. ("2532209" "2584955" "3091421" "5322255" "5619395" "5768163" "5855343" "6239841" "6323902").pn. OR ("6481681").urpn. AND (PGPB USPT USOC).dbnm.	VN); FPRS; EPO; JPO; DERWENT; IBM_TDB) (US-PGPUB; USPAT; USOCR)	ADJ	ON	ON	2025/05/14 08:24 AM
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PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.



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(54) **A measurement system**

(57) A measurement system (1) has robotic system (3) mounted over a base plate (2) which provides a vertical height reference. In the optical head (8), a CCD camera (17) is adjustable to be pre-set in height. The optical head (8) also has an upper light source (18) comprising LEDs and a lower light source (25) comprising a white fluorescent lamp (26) for lateral component illumination. An air flow system (45) directs cooling air in a swirling motion around the tube. An image analysis computer (10) automatically performs various tests to co-ordinate optical and mechanical operation.

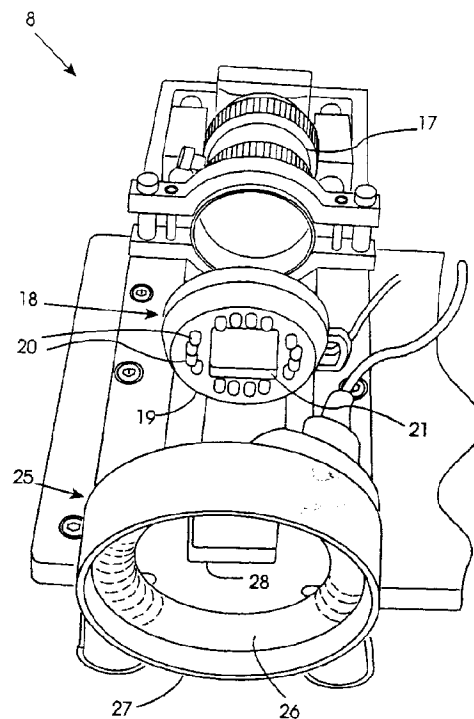


Fig. 4

DescriptionINTRODUCTIONField of the Invention

The invention relates to a measurement system, and more particularly to a system for identifying components on an electronic circuit board and measuring their locations. Such systems generally comprise a support for supporting the circuit board and a robotic system which drives an optical head having a camera connected to an image processor.

Prior Art Discussion

EP 634892 (Citizen) describes a system which has a light source comprising a plurality of LEDs and a light shielding arrangement. WO 91/12489 (ABOS) describes a system having a light transmission arrangement which is specific to a particular type of component being measured. While these systems appear to be quite effective for particular applications, they appear to be limited in their range of applications. US 5302836 (Siu, B) describes a system which has multiple rings of illumination focused towards their axes. It appears that it would be difficult to control and drive such an arrangement in a high-speed real-time manufacturing environment.

Objects of the Invention

One object is to improve the "optical chain" signal from the components to the processor to allow accurate and repeatable measurements in a robust system suitable for a manufacturing environment.

Another object is to provide a simpler measurement system, leading to lower cost and simpler maintenance.

SUMMARY OF THE INVENTION

According to the invention, there is provided a measurement system comprising:-

a robotic system mounted on a base;

an optical head driven by the robotic system and comprising a light source and a camera;

an image analysis computer connected to the optical head and comprising means for capturing circuit board images and using the images to measure component locations;

characterised in that,

the camera is mounted on the optical head in a vertically adjustable manner; and

the light source means comprises:-

an upper set of light emitting diodes mounted in a ring arrangement for near-on-axis illumination, and means for switching said light emitting diodes,

a lower annular fluorescent lamp, and

means for cooling air under the fluorescent lamp.

By providing two light sources optimum illumination may be achieved. For example, the LEDs may be switched on for fiducial measurement and off for component measurement. The fluorescent lamp provides comprehensive lateral and diffuse illumination for component measurement. By cooling the air under the lamp, heat shimmer distortion is avoided in a very simple manner and the benefits of a fluorescent lamp may be availed of.

In one embodiment, the fluorescent lamp is of white colour and has a higher intensity than the light emitting diodes. This is particularly effective for component measurement.

Preferably, the light source further comprises a reflector surrounding the fluorescent lamp at its upper side and its outer periphery to provide additional diffuse illumination. This allows the fluorescent lamp provide both direct (mainly lateral) illumination and diffuse illumination arising from reflection.

In one embodiment, the cooling means comprises means for directing cooling air in a swirling motion around the fluorescent tube. This is a simple and effective way of avoiding heat shimmer. The air directing means may comprise air ducts within the reflector and having at least two mutually complementary air outlets. This arrangement is simple as it results in few parts. The outlets are preferably located at approximately the central vertical position of the lamp.

In one embodiment, the fluorescent lamp is operated at a frequency of 23 to 40 kHz. This avoids image intensity "beat", leading to high accuracy and stability.

Preferably, the robotic system comprises means for adjusting vertical position of the optical head. In one embodiment, the optical head comprises means for adjusting vertical position of the fluorescent lamp, and said adjustment means comprises a snap-fitting connector. These arrangements allow versatility to the extent of providing for pre-reflow or post-reflow component measurement.

Preferably, the camera has a tele-centric gauging capacity.

In one embodiment, the optical head comprises means for rapid switching of the LEDs. This allows fast operation by minimising delay between fiducial and component measurement.

In another embodiment, the image analysis compu-

ter comprises a frame grabber with a pixel jitter value of less than 5 ns.

Preferably, the system comprises a support frame having a mass in excess of 1000 kg, and the robotic system base plate is point mounted onto horizontally milled upper surfaces of the frame. This is a very important feature as it ensures stability and level positioning of the robotic system.

In one embodiment, the image analysis computer is programmed to perform repeatability tests comprising the steps of:-

for each of a plurality of optical head acceleration values performing a plurality of component measurements and recording time duration and a standard deviation of the measured location;

plotting responses of said standard deviation and time versus acceleration; and

determining an optimum optical head acceleration value based on both of said plots analyses in conjunction with each other.

This provides for repeatability and optimum acceleration in a very simple manner

In one embodiment, the image analysis computer comprises means for performing automatic scaling by:-

directing movement of a reference target to the optical head field of view;

directing robotic movement of the target with an accuracy of less than +/- 5.0 microns over the working area and determining the corresponding movement in the image as a number of pixels; and

determining a correlating relationship between the robotic and image movements and using said relationship to determine and store a fresh scaling factor.

Preferably, the image analysis computer comprises means for storing in a database a flag indicating components which are larger than the field of view, and for capturing images of pads in rows of such components when they are identified and subsequently merging the associated measurements to generate a composite measurement.

In one embodiment, the image analysis computer comprises means for directing a second pass for components which are identified in a database as potentially having different identification colours, the second pass being initiated according to comparisons with grey scale thresholds on the first pass and being limited to a pre-defined area of the component.

In a further embodiment, the computer performs initial view allocation, and in a second pass eliminates sin-

gle-component views of the component in another view, where possible.

Ideally, the computer stores a computer aided design circuit board layout, displays the layout, and adjusts component colours according to measured parameter trends.

In one embodiment, the computer applies a colour-coding scheme to each parameter tracked.

DESCRIPTION OF THE INVENTION

Brief Description of the Drawings

The invention will be more clearly understood from the following description of some embodiments thereof, given by way of example only with reference to the accompanying drawings, in which:-

Fig. 1 is a front view of a measurement system of the invention;

Fig. 2 is a more detailed and side perspective view of the system;

Fig. 3 is a side view showing an optical head of the system;

Fig. 4 is a perspective view from underneath of the optical head;

Fig. 5(a) is a diagrammatic cross-sectional front view of a lower light source, and Figs. 5(b) and 5(c) are plan views according to the arrows (i) - (i) and (ii) - (ii) of Fig. 5(a) respectively.

Fig. 6 is a flow diagram illustrating the manner in which the system performs automated repeatability tests;

Figs. 7 and 8 are diagrams illustrating operation of the system to perform automated repeatability tests;

Fig 9 is a flow diagram illustrating the manner in which the system performs automatic scaling; and

Fig. 10 is a flow diagram illustrating the manner in which the system monitors large components.

Detailed Description of the Preferred Embodiments

Referring to the drawings, and initially to Figs. 1 to 4, there is illustrated a measurement system of the invention indicated generally by the numeral 1. The system 1 comprises a base plate 2 having a machined upper flat surface which provides a base reference for the system. A robotic system 3 is mounted over the base plate 2 on a pair of rails 4 mounted on risers 5, in turn

mounted on the base plate 2. The height of the risers is carefully selected as this height provides the base height for the robotic system and the optical head which it drives. In more detail, the robotic system 3 comprises a longitudinal drive 6 and a transverse drive 7, both of the linear motor system type.

An optical head 8 is mounted on the robotic system and is connected to display screens 9 via an image analysis computer 10. The computer 10 has a frame grabber with a jitter value of less than 5 ns. In addition to performing image analysis, the computer 10 also performs motor control and digital input/output functions. Conveyor rails 11 are mounted above the base plate 2 and beneath the optical head 8 and these are for conveying printed circuit boards (PCB's) 12 underneath the optical head for measurement of components on the board. The apparatus also comprises a keyboard 13 on sliding rails, as shown in Fig. 1.

The base plate 2 is point mounted on a heavy support frame 14 which houses the computer 10. The frame 14 has a mass in excess of 1000 kg, and the plate 2 is bolted at six upper surfaces which have been machined in a single pass to ensure that they are level.

The optical head 8 is mounted on a support block 15 having a pair of vertical bars 16 onto which a camera 17 is mounted. The camera 17 is of the CCD type and has a tele-centric gauging lens. It is mounted on the bars 16 in a manner which allows vertical pre-setting.

The optical head also comprises, beneath the camera 17, an upper light source 18 comprising a support 19 supporting a ring of red light emitting diodes (LEDs) 20 around an aperture 21. The optical head 8 also comprises a lower light source 25 comprising a ring-shaped white fluorescent lamp 26 mounted in a reflective housing 27. The housing 27 has an aperture 28 which is larger than the maximum field of view of the camera 17.

The system 1 is suitable for use before or after reflow in a surface mount technology (SMT) manufacturing process so that trends in the placement operations can be determined from the measurement results. The system 1 initially measures the position of fiducials on the printed circuit (PCB) using the near on-axis illumination of the LEDs 20. The system 1 then measures each component's position relative to the fiducial coordinates and identifies the components. Due to a combination of optical and drive features, the system achieves very high accuracy and excellent repeatability in making measurements at production rates to provide real-time statistical trends of the manufacturing process. This is invaluable to the manufacturer as the trend information allows a preventative maintenance program to be implemented for the placement machines in the process.

Referring now to Fig. 5, the manner in which a component being measured is illuminated is now described. The upper light source 18 generates a near-on-axis red light beam A directed vertically through the aperture 28. The beam A is relatively weak and is useful primarily for identifying fiducials at the beginning of a measurement

process. Thus, the LEDs 20 are rapidly switched for fiducial measurement before component measurement.

As is clear from Fig. 5(a), the fluorescent lamp 26 is close to the level of the PCB, extends in a circle having a larger diameter than the field of view, and is surrounded by a reflective housing which extends downwardly. Because of this arrangement light rays B both impinge laterally on the target and also provide diffuse illumination by reflecting from the reflector surfaces. In this drawing, an SMT component 41 having leads 42 is within the field of view. An important aspect of the lighting arrangement is that the light rays B impinge on the sides of the component 41, namely at the leads 42 and some of them reflect upwardly within the field of view to be captured by the camera 17. This puts a large degree of emphasis on the sides of the components, and more particularly the leads 42. As these are the most important parts of the components for measurement purposes, this optical emphasis reduces the complexity of image analysis which is required and therefore allows a faster response time for real-time measurement to be achieved. Because white light is emitted by the lamp 26, the computer 10 may capture and display colour or monochrome images for analysis. Another important aspect of the lower light source 25 is that high-frequency (the frequency level being 23-40 kHz) fluorescent lighting is used so that image capture "beat" is avoided. These advantages stem largely from use of a fluorescent lamp. However, such a type of lamp has previously been dismissed as a viable option as it results in heat shimmer distortion. In the invention, this problem has been overcome by use of an air flow system illustrated in Figs. 5 (a), 5(b), and 5(c). As illustrated, an internal duct 45 having an inlet 45(a) at the rear extends forwardly from the inlet, laterally in both directions across the top plate of the housing 27, and then downwardly to outlets 45(b). As is clear from Fig. 5(c), the configuration of the outlets 45(b) is such that the air pumped through the duct 45 exits at the outlets 45(b) and flows with a swirling motion inside the housing 27 and around the lamp 26. For clarity, the lamp is not illustrated in Fig. 5(c). It has been found that the air flow system is a very simple, effective, and inexpensive way preventing heat shimmer. It thus allows use of a fluorescent lamp so that the system can avail of the advantages of high frequency, high intensity, and low lamp cost.

Referring again to Figs. 1 to 4 the optical axis of the system is configured so that it is parallel to the z vertical axis of the robotic system 3, but offset in one direction by a predetermined amount. Further, the risers 5 are of a specific height to ensure that the focal plane of the camera 17 is centred around the point of inspection. As shown most clearly in Fig. 3, the optical head 8 is mounted onto the support block 15 by bolts. Thus, the vertical position of the optical head can be adjusted by removing the bolts and reinserting them in different tapped holes with the head 8 at a higher level. This simple adjustment allows use of the system for post-reflow component

measurement. For such measurement, the head is adjusted to a higher level, and so the light beams are at a larger angle to horizontal. At the post-reflow stage, the solder has formed a solidified solder fillet against the component, which reflects such light away, thus causing darkness at the solder image location and therefore improving definition and discrimination.

Height of the lower light source 18 may alternatively be adjusted by connecting the reflector housing 27 to an upstanding carrier which slides relative to the support block. The carrier may be configured for snap-fitting engagement at pre-set positions.

These features allow very flexible use of the system 1. For example, by substituting the optical head with one having a different camera and adjusting height the number of pixels per view can be dramatically increased per improved performance where required.

Another aspect of the manner in which optical and mechanical drive features are combined to achieve high accuracy and excellent repeatability is the fact that the system 1 carries out repeatability tests, as described in the flow diagram of Fig. 6. In this drawing, a method 50 is illustrated which has the initial step 51 of measuring the location of a particular target on the X and Y axes and monitoring the time taken to make the measurement. As indicated by the decision step 52, step 51 is repeated n (in this case, 3) times, after which in step 53 the computer 10 computes X and Y standard deviations XRR and YRR and an aggregate measurement time. In step 54, the computer 10 stores a value for the standard deviation for the particular robotic system optical head acceleration values, and also stores the value for the aggregate measuring time for the acceleration values. The following is an example of a table which is stored.

Acceleration ($\mu\text{m}/\text{ms}^2$)					
X	Y	n	Time (ms)	XRR	YRR
2.0	1.0	3	280	6	7
3.0	1.5	3	230	6	8
4.0	2.0	3	215	8	9
5.0	2.5	3	205	9	10
6.0	3.0	3	200	11	15

As indicated by the steps 55 and 56, these tests are repeated m times and after each test the computer adjusts the motor control settings to increase the acceleration to a new, incremented value before the next test is carried out. After steps 51 to 54 have been carried out m (in this case, 5) times, tables of values corresponding to the graphs shown in Figs. 7 and 8 are developed. The former graph plots a vertical axis parameter being six times the standard deviation for the measured location against acceleration on the horizontal axis. It is desirable to use an acceleration which gives the best combination of low RR values and time. In the latter diagram,

there is a gradual reduction in the measurement time until an acceleration level of approximately $4 \mu\text{m}/\text{ms}^2$ is reached. The interrupted line between the two graphs indicates a possible optimum acceleration level to achieve a narrow standard deviation with a low measurement time for optimum results. This acceleration level is determined in steps 57 and 58 by the computer 10.

The system 1 also combines optical and mechanical drive features in an automatic scaling process 70 shown in Fig. 9. In this process, in step 71 a glass calibration plate is mounted beneath the optical head 8 and in step 72, the robotic system 3 moves the plate to cause a precision fiducial reference mark on the plate to be located within the field of view. In step 73, the robotic system 3 moves the fiducial a total of Nmm with an accuracy of $\pm 5.0 \times 10^{-6}$ m over the working area on the X axis. This level of mechanical drive accuracy is achieved by use of a linear motor drive system and accurate machining of the base plate, risers and rails. In step 74, the computer 10 determines the number of image pixels ("pixel distance") which the fiducial mark traverses during this physical motion, using sub-pixel measurement algorithms. As indicated by the decision step 55, the steps 73 and 74 are repeated n times and in step 76 the physical distances of the robotic system and the "pixel distances" are averaged. In step 77, the computer 10 stores an automatic scaling factor correlating these two distances. Then, as indicated generally by the steps 78, it repeats steps similar to steps 71 to 77 for the Y axis. This automatic scaling is achieved because the robotic system employed is accurate to one micron repeatability and ± 5.0 micron accuracy over the working area and use of highly accurate sub-pixel algorithms in conjunction with the optimum lighting head configuration.

The manner in which the system 1 deals with components which are larger than the field of view is illustrated by the process 90 in Fig. 10. In this process, in step 91 the computer 10 recognises a component by virtue of its measured location and by cross-reference to a database indicating such large components by a data record flag. These latter steps are indicated by the step 92 and as indicated by the decision step 93 are repeated for each component identified. Where a large component is identified, in step 94 the computer breaks the component into four sub-components or "row" of pads and then inspects each pad in isolation. A row naming scheme is used by the computer 10. For example, the component may be called u200 and the system would break it into four rows of pads, one from each side. The component is now named u500ne12, u200en10, u200sw12 and u200ws10. Each of these rows of pads is measured in isolation and the results are then merged back together to yield a measurement for the whole component. An important aspect of this process is the fact that the step 94 of capturing the pad images involves tracking of offsets for each measurement, the

offset levels being stored in the database. Once the offsets have been correctly retrieved by the computer 10, it is a relatively simple operation to merge the measurements. Thus, while the process 90 may at first appear complex, it may be carried out in real-time with a fast response time.

Another aspect of operation of the system 1 is that the computer 10 differentiates tantalum capacitor components, the colour of which may change without notification. This is achieved by using two grey scale thresholds, a high one for the yellow examples and a low one for the black examples. If the image is above the high threshold, a full measurement result set is generated. If it fails the high threshold test, the central area only is tested against the low threshold and if it is below this, the component is considered to be present, but no X and Y information is generated. This effectively means that multiple image analysis algorithms are employed to cater for a situation where there are two potential solutions.

In controlling the fields of view, the computer performs initial view allocation in which the components are sorted in top to bottom and left to right order. Starting at the top left, a view is "hung" on the first components, and all components that fit within that view are allocated to it in a non-optimal fashion. These components are flagged as unavailable. The search continues with the next component, "hanging" another view and allocating as many components to it as possible and continuing until all of the views are allocated. To eliminate anomalous results arising from single components allocated to views, the computer 10 uses a compactor algorithm in the second pass. This looks at all single component views and checks if the component lies within another view. If it does, it is allocated to that view and the initial view is deleted. In this way, about 5% of the views can be deleted with a corresponding improvement in performance.

For display of captured images, the computer 10 generates a graphical display for ease of viewing of measurement information on a production line. This caters for the fact that there may be as many as 2000 X and 2000 Y measurement data sets for each pcb 12 being measured. The system computes mean X and Y offsets from nominal position and standard deviation of X and Y offsets for each component. Using the mean and standard deviation, and also using known process widths, the system calculates Cp (potential process capability index), K (correction factor), and CpK (process capability index) for each component in real-time. CAD data for the circuit board layout which was previously stored is employed to display a map of the board. By selecting one parameter, the CAD layout map for the circuit board is colour-coded so that the characteristics of individual components become explicit. There is one colour code for each parameter. This display technique gives the operator instant feedback on the manufacturing process.

The invention is not limited to the embodiments hereinbefore described, but may be varied in construction and detail. For example, the air flow system may comprise external tubes connected to the reflector housing. It is not essential that a telecentric gauging lens be used.

Claims

1. A measurement system (1) comprising:-
 - a robotic system (3) mounted on a base;
 - an optical head (8) driven by the robotic system and comprising a light source and a camera;
 - an image analysis computer (10) connected to the optical head and comprising means for capturing circuit board images and using the images to measure component locations;
 characterised in that,
 - the camera (17) is mounted on the optical head in a vertically adjustable manner; and
 - the light source means comprises:-
 - an upper set of light emitting diodes (20) mounted in a ring arrangement for near-on-axis illumination, and means for switching said light emitting diodes,
 - a lower annular fluorescent lamp (26), and
 - means (45) for cooling air under the fluorescent lamp.
2. A measurement system as claimed in claim 1, wherein the fluorescent lamp is of white colour and has a higher intensity than the light emitting diodes, and preferably the light source further comprises a reflector (27) surrounding the fluorescent lamp (26) at its upper side and its outer periphery to provide additional diffuse illumination.
3. A measurement system as claimed in claims 1 or 2, wherein the cooling means comprises means (45, 45(b)) for directing cooling air in a swirling motion (c) around the fluorescent tube.
4. A measurement system as claimed in claim 3, wherein said air directing means comprises air ducts (45) within the reflector and having at least two mutually complementary air outlets (45(b)).
5. A measurement system as claimed in any preceding

ing claim, wherein the fluorescent lamp is operated at a frequency of 23 to 40 kHz.

6. A measurement system as claimed in any preceding claim, wherein the robotic system comprises means (15) for adjusting vertical position of the optical head. 5
7. A measurement system as claimed in any preceding claim, wherein the system comprises a support frame having a mass in excess of 1000 kg, and a robotic system base plate is point mounted onto horizontally milled upper surfaces of the frame. 10
8. A measurement system as claimed in any preceding claim, wherein the image analysis computer (10) is programmed to perform automated repeatability tests comprising the steps of:- 15

for each of a plurality of optical head acceleration values, performing a plurality of component measurements (51) and recording time duration and a standard deviation of the measured location; 20

plotting (54) responses of said standard deviation and time versus acceleration; and 25

determining (58) an optimum optical head acceleration value based on both of said plots analysed in conjunction with each other. 30

9. A measurement system as claimed in any preceding claim, wherein the image analysis computer comprises means for performing automatic scaling by:- 35

directing movement of a reference target to the optical field of view; 40

directing robotic movement of the target with an accuracy of less than +/-5.0 microns over the working area and determining the corresponding movement in the image as a number of pixels; and 45

determining a correlating relationship between the robotic and image movements and using said relationship to determine and store a fresh scaling factor. 50

10. A measurement system as claimed in any preceding claim, wherein the image analysis computer comprises means for storing in a database a flag indicating components which are larger than the field of view, and for capturing images of pads in rows of such components when they are identified and subsequently merging the associated meas- 55

urements to generate a composite measurement.

11. A measurement system as claimed in any preceding claim, wherein the image analysis computer comprises means for directing a second pass for components which are identified in a database as potentially having different identification colours, the second pass being initiated according to comparisons with grey scale thresholds on the first pass and being limited to a pre-defined area of the component.
12. A measurement system as claimed in any preceding claim, wherein the computer performs initial view allocation and in a second pass eliminates single-component views of the component in another view.
13. A measurement system as claimed in claim 1, wherein the computer stores a computer aided design circuit board layout, displays the layout, and adjusts component colours according to measured parameter trends.

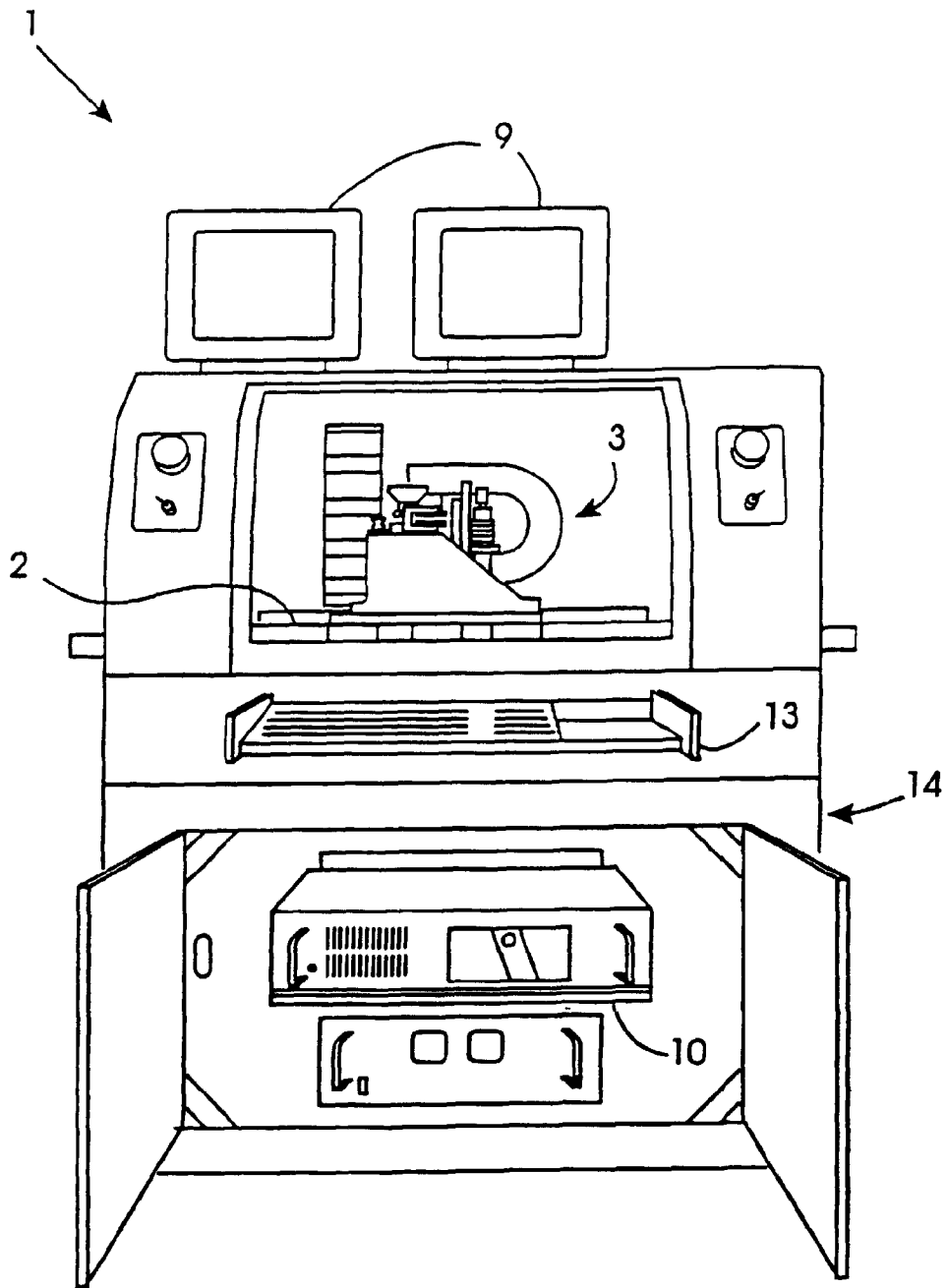


Fig. 1

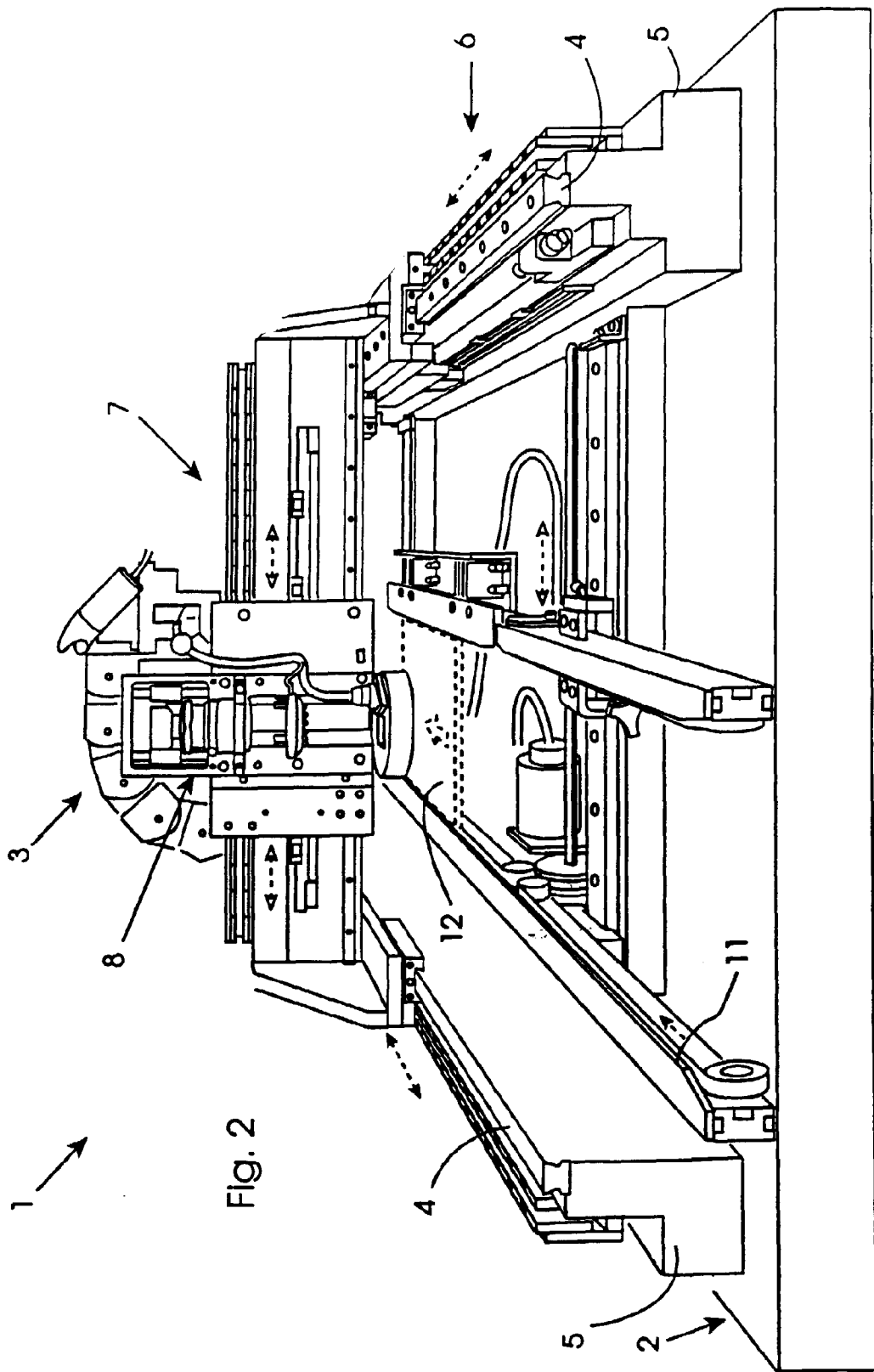


FIG. 2

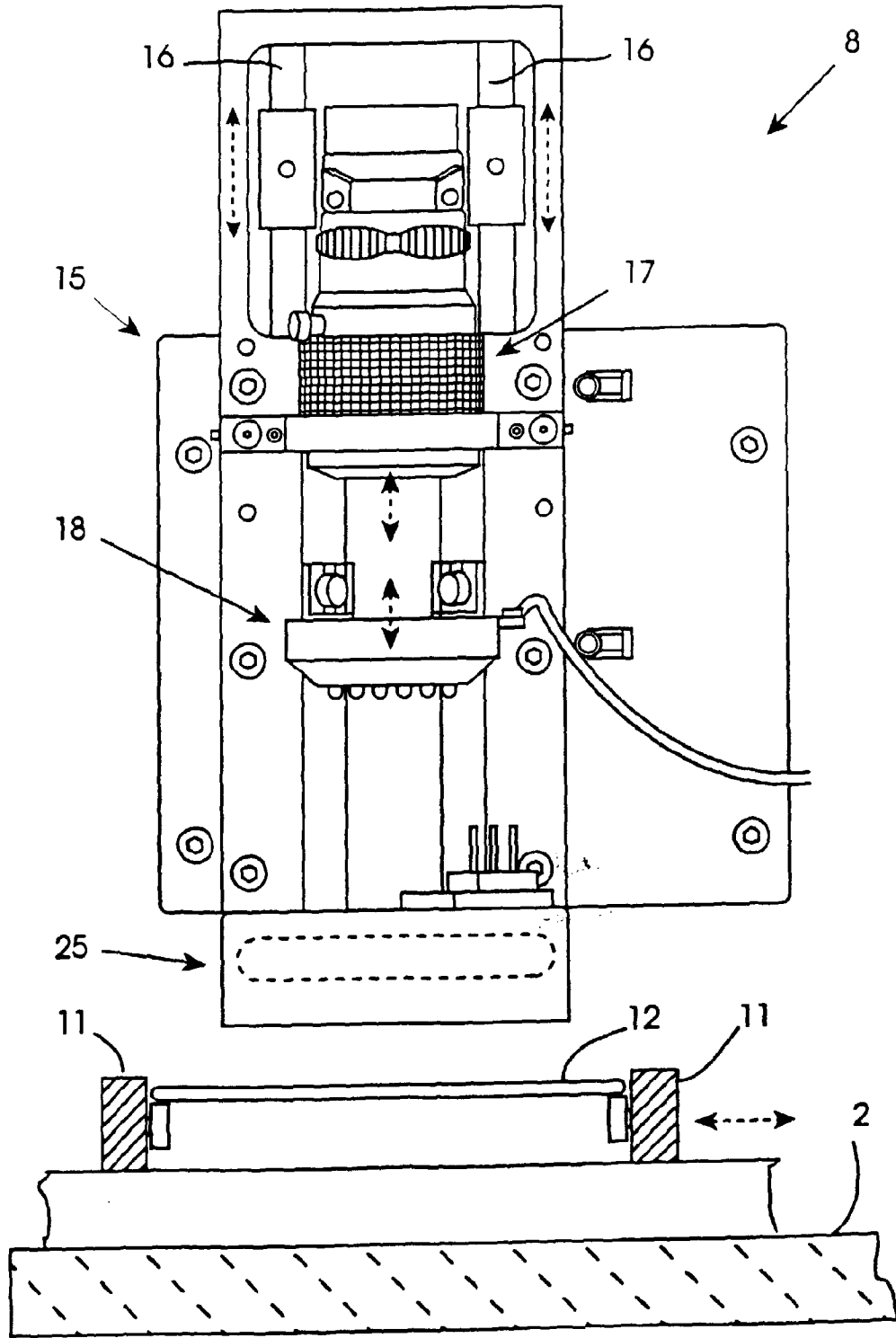


Fig. 3

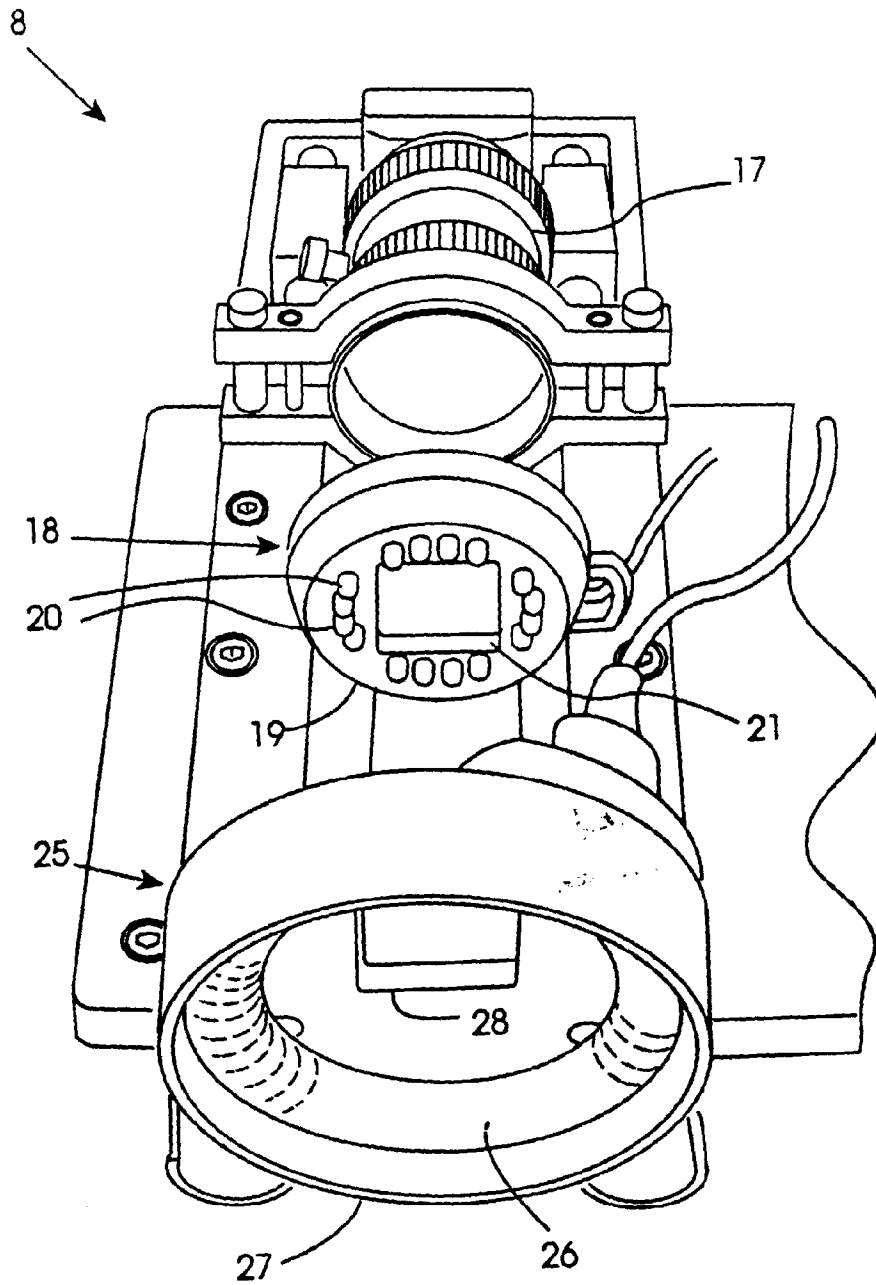


Fig. 4

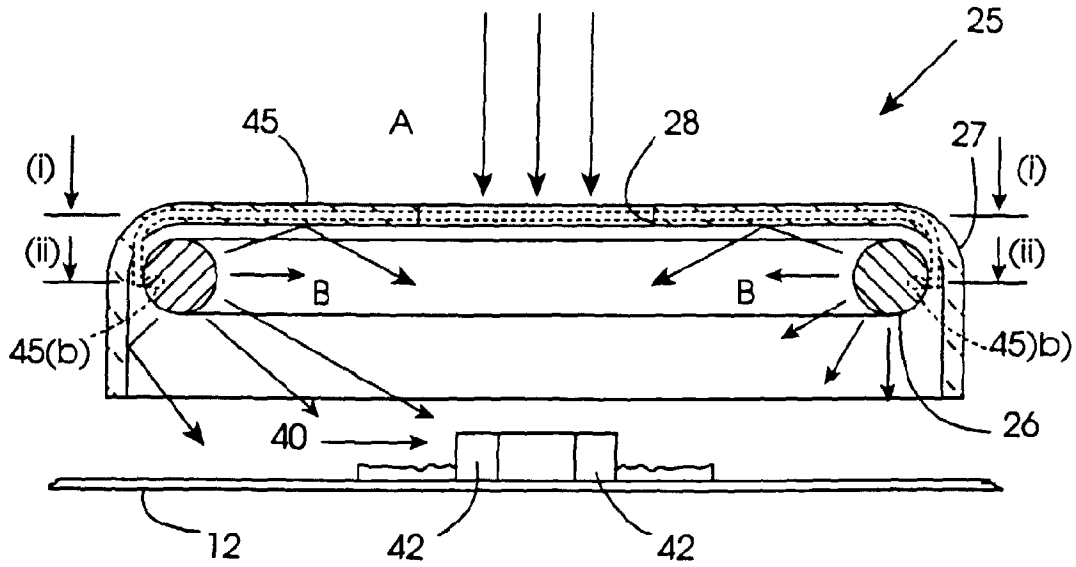


Fig. 5 (a)

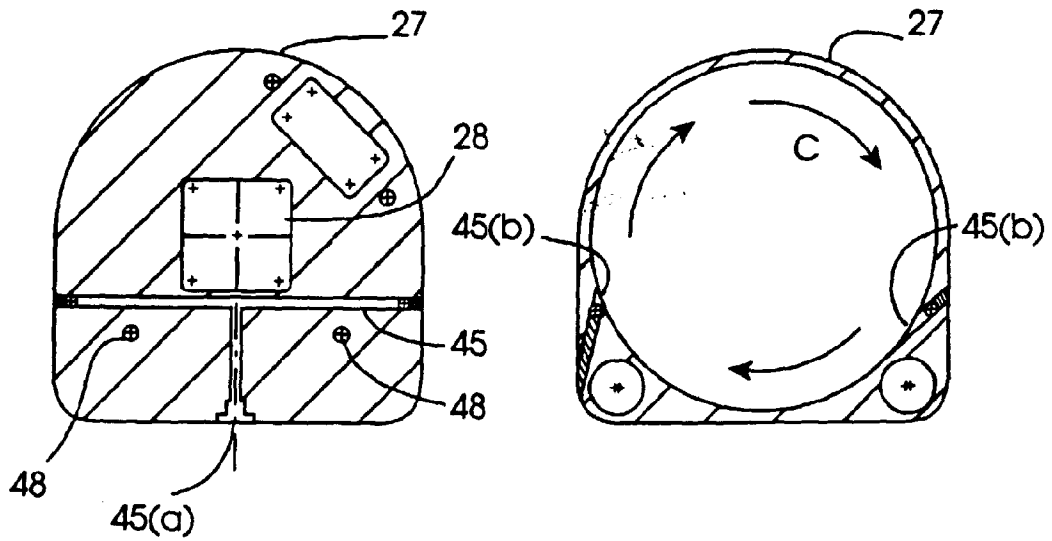


Fig. 5 (b)

Fig. 5 (c)

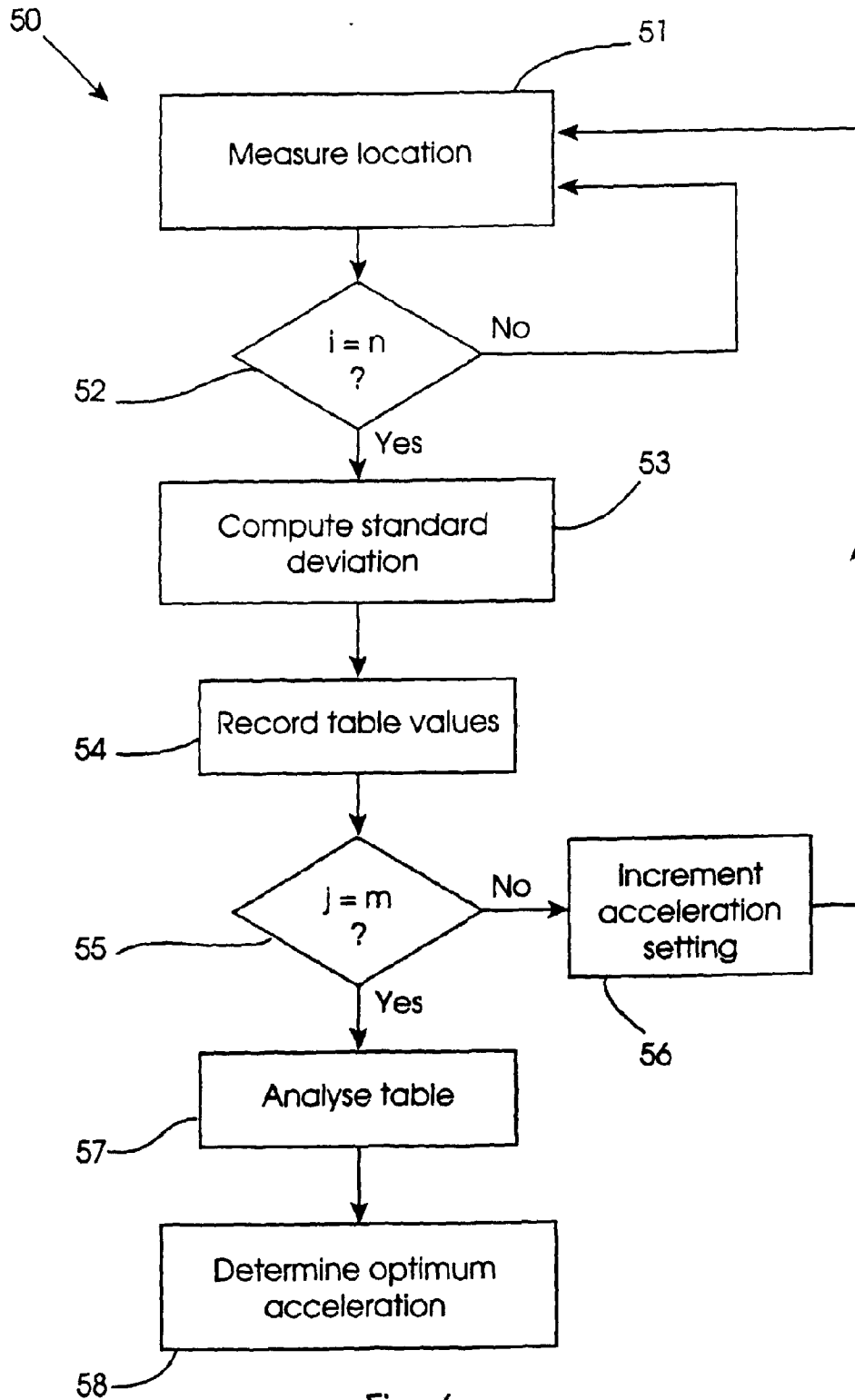


Fig. 6

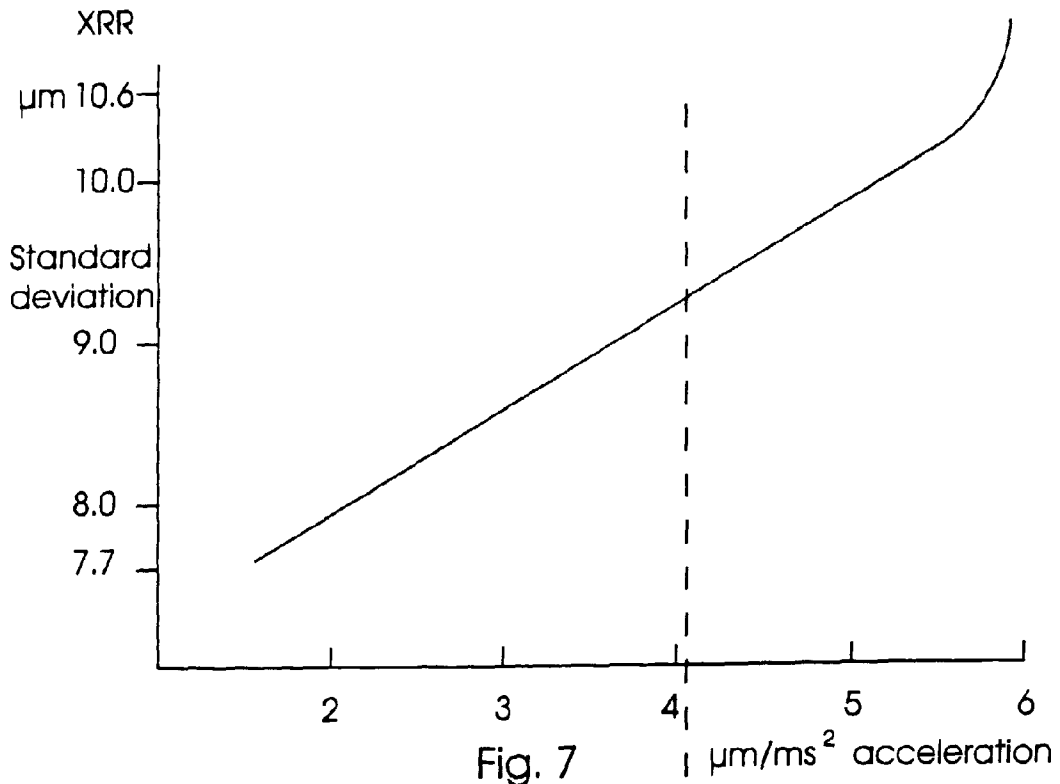


Fig. 7

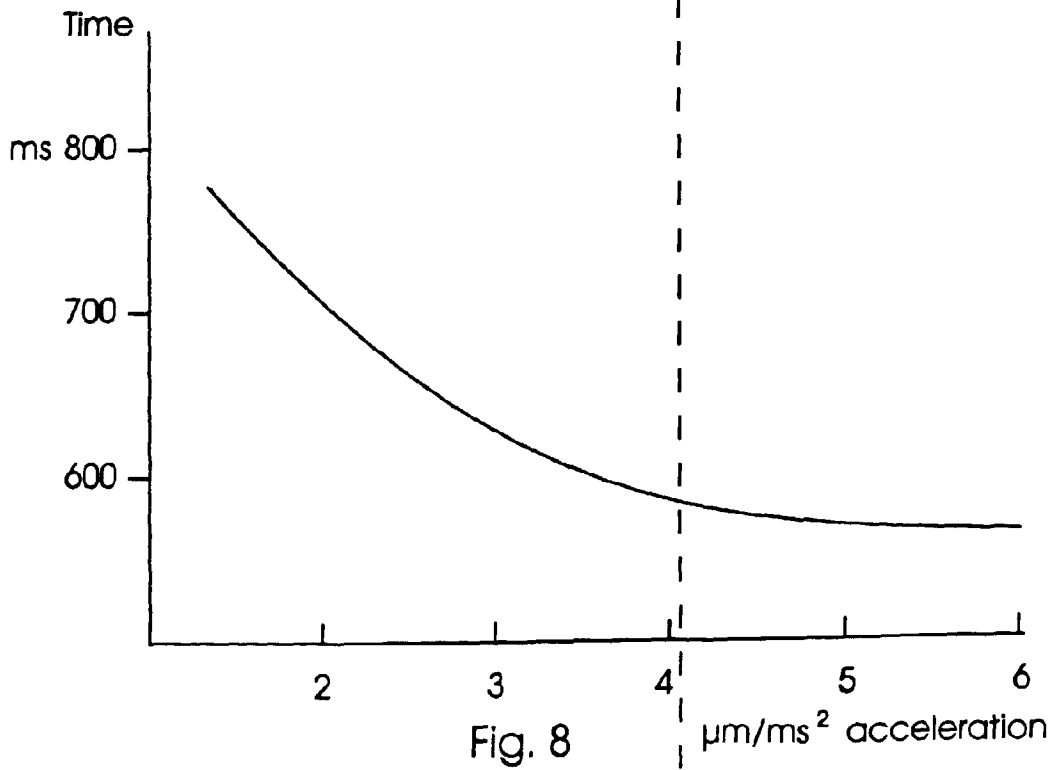


Fig. 8

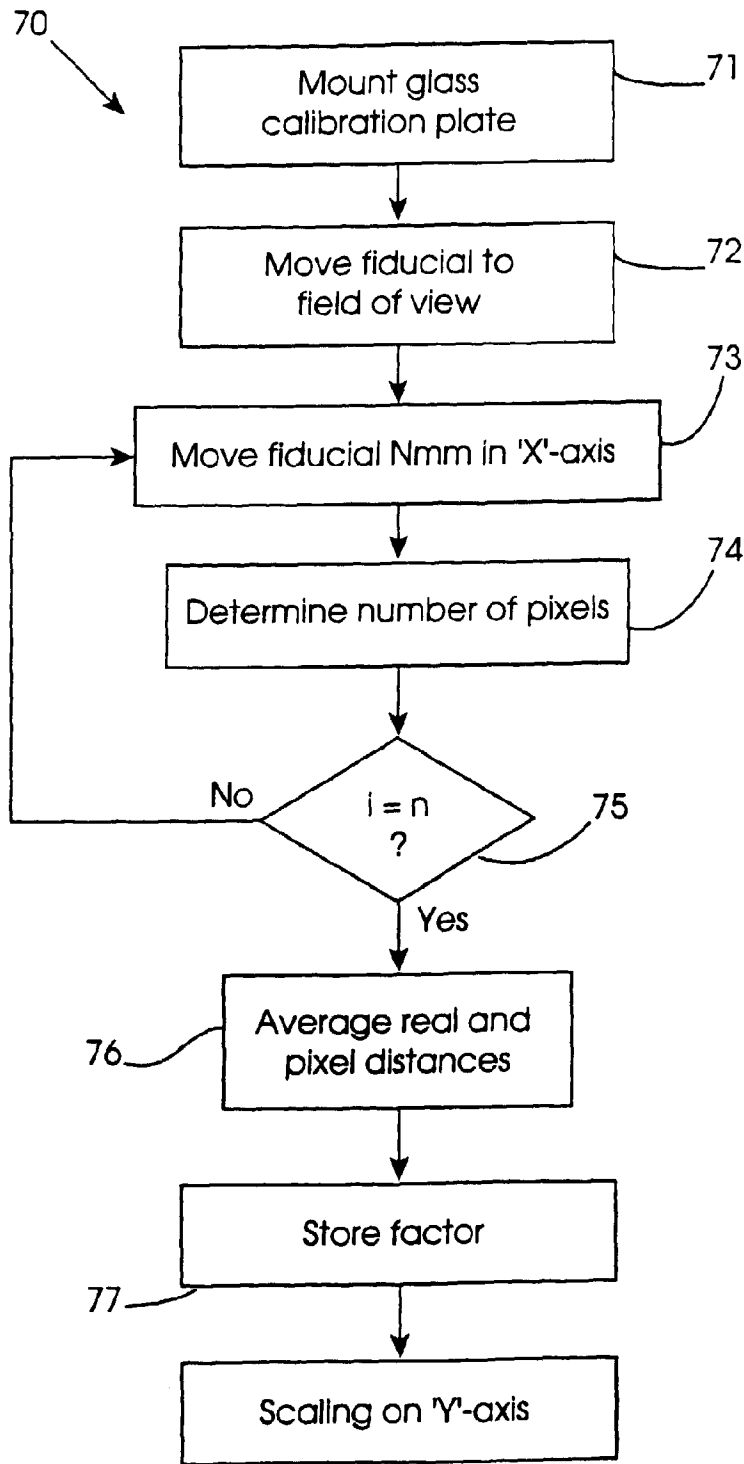


Fig. 9

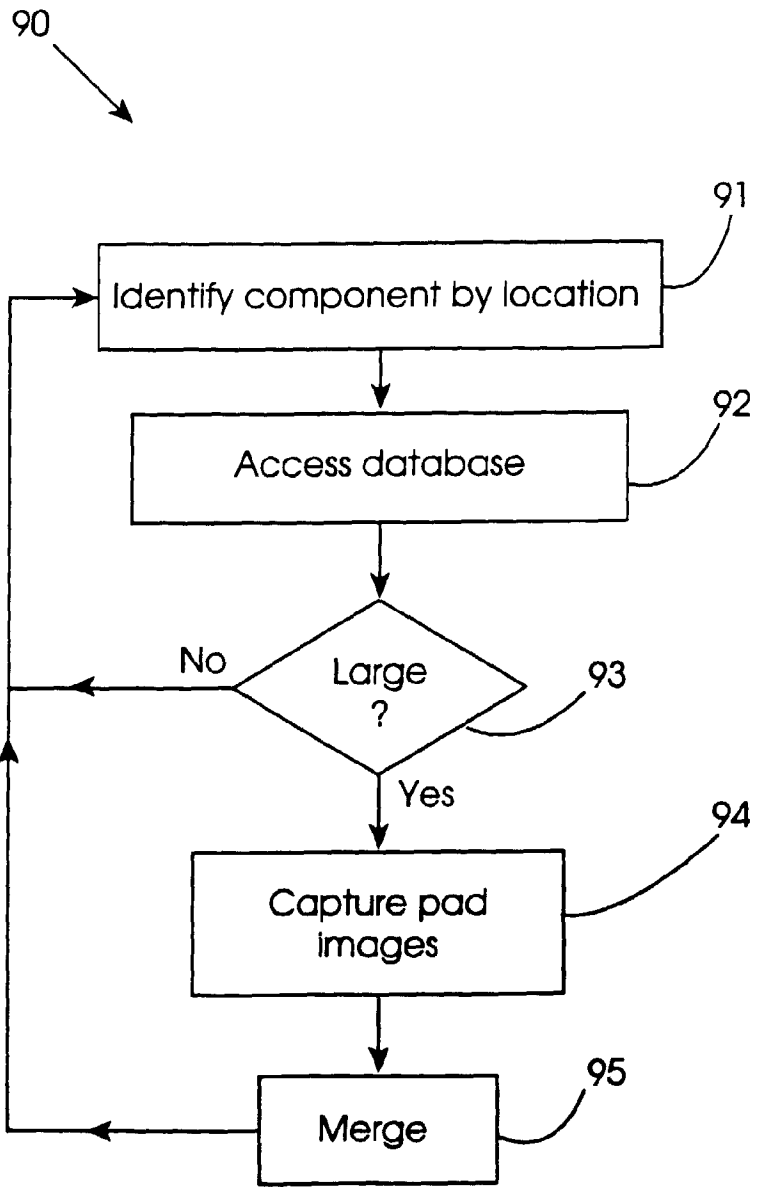


Fig.10



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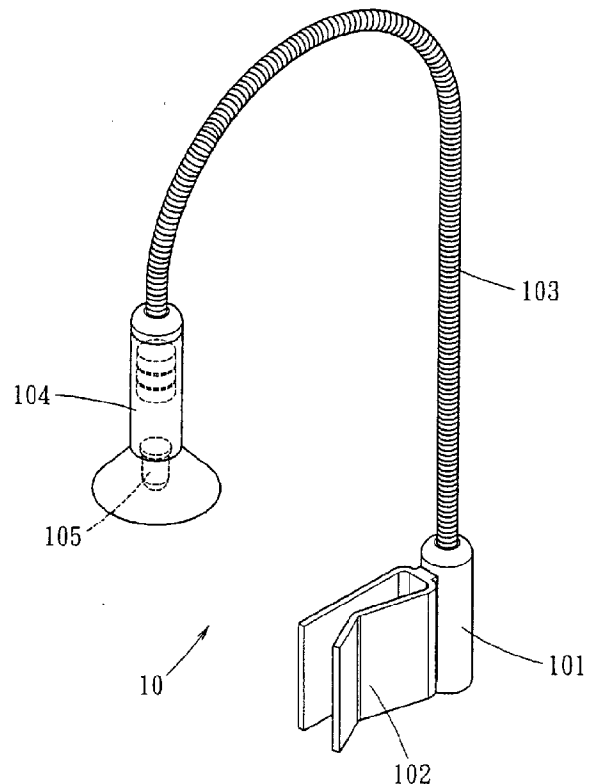
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Die folgenden Angaben sind den vom Anmelder eingereichten Unterlagen entnommen

(54) Bezeichnung: Lampenkonstruktion für ein elektrisches Gerät

(57) Hauptanspruch: Lampenkonstruktion für ein elektrisches Gerät, mit:

- einem Halteabschnitt mit mindestens einem Klemmelement und einem flexiblen Rohr mit einem an dessen oberem Ende angebrachten Adapter; und
- einem Buchsenabschnitt, der schwenkbar mit dem Adapter verbunden ist und zwei getrennte Leiter mit einer Anzahl von daran positionierten Beleuchtungselementen aufweist, von denen jedes über zwei Stiftbeine verfügt, die jeweils elektrisch mit den Leitern verbunden sind.



Beschreibung**HINTERGRUND DER ERFINDUNG**

[0001] Die Erfindung betrifft allgemein eine Lampenkonstruktion für ein elektrisches Gerät, und spezieller betrifft sie eine Lampenkonstruktion zur Verwendung in einem tragbaren elektrischen Gerät wie einem Laptopcomputer, um für ausreichende Beleuchtung zu sorgen.

[0002] Durch das Fortschreiten der Technik ist es gut bekannt, dass ein tragbares elektrisches Gerät wie ein Laptopcomputer das Leben der Menschen erleichtert. Ein tragbares elektrisches Gerät ist wegen seiner Tragbarkeit zur Benutzung zu jeder Zeit und an jedem Ort geeignet. Jedoch besteht in der Praxis ein Problem dahingehend, das tragbare elektrische Gerät im Dunkeln oder einer Umgebung mit wenig Licht zu benutzen, weswegen eine herkömmliche Lampeneinrichtung vorhanden ist, die für zusätzliche Beleuchtung sorgt.

[0003] Die **Fig. 1** ist eine perspektivische Ansicht einer herkömmlichen Lampenkonstruktion zur Verwendung in einem Laptopcomputer (nicht dargestellt). Sie kann für eine zusätzliche Beleuchtung für den Benutzer zum Bedienen des Laptopcomputers sorgen.

[0004] Die herkömmliche Lampeneinrichtung **10** verfügt über eine Basis **101** mit einem Klemmelement **102** auf einer Seite für Klemmbefestigung am LCD des Laptopcomputers. An der Basis **101** ist ein Faltenrohr **103** angebracht, das flexibel ist, um einstellbar zu sein, so dass eine in einer Fassung **204** montierte Lampe **103** den Laptopcomputer mit geeigneter Beleuchtung versehen kann.

[0005] Jedoch wird die herkömmliche Lampeneinrichtung **10** an einem Rand des LCD montiert, und die Lampe **105** bildet nur ein Lichtelement; daher kann die Beleuchtung unzureichend sein.

[0006] Daher existieren hinsichtlich der praktischen Anwendung der obigen herkömmlichen Lampenkonstruktion Nachteile und Mängel. Demgemäß besteht erheblicher Bedarf am Bereitstellen einer verbesserten Lampenkonstruktion, die die obigen Nachteile löst und die zweckdienlicher und praktischer verwendet werden kann.

KURZE ZUSAMMENFASSUNG DER ERFINDUNG

[0007] Durch die Erfindung ist eine Lampenkonstruktion für ein elektrisches Gerät mit einer Anzahl ausgerichteter Beleuchtungselemente geschaffen, um für ausreichende Beleuchtung eines elektrischen Geräts wie eines Laptopcomputers zu sorgen, so dass es für den Benutzer bequem ist, den Laptopcomputer im Dunkeln oder in einer Umgebung mit schlechter Beleuchtung zu bedienen.

[0008] Eine andere Aufgabe der Erfindung ist es, eine Lampeneinrichtung mit verschiedenen vom Benutzer wählbaren Spannungsquellen zu schaffen, um den Gebrauch zu vereinfachen.

[0009] Um die oben genannten Aufgaben zu lösen, verfügt die durch die Erfindung geschaffene Lampenkonstruktion über einen Halteabschnitt und einen Fassungsabschnitt. Der Halteabschnitt verfügt über mindestens ein Klemmelement und ein flexibles Rohr mit einem an dessen oberem Ende angebrachten Adapter. Der Fassungsabschnitt, der an einem Ende des Adapters schwenkbar mit diesem verbunden ist, verfügt über zwei getrennte Leiter mit mehreren daran positionierten Beleuchtungselementen, von denen jedes über zwei Stiftbeine verfügt, die jeweils elektrisch mit den Leitern verbunden sind. Jeder Leiter verfügt über einen geknickten und elastischen Halteteil an einer zugehörigen Seite sowie eine Anzahl von über dem Halteteil ausgebildeten Stecklöchern, so dass zwei Stiftbeine jedes Beleuchtungselements durch die Stecklöcher passen, um jeweils durch die zwei Halteteile gehalten zu werden.

[0010] Ferner verfügt die durch die Erfindung geschaffene Lampenkonstruktion über zwei mit den jeweiligen Leitern verbundene Drähte, die sich durch das flexible Rohr erstrecken. Der Halteabschnitt verfügt ferner über eine Basis zum Aufnehmen von mit den zwei Drähten verbundenen Batterien zum Liefern von Energie. Außerdem ist an den Enden der Drähte ein Verbinder wie ein USB-Verbinder oder ein Stecker ausgebildet; daher wird die Energie dadurch zugeführt, dass der Verbinder mit dem Laptopcomputer verbunden wird oder er in eine Spannungsbuchse eingesteckt wird.

[0011] Daher werden durch die Erfindung eine Licht emittierende Diode und ein Schalter an einem Griff eines Fahrzeug-Zigarettenanzünders installiert, so dass dann, wenn der Anzünder leitet, der Benutzer oder Fahrer den Leitungszustand leicht durch das durch die Licht emittierende Diode erzeugte Licht erkennen kann.

KURZE BESCHREIBUNG DER ZEICHNUNGEN

[0012] Diese und auch andere Merkmale der Erfindung werden unter Bezugnahme auf die Zeichnungen besser ersichtlich.

[0013] **Fig. 1** zeigt eine perspektivische Ansicht einer herkömmlichen Lampeneinrichtung;

[0014] **Fig. 2** zeigt eine Explosionsansicht einer erfindungsgemäßen Lampenkonstruktion;

[0015] **Fig. 3** zeigt eine Explosionsansicht eines Fassungsabschnitts der Lampenkonstruktion;

[0016] **Fig. 4** zeigt eine vordere Stirnansicht des erfindungsgemäßen Buchsenabschnitts;

[0017] **Fig. 5** zeigt den Zusammenbau des erfindungsgemäßen Buchsenabschnitts;

[0018] **Fig. 6** zeigt den Zusammenbau der Lampenkonstruktion für einen Laptopcomputer;

[0019] **Fig. 7** zeigt eine Anwendung der Lampenkonstruktion für einen Laptopcomputer;

[0020] **Fig. 8** zeigt eine Lampenkonstruktion gemäß einer anderen bevorzugten Ausführungsform der Erfindung; und

[0021] **Fig. 9** zeigt eine Lampenkonstruktion gemäß noch einer anderen bevorzugten Ausführungsform der Erfindung.

DETAILLIERTE BESCHREIBUNG DER ERFINDUNG

[0022] Nun wird detailliert auf die bevorzugten Ausführungsformen der Erfindung Bezug genommen, zu denen Beispiele in den beigefügten Zeichnungen dargestellt sind. Wo immer möglich werden in den Zeichnungen und der Beschreibung dieselben Bezugszahlen dazu verwendet, dieselben oder ähnliche Teile zu kennzeichnen.

[0023] Gemäß der **Fig. 2** verfügt eine Lampenkonstruktion für ein elektrisches Gerät wie einen Laptopcomputer, um gemäß der Erfindung für ausreichende Beleuchtung zu sorgen, über einen Halteabschnitt **20** und einen Buchsenabschnitt **30**.

[0024] Der Halteabschnitt **20** verfügt über eine Basis **21** zum Aufnehmen von Batterien **22**. An einer Seite der Außenfläche der Basis **21** ist mindestens ein Klemmelement **23** ausgebildet. Bei dieser bevorzugten Ausführungsform existieren zwei Klemmelemente **23** zum Festklemmen am LCD des Laptopcomputers.

[0025] Der Halteabschnitt **20** verfügt ferner über ein flexibles Rohr **24** wie ein Faltenrohr, das an einem Ende an der Basis **21** angebracht ist. Am anderen Ende des flexiblen Rohrs **24** ist zum schwenkbaren Anschließen des Buchsenabschnitts ein Adapter **25** angebracht. Daher können sich die Drähte **26** ausgehend vom Buchsenabschnitt **30** so erstrecken, dass sie durch das Innere des flexiblen Rohrs **24** laufen, um mit den Batterien **22** verbunden zu sein.

[0026] Gemäß den **Fig. 3 bis 5** verfügt der Buchsenabschnitt **30** über eine bandförmige Lichtabdeckung **31**, eine Befestigungsplatte **32**, mehrere Beleuchtungselemente **33**, zwei getrennte Leiter **34** und einen halbzyklindrischen Sitz **35**.

[0027] Die bandförmige Lichtabdeckung **31** verfügt über eine Grundplatte **31a**, die mit einer bogenförmigen Lichtmaskierung **303** verbunden ist, die über ihr anzubringen ist. Die der Grundplatte **31a** zugewandte Innenseite **302** der Lichtmaskierung **301** ist eine reflektierende Fläche zum Reflektieren des auffallenden Lichts.

[0028] In der Grundplatte **31a** ist eine Anzahl ausgerichteter Löcher **31b** ausgebildet, und an der Unterseite der Bodenplatte **31a** ist eine Anzahl von Schraubzapfen **31c** mit einem Kegelgewinde im Inneren ausgebildet. Jedes an der Befestigungsplatte **32** angebrachte Beleuchtungselement **33** durchdringt ein entsprechendes Loch **31b** der Grundplatte **31a**, um innerhalb der Abdeckung **31** zu liegen. Die Befestigungsplatte **32** besteht aus einem isolierenden Material wie Kunststoff, und sie befindet sich aus Sicherheitsgründen zwischen der Abdeckung **31** und dem Sitz **35**.

[0029] Die Beleuchtungselemente sind helle Licht

emittierende Dioden (LEDs), die gering versorgt werden müssen, um Energie zu sparen. Zwei positive und negative Elektrodenstiftbeine **331** des Beleuchtungselements **33** sind jeweils mit zwei Stecklöchern **341** des Leiters **34** verbunden.

[0030] Ein Ende jedes Leiters **34** ist mit den Drähten **26** verbunden, um die positive oder negative Elektrode zu bilden. An den Leitern **34** sind zwei symmetrisch geknickte und elastische Halteteile **342** ausgebildet. Die mehreren Paare von Stecklöchern **341** sind über den Halteteilen **342** so ausgebildet, dass jedes Paar der Stiftbeine **331** durch das entsprechende Paar von Stecklöchern **341** läuft, um in den Halteteilen gehalten zu werden, wie es in der **Fig. 4** dargestellt ist. Daher stehen die Stiftbeine **331** der Beleuchtungselemente **33** mit den Leitern **34** in stabilem Kontakt, und sie sind fest an den Leitern **34** montiert.

[0031] Der bogenförmige Sitz **35** verfügt über eine Isolierplatte **351** in der Mitte, um die zwei sich im Sitz **35** befindenden Leiter **34** zu trennen, und über zwei Sperrplatten **352**, die an einer jeweiligen Seite der Isolierplatte **351** ausgebildet sind. Jede Halteteil **342** der Leiter **34** ist zwischen der entsprechenden Sperrplatte **352** und der Isolierplatte **351** fixiert.

[0032] Hinsichtlich der am Sitz **35** ausgebildeten Schraubzapfen **31c** existiert eine Anzahl von Schraubblöchern für eine Anzahl von Schrauben, um die bandförmige Lichtabdeckung **31** und den halbzyklindrischen Sitz **35** zusammensetzen. Ferner wird eine Kappe **36** dazu verwendet, das andere Ende des Buchsenabschnitts **30** abzudecken, wie es in der **Fig. 5** dargestellt ist.

[0033] Es ist auf die **Fig. 6 und 7** Bezug zu nehmen. Die erfindungsgemäße Lampeneinrichtung wird durch die Klemmelemente **23** an einem Rand des LCD **42** eines Laptopcomputers **40** gehalten. Die ausgerichteten Beleuchtungselemente **33** im Buchsenabschnitt **30** sorgen für ausreichende Beleuchtung der Tastatur **31** und des LCD **42**, um die Bedienung des Laptopcomputers **40** durch den Benutzer in einer dunklen oder schlecht beleuchteten Umgebung zu erleichtern.

[0034] Unter Bezugnahme auf die **Fig. 8 und 9** werden andere bevorzugte Ausführungsformen der erfindungsgemäßen Lampenkonstruktion veranschaulicht. Ein Verbinder **50** erstreckt sich weiter von der Basis **21** des Halteabschnitts **20**, um zu einer äußeren Spannungsversorgung zu gelangen. Gemäß der **Fig. 8** ist der Verbinder **50** ein USB-Verbinder für Verbindung mit einem USB-Port des Laptopcomputers. In der **Fig. 9** ist der Verbinder **50** ein Stecker für Verbindung mit einer Spannungsbuchse.

[0035] Die erfindungsgemäße Lampenkonstruktion sorgt zumindest für die folgenden Vorteile:

[0036] 1. Zwei Leiter **34** werden dazu verwendet, vielen Beleuchtungselementen im Buchsenabschnitt **30** zugeordnet zu werden; daher kann eine ausreichend helle Beleuchtung erzielt werden.

[0037] 2. Es ist für verschiedene vom Benutzer auswählbare Spannungsquellen gesorgt, um den Ge-

brauch zu erleichtern, nämlich für die Batterien **22** und den USB- oder den Steckverbinder **50**.

[0038] 3. Das Paar von Stiftbeinen **331** jedes Beleuchtungselements **33** wird durch die Halteteile **342** gehalten; daher ist der Zusammenbau der Beleuchtungselemente **33** und der Leiter einfach und fein, um die Kosten zu senken.

[0039] Der Fachmann erkennt, dass an der Erfindung verschiedenen Modifizierungen und Variationen vorgenommen werden können, ohne vom Grundgedanken oder Schutzzumfang derselben abzuweichen. Angesichts des Vorstehenden sollen durch die Erfindung Modifizierungen und Variationen derselben abgedeckt sei vollständig in den Schutzzumfang der Erfindung und zugehöriger Äquivalente fallen.

Schutzansprüche

1. Lampenkonstruktion für ein elektrisches Gerät, mit:

- einem Halteabschnitt mit mindestens einem Klemmelement und einem flexiblen Rohr mit einem an dessen oberem Ende angebrachten Adapter; und
- einem Buchsenabschnitt, der schwenkbar mit dem Adapter verbunden ist und zwei getrennte Leiter mit einer Anzahl von daran positionierten Beleuchtungselementen aufweist, von denen jedes über zwei Stiftbeine verfügt, die jeweils elektrisch mit den Leitern verbunden sind.

2. Lampenkonstruktion nach Anspruch 1, bei der der Halteabschnitt ferner über eine Basis zum Aufnehmen mindestens einer Batterie sowie zwei zwischen die Leiter und die Batterie geschaltete Drähte verfügt.

3. Lampenkonstruktion nach Anspruch 2, bei der das Klemmelement an einer Seite der Basis angebracht ist.

4. Lampenkonstruktion nach Anspruch 1, bei der das flexible Rohr ein Faltenrohr ist.

5. Lampenkonstruktion nach Anspruch 1, bei der der Buchsenabschnitt über eine bandförmige Lichtabdeckung mit einer Anzahl von an ihrer Unterseite ausgebildeten Schraubzapfen mit Kegelfgewinde im Inneren und einen halbzylindrischen Sitz mit einer Anzahl von Schraublöchern hinsichtlich der Schraubzapfen verfügt, um die Abdeckung und den Sitz durch eine Anzahl von Schrauben zusammenzusetzen.

6. Lampenkonstruktion nach Anspruch 5, bei der die Abdeckung eine Bodenplatte aufweist, die mit einer darüber anzubringenden bogenförmigen Lichtmaskierung zu verbinden ist, wobei die der Bodenplatte zugewandte Lichtmaskierung eine reflektierende Fläche ist.

7. Lampenkonstruktion nach Anspruch 5, bei der der Buchsenabschnitt ferner über eine zwischen der Abdeckung und dem Sitz angebrachte Isolierplatte mit den Beleuchtungselementen verfügt .

8. Lampenkonstruktion nach Anspruch 5, bei der der Buchsenabschnitt ferner über eine ein Ende desselben abdeckende Kappe verfügt, wobei das andere Ende des Buchsenabschnitts mit dem Adapter verbunden ist.

9. Lampenkonstruktion nach Anspruch 5, bei der der Sitz eine Isolierplatte zum Trennen der zwei Leiter enthält.

10. Lampenkonstruktion nach Anspruch 9, bei der der Sitz ferner zwei an einer jeweiligen Seite der Isolierplatte ausgebildete Sperrplatten enthält, wobei jeder Leiter zwischen einer entsprechenden Sperrplatte und der Isolierplatte fixiert ist.

11. Lampenkonstruktion nach Anspruch 1, bei der der Buchsenabschnitt zwei Drähte enthält, die jeweils mit den Leitern verbunden sind und die sich durch das flexible Rohr erstrecken, um an den zugehörigen Enden einen Verbinder zu bilden.

12. Lampenkonstruktion nach Anspruch 11, bei der der Verbinder ein Universal-Serial-Bus(USB)-Verbinder oder ein Stecker ist.

13. Lampenkonstruktion nach Anspruch 1, bei der jeder Leiter einen geknickten und elastischen Halteteil an einer zugehörigen Seite aufweist und eine Anzahl von Stecklöchern über dem Halteteil ausgebildet ist, so dass zwei Stiftbeine jedes Beleuchtungselements durch das Steckloch gesteckt werden, um jeweils durch die zwei Halteteile gehalten zu werden.

14. Lampenkonstruktion nach Anspruch 1, bei der die Beleuchtungselemente Licht emittierende Dioden (LEDs) sind.

Es folgen 9 Blatt Zeichnungen

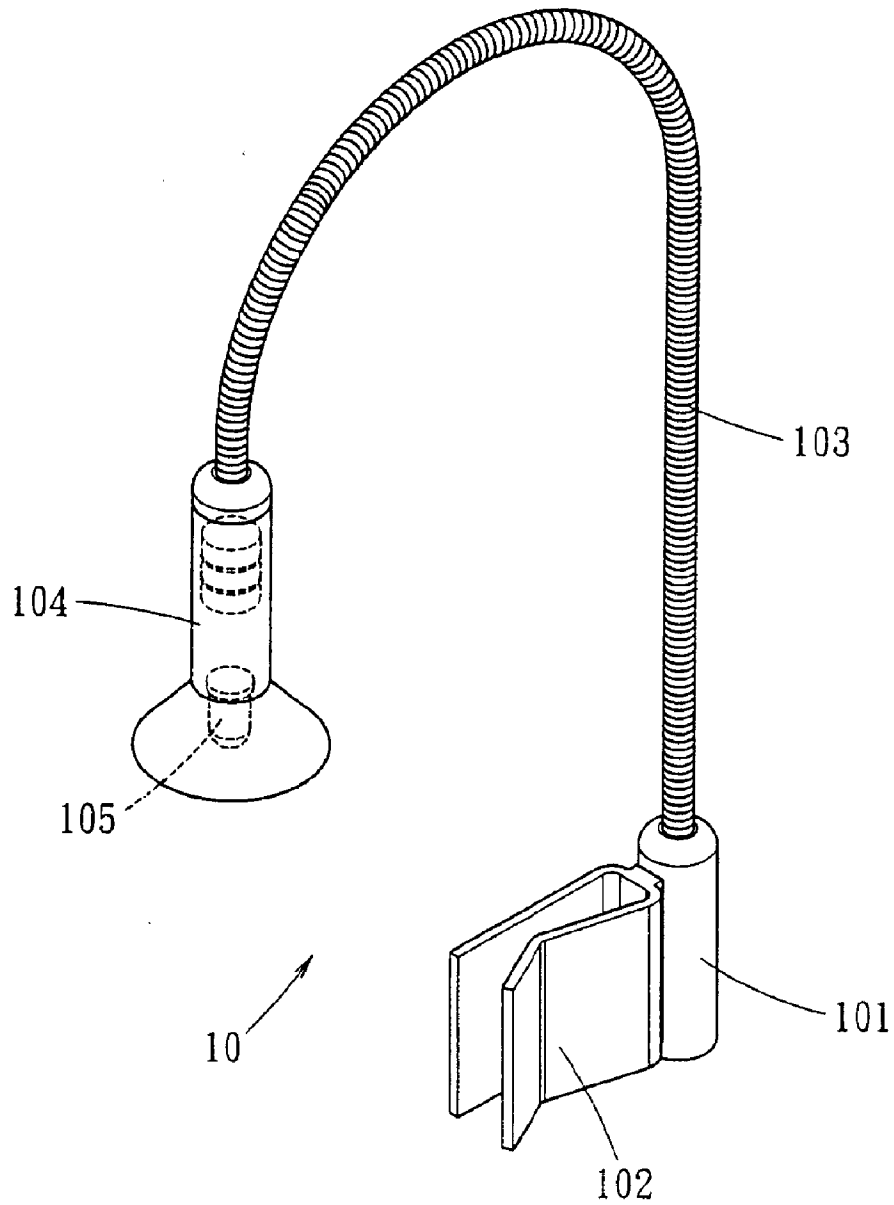


FIG. 1

STAND DER TECHNIK

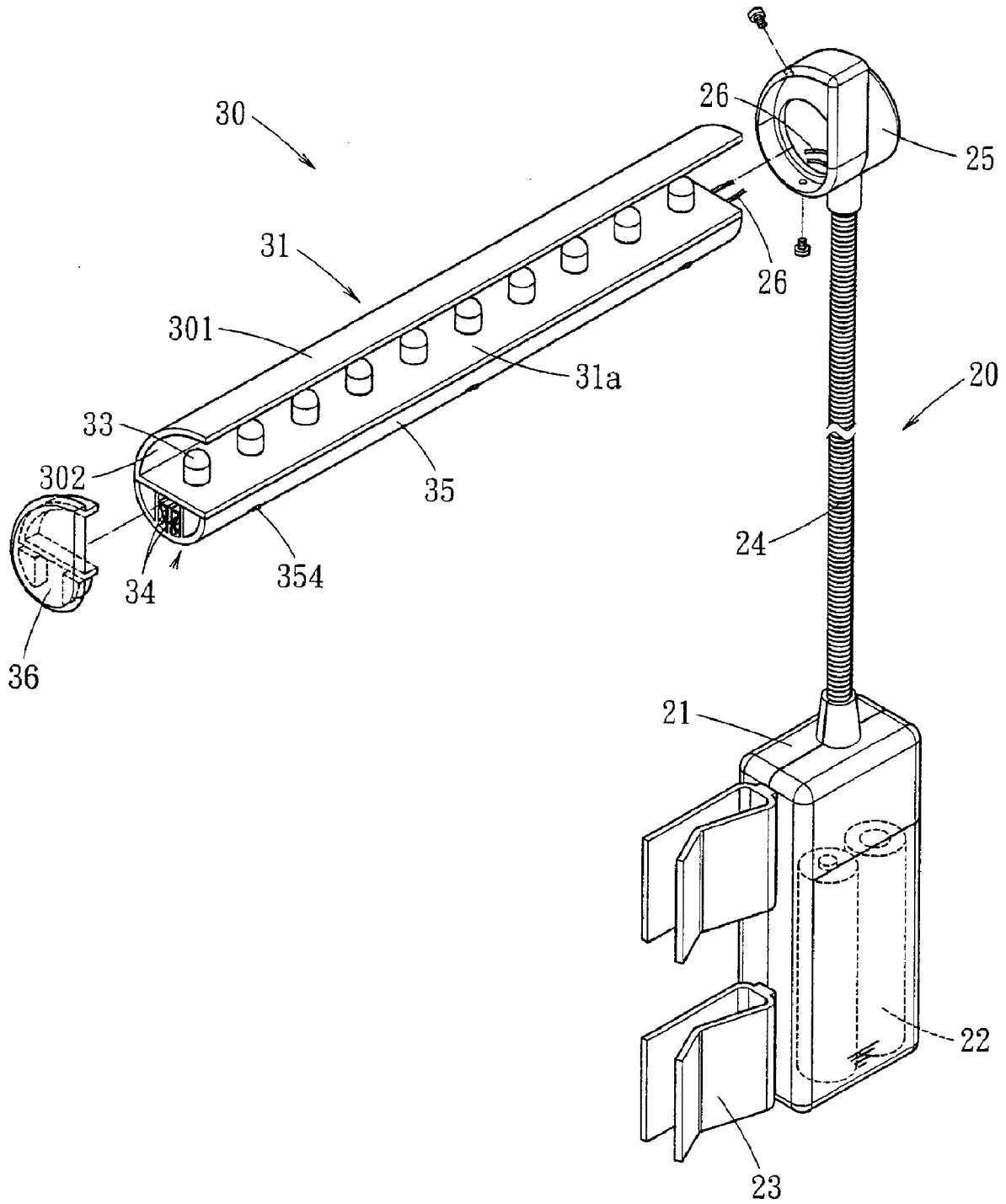


FIG. 2

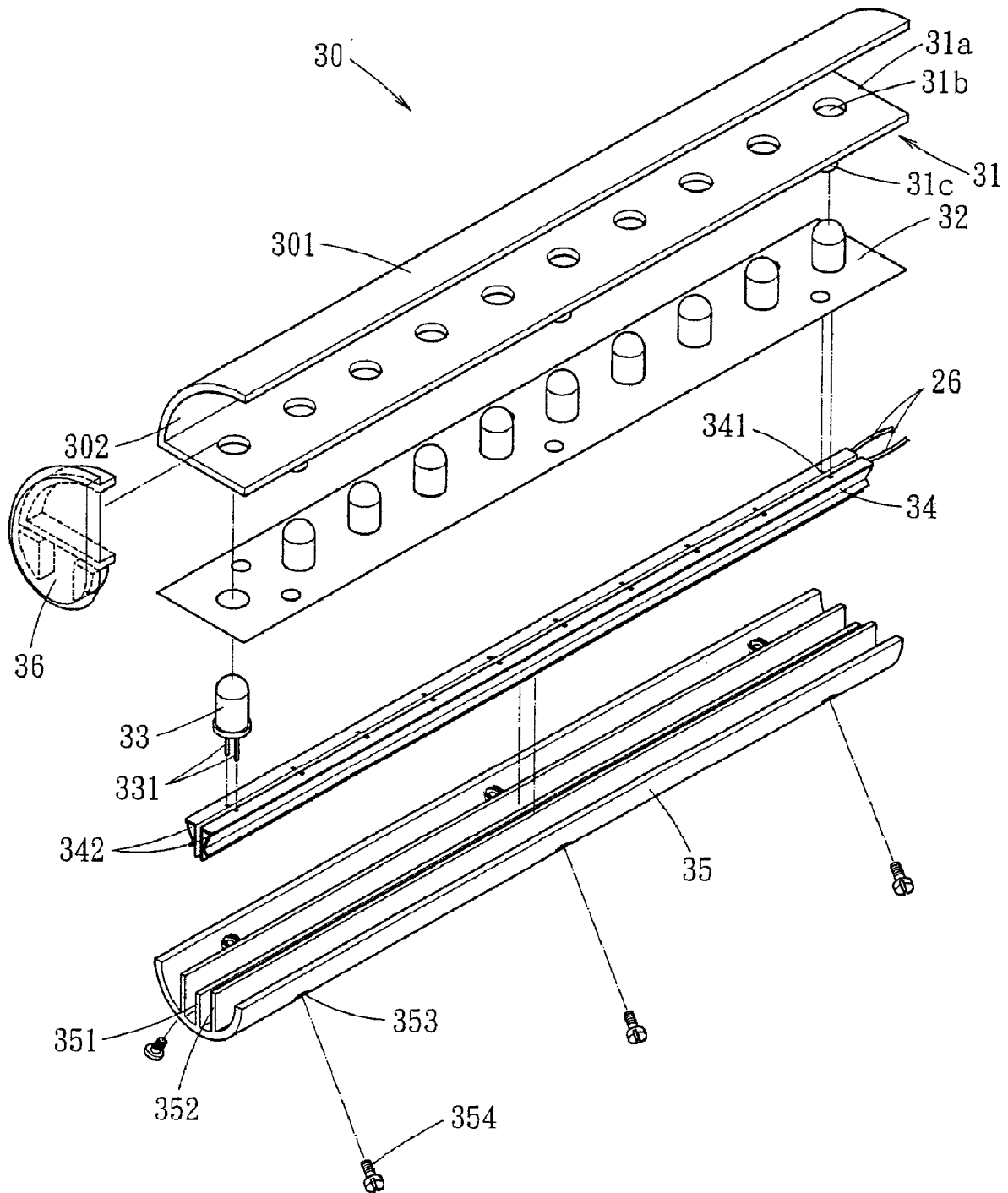


FIG. 3

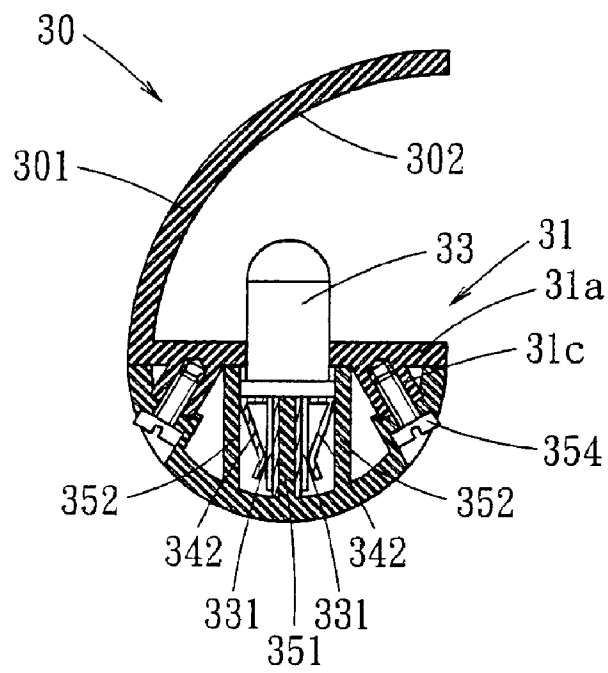


FIG. 4

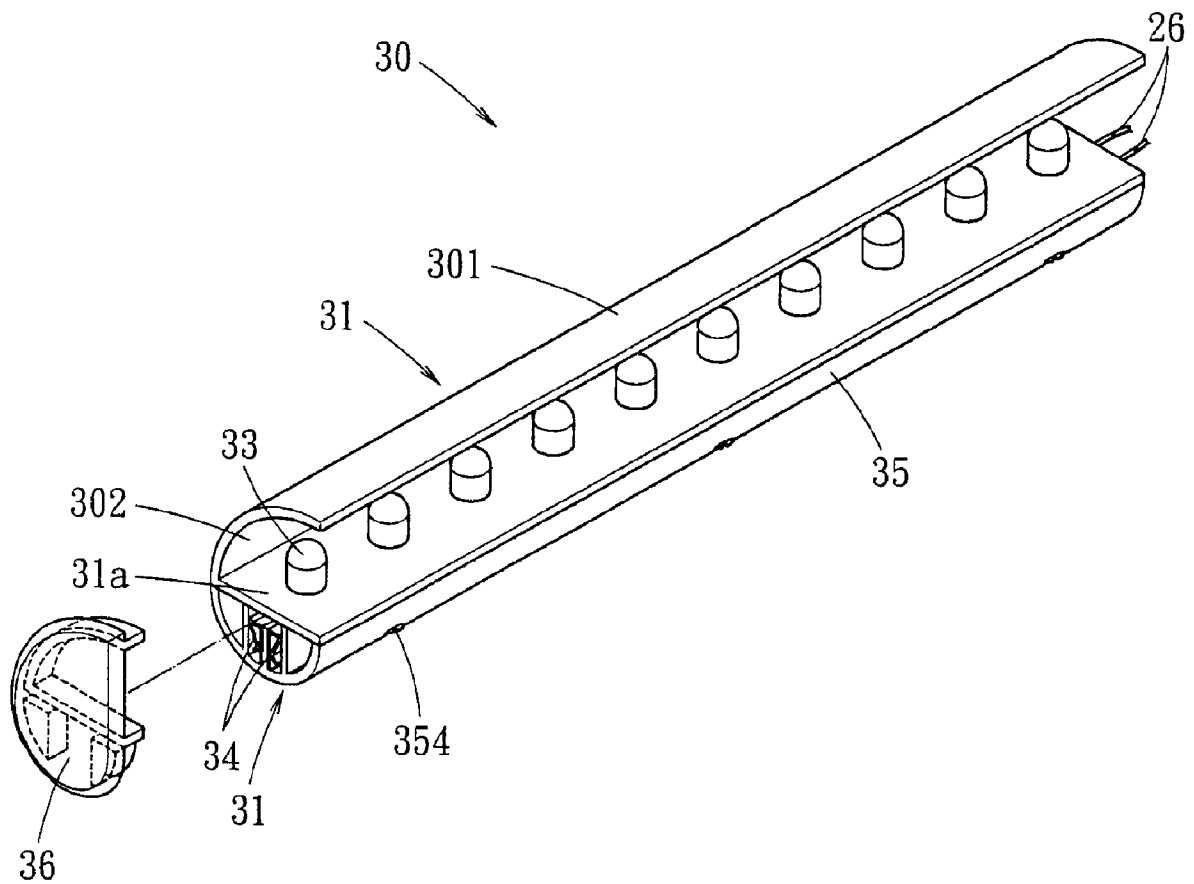


FIG. 5

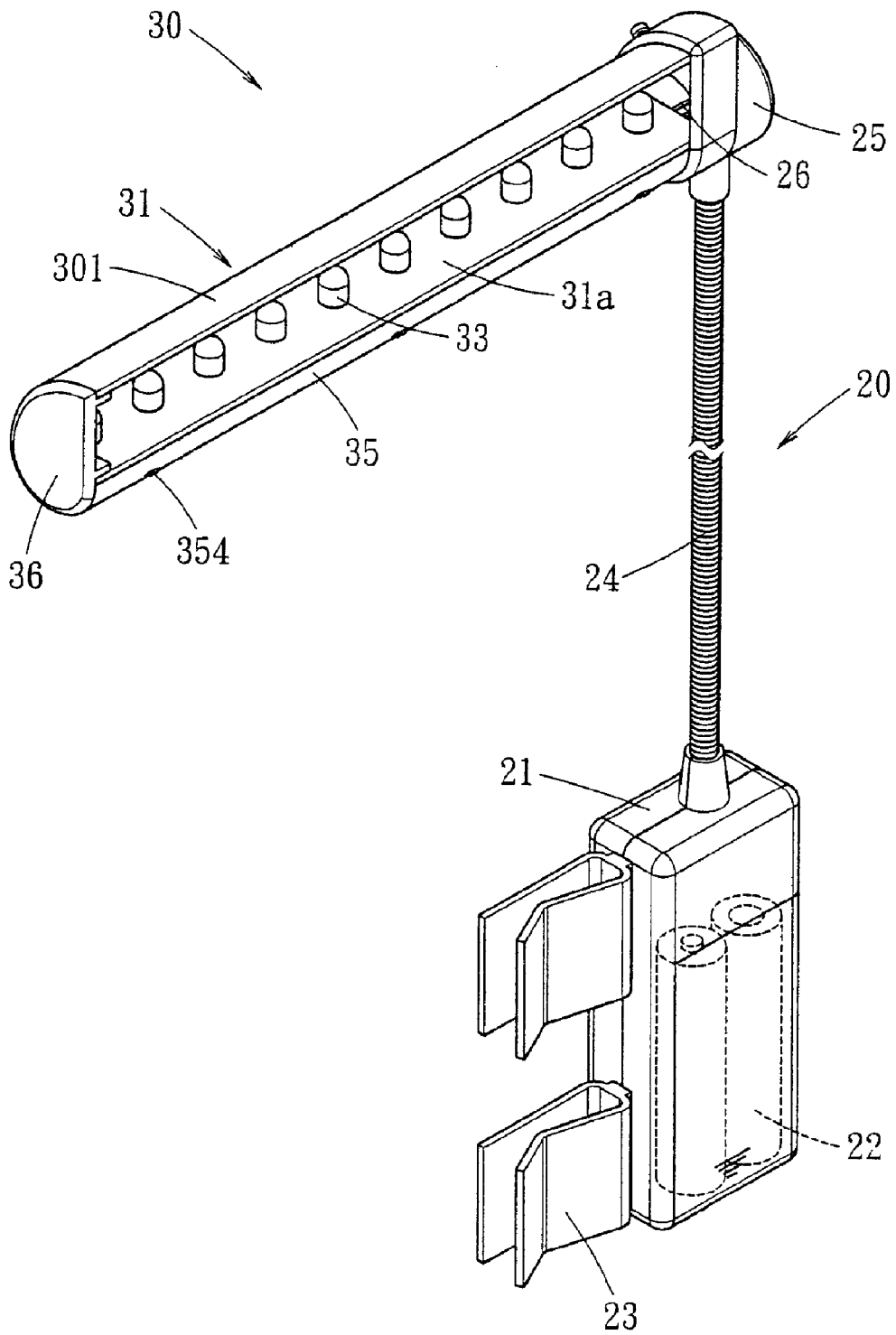


FIG. 6

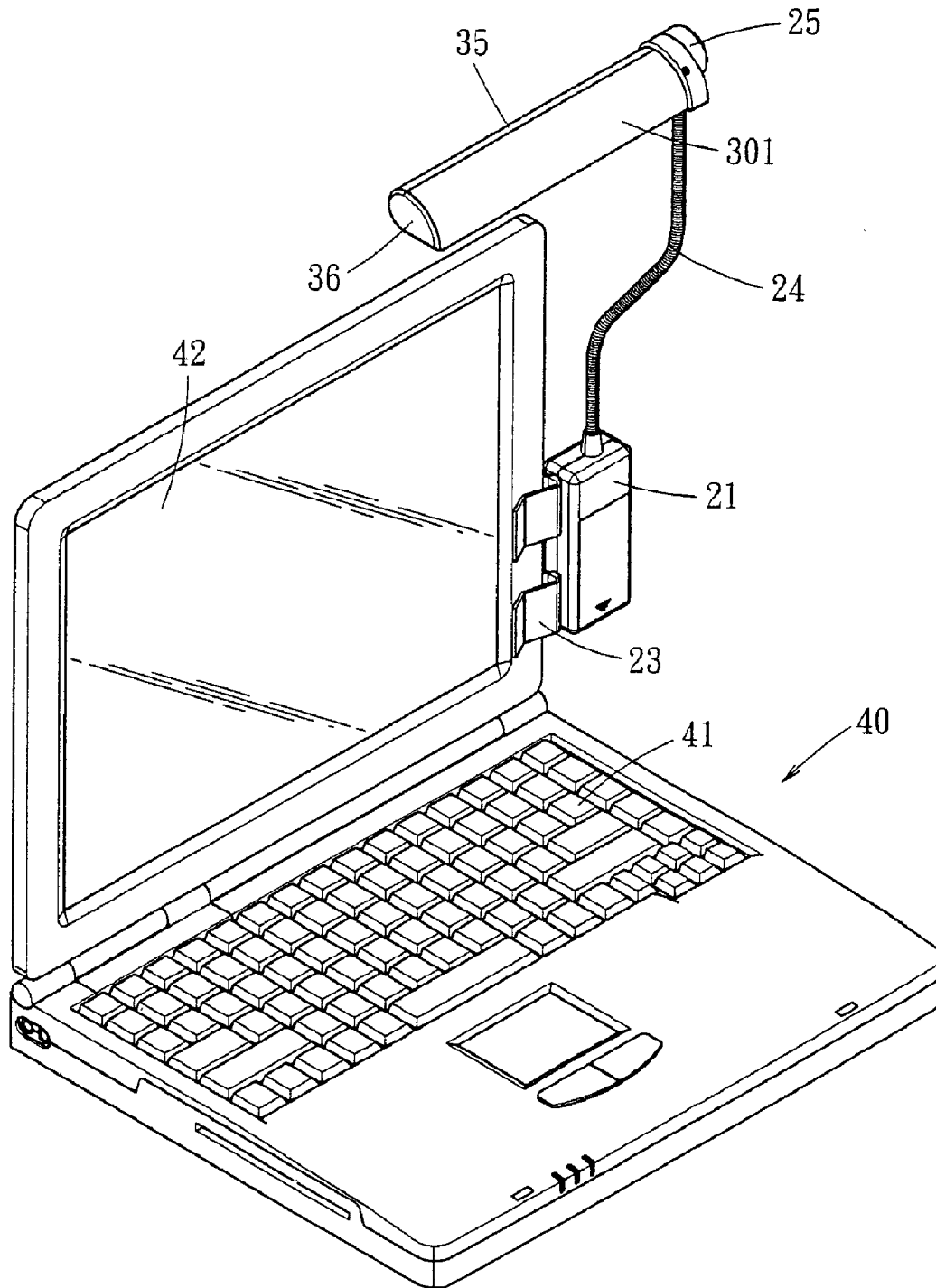


FIG. 7

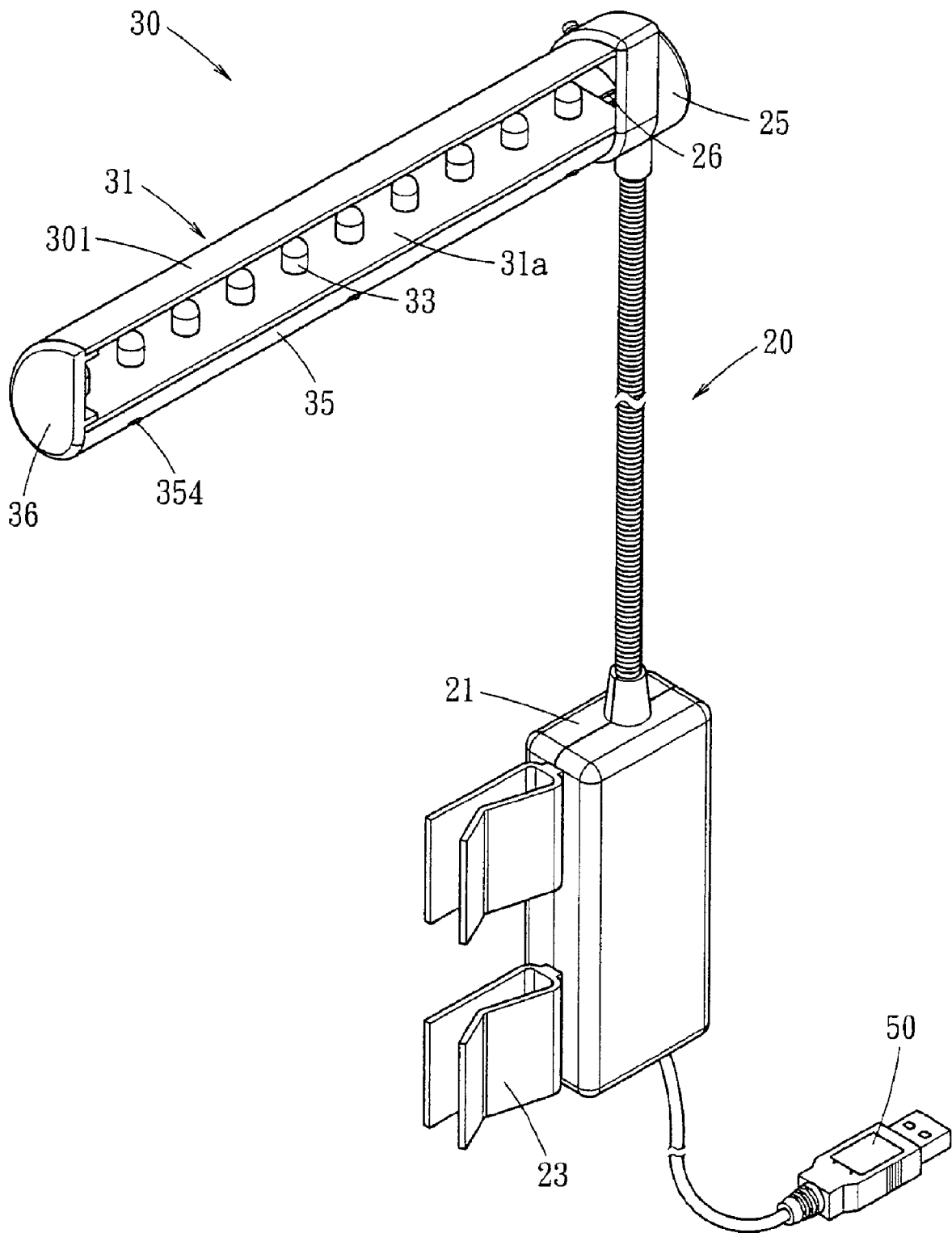


FIG. 8

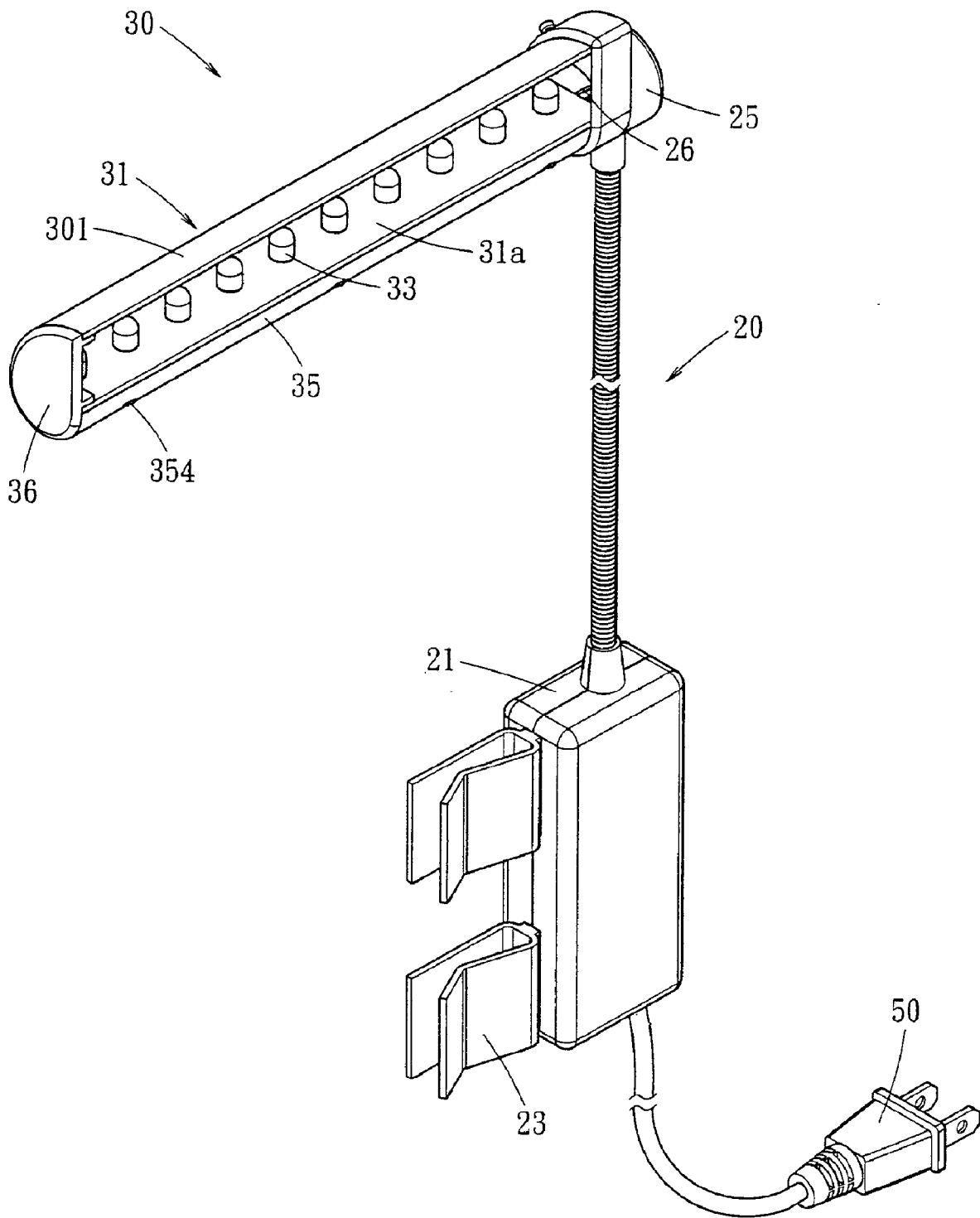


FIG. 9