(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 063 172 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
27.05.2009 Bulletin 2009/22

(51) Int Cl.:
F21V 19/00 *(2006.01)*

(21) Application number: **08253769.7**

(22) Date of filing: **19.11.2008**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR
Designated Extension States:
AL BA MK RS

(30) Priority: **21.11.2007 GB 0722770**

(71) Applicant: **ASD Lighting PLC**
Rotherham S61 4RJ (GB)

(72) Inventor: **Amos, David Paul**
Sheffield S10 3ET (GB)

(74) Representative: **Chapman, Paul Nicholas et al**
Atkinson & Company
Intellectual Property Limited
7 Moorgate Road
Rotherham
South Yorkshire S60 2EN (GB)

(54) An electric light

(57) An electric light comprising: a light fitting; a plate (402), located within the light fitting, that defines a pair of apertures (407); and a lamp (201, 603, 605) connected to a lamp holder (501) within the light fitting. The electric light further comprises a retaining device (204) for increasing mechanical stability of the lamp within the light fitting. The retaining device comprises a strap (301) having a substantially C-shaped form and having a respective end portion (307A, 307B) adjacent to each of the two ends of the strap. The retaining device also has latching means (308A, 308B, 309A and 309B) located on each of the end portions latching the respective end portion within one of the apertures. The latching means comprises a plurality of latching elements (308A, 308B, 309A and 309B) spaced along each of the end portions to allow the device to accommodate a variety of types of lamp (201, 603, 605) having a variety of dimensions.

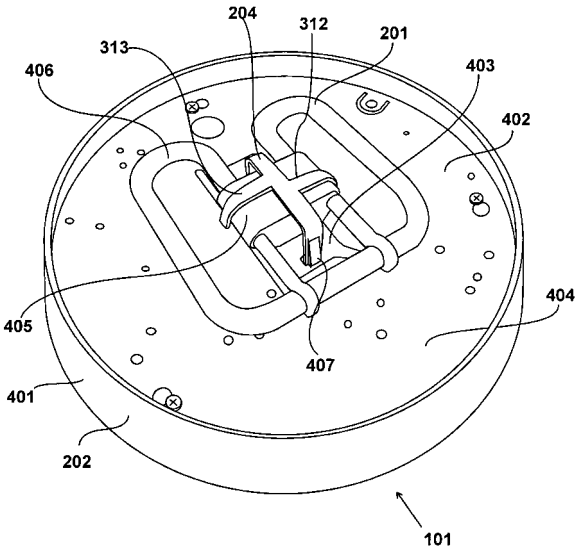

Figure 4

EP 2 063 172 A1

Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to an electric light and a method of retaining a lamp within a lamp holder.

BRIEF SUMMARY OF THE INVENTION

[0002] According to an aspect of the present invention, there is provided an electric light as claimed in claim 1.
[0003] According to a second aspect of the invention there is provided a method of retaining a lamp within a lamp holder as claimed in claim 11.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0004]

Figure 1 shows an electric light 101 in use;
Figure 2 shows a front view of the electric light 101;
Figure 3A, 3B, 3C and 3D respectively show a perspective view, a plan view, a side view and a front view of the lamp retaining device 204;
Figure 4 shows a perspective view of the electric light 101 after removal of its diffuser 203;
Figure 5A shows the gear tray 402 and lamp holder 501 before the lamp 201 and device 204 are fitted;
Figure 5B shows the lamp 201 and device 204 assembled to the lamp holder 501 and gear tray 402;
Figures 6A, 6B and 6C respectively show a partial cross-sectional view of the gear tray 402, lamp 201 and retaining device 204, and a similar views of the gear tray and retaining device with other types of lamp fitted;
Figure 7 shows the lamp 201 and retaining device 204 assembled within a light fixture 701 of an alternative design; and
Figure 8 shows an alternative retaining device 800.

DESCRIPTION OF THE BEST MODE FOR CARRYING OUT THE INVENTION

Figure 1

[0005] An electric light 101 embodying the present invention is shown in use in Figure 1. By way of example of the environmental conditions imposed upon such an electric light, the light 101 is mounted on a wall 102 of a passageway, and access to the passageway is provided by a door 104 located in the wall 102. Consequently, the electric light 101 is subjected to vibrations generated from use of the door 104, especially when it slams shut.
[0006] In addition, where the light is fitted in a public place, such as a subway, car park, building exterior, etc., the light may be subject to vandalism. Thus, the light may be struck with a bat, brick, etc., with the intention of damaging the light. Such a strike could damage the exterior of the light, but it also generates vibrations that test the mechanical soundness of the electrical connections within the light. Thus, the successful operation of the electric light 101 depends upon the uninterrupted integrity of electrical connections within the light, despite said vibrations.

Figure 2

[0007] A front view of the electric light 101 is shown in Figure 2. The electric light 101 includes a fluorescent lamp 201 mounted within a light fitting 202. The lamp 201 is of a type commonly referred to as a 2D lamp. The light fitting itself includes a diffuser 203 formed of a translucent material configured to diffuse light emitted from the lamp 201 as it passes through. In the present case, the diffuser is formed of a colourless transparent material that has a rough surface finish to cause the required diffusion.
[0008] The lamp 201 has electrical connectors that connect with corresponding connectors of the light fitting 202. It is therefore essential to the proper operation of the light 101 that these connections are not disrupted by the above-mentioned vibrations. To ensure that the connectors of the lamp 201 remain firmly connected, the light 101 also contains a lamp retaining device 204.
[0009] The lamp 201 and retaining device 204 are located inside the light fitting, behind the diffuser 203, and the retaining device is formed of a colourless material so that it is not visible at all through the diffuser 203. In the present case the device 204 is clear and colourless, but in alternative embodiments the device is translucent, or opaque, and white.

Figures 3A, 3B, 3C and 3D

[0010] The lamp retaining device 204 is shown in detail in the perspective view, plan view, side view and front view of Figures 3A, 3B, 3C and 3D respectively. The device 204 essentially comprises a strap 301 containing a pair of bends 302 and 303 so that the strap forms a "C" shape, as best seen in Figure 3D. Thus, the bends 302 and 303 divide the length of the strap 301 into three portions: a middle portion 304; and two legs 305 and 306 extending from respective ends of the middle portion 304.
[0011] An end portion 307A adjacent to the end of the leg 305 is shaped to define latching elements 308A and 309A on the outside of the C-shaped strap. The latching elements 308A and 309A are each in the form of a triangular-shaped tooth having a front face 310 that slopes outwards from the plane of the leg 305 and a rear face 311 that extends substantially perpendicularly to said plane. Thus, in use the sloping front face 310 facilitates the insertion of the latching element through an aperture in a plate, while the perpendicular rear face 311 allows the tooth to latch behind the plate after insertion.

[0012] An end portion 307B adjacent to the end of the leg 306 is similarly shaped to define latching elements 308B and 309B.

[0013] The end portions 307A and 308B have a flat surface on the outside of the C-shaped strap, so that the flat surface is able to lay against a corresponding flat edge of an aperture, as will be described further below.

[0014] The device 204 further comprises a pair of arms 312 and 313. The arms 312 and 313 are similarly shaped and each extends from the middle portion 304 of the strap 301. One arm 312 extends from the strap to one side of the plane of the C-shape while the other arm extends from the strap to the other side of said plane. The arms 312 and 313 generally curve such that when the legs 305 and 306 are located around a lamp cap, said arms also curve around the lamp cap.

[0015] To facilitate the location of the arms 312 and 313 around a lamp cap, the arms form a curve having a point of inflection 314 (best seen in Figure 3C). Thus, an end part of the arms curves outwards to prevent the tip of the arms interfering with the lamp cap during assembly.

[0016] The whole of the device 204 is moulded as a single unit in a springy plastics material. In the present embodiment the plastics material is polycarbonate. To simplify the design and manufacture of the mould used to produce the device 204, the arms 312 and 313 are arranged in a staggered relationship. That is, one arm extends from one part of the strap 301 while the other arm extends from a different part.

Figure 4

[0017] The electric light 101 is shown in the perspective view of Figure 4 after removal of the diffuser 203. The light fixture 202 comprises a base plate 401 that, in the present example, has the form of a cylinder having a closed end. The closed end (not seen in Figure 4) defines holes allowing the base plate to be fastened to a wall, ceiling, or a conduit box (or BESA box). The wall of the base plate 202 contains a gear tray 402, which itself is essentially a metal plate. The gear tray 402 supports a 2D lamp holder, defining the electrical connectors of the light fixture 202, and electrical components, such as ballast, required for the operation of the lamp 201. In the present embodiment the electrical components, other than the lamp and lamp holder, are located below the gear tray 402, and they are therefore not visible in Figure 4.

[0018] To enable the lamp fixture 202 to be reasonably slim, the gear tray 402 has a central portion 403 that is arranged to be in a separate plane to the surrounding part 404 of the gear tray. Consequently, the lamp 201 resides in a plane that is closer to the surrounding part 404 of the gear tray than it otherwise would be. Conventionally, this proximity of the lamp to the base plate is a cause for concern when an electric light such as light 101 is transported from its place of production, or sale, etc. For example, if the lamp came loose from its lamp holder, it may knock against the gear tray, or another surface within the light fixture, and become damaged. Thus, conventionally during transport, packing material is located around the lamp to prevent its movement and damage. This packing must then be removed when the light is installed. However, in accordance with the present invention, the light 101 is provided with the lamp retaining device 204 which resists movement of the lamp 201 and holds it firmly within its holder. Consequently, during transport, the need for packing around the lamp is eliminated by use of the retaining device 204. This also means that when the light is installed there is no packing to be removed by the installer.

[0019] The lamp 201, like all 2d lamps, has a lamp cap 405 that has a lower surface comprising electrical connectors configured to connect with a lamp holder. A shaped fluorescent tube 406 extends from one end of the lamp cap around the cap and back to the same end, such that the lamp is symmetrical about a central plane. The gear tray 404 defines an aperture 407 located on this plane of symmetry at each end of the lamp cap 405. Thus, as shown in Figure 4, the C-shaped strap 301 of the retaining device 204 is configured to reside within the plane of symmetry of the lamp, while the arms 312 and 313 extend onto and around the sides of the lamp cap 405.

[0020] The apertures 407 are rectangular in shape and have a width that is a good fit on the width of the strap 301. Consequently, lateral movement of the strap within the aperture is prevented, and so the mechanical stability of the lamp is further enhanced.

Figures 5A and 5B

[0021] The gear tray 402 and lamp holder 501 are shown in Figure 5A before the lamp 201 and device 204 are fitted, and said components are shown assembled together in Figure 5B.

[0022] Firstly, when fitting a new lamp 210 to the gear tray 402, the connectors 502 located on the lower side of the lamp cap 405 are located into corresponding connectors of the lamp holder 501.

[0023] As illustrated in Figure 5A, before assembly the legs 305 and 306 are almost parallel with each other but slightly splayed apart. Consequently, the legs are manually flexed inwards towards each other so that they are able to be located within the apertures 407 in the gear tray 402. Once the legs are located within the apertures 407, the device is pushed down until its arms push against the lamp cap 405 and teeth 308A and 308B, or teeth 309A and 309B, are fully through their respective apertures 407. Manual pressure on the device is then released leaving the arms 312 and 313 of the device 204 pressing against the lamp cap 405 and the teeth 308A and 308B, or 309A and 309B, latched behind the gear tray 402. Thus, the parts are assembled together as shown in Figure 5B.

[0024] The removal of the lamp 201 requires the re-

verse process. Thus, the legs of the device 204 are manually forced together to free the teeth 308A and 308B, or 309A and 309B, from the gear tray and the legs of the device are then withdrawn from the apertures. The lamp 201 can then be pulled free of the lamp holder 501 in a conventional manner.

[0025] Each manufacturer of 2D lamps produces a type of lamp that differs from that of other manufacturers in respect of its dimensions. However, the retaining device can be used with many different such types of lamp, primarily as it is provided with several teeth spaced along each of its legs, and secondly because the part of the device that presses against the lamp cap is springy.

Figures 6A, 6B and 6C

[0026] A partial cross-sectional view of the gear tray 402, lamp 201 and retaining device 204 is shown in Figure 6A, and a similar view of the gear tray and retaining device with other types of lamp fitted are shown in Figures 6B and 6C.

[0027] The lamp 201 has a relatively deep and wide lamp cap 405 and consequently the device is fitted such that only the first tooth 308A and 308B on the legs 305 and 306 passes through the aperture 407 on the gear tray. In addition, the arms 312 and 313 are flexed outwards and upwards in a direction indicated by arrows 601, and the lamp cap 405 is in contact with the arms at a position close to their ends.

[0028] By the way, it will be understood by observing Figure 6A how the outwardly turned tips 602 of the arms 312 and 313 allow the tips to ride over the lamp cap (rather than interfering) during the positioning of the retaining device 204.

[0029] The lamp 603 in Figure 6B has a lamp cap 604 that is slightly less deep and less wide than that of lamp 201. Consequently, the arms 312 and 313 are less flexed than in Figure 6A and the lamp cap 604 contacts the arms at a position further from their ends than in Figure 6A. However, because the differences in dimensions between the lamp 201 and lamp 603 are only slight, the device is again located such that only the first tooth 308A and 308B on each leg are located through the apertures 407.

[0030] The lamp 605 in Figure 6C has a lamp cap 606 that is much less deep and less wide than that of lamp 201. Consequently, both teeth (308A and 309A, and 308B and 309B) on each leg of the device 204 have passed through the apertures 407, and the second tooth (309A, 309B) is latched against the rear of the gear plate. It may also be noted that the lamp cap 606 contacts the arms 312 and 313 at a position that is still further from their ends, when compared to Figure 6B.

Figure 7

[0031] The lamp 201 and retaining device 204 are shown assembled within a light fixture 701 of an alternative design in Figure 7. The light fixture 701 is shown without its diffuser, so that the lamp 201, device 204 and lamp mounting may be seen. In this embodiment, a bracket 702 is mounted on a gear tray 703 to provide a small platform 704 that resides in a plane parallel to, and above, the gear tray 703. In this embodiment, other electrical components are located on the same side of the gear tray as the lamp 201, but for the sake of clarity and simplicity they are not shown in Figure 7.

[0032] The platform 704 is a metal plate that supports a lamp holder to which the lamp 201 is fitted. The platform is provided with rectangular apertures in a similar manner to gear tray 402 for receiving the end portions of the legs of the retaining device 204.

Figure 8

[0033] An alternative retaining device 800 is shown in Figure 8. The retaining device 800, like device 204, comprises a strap 801 containing a pair of bends 802 and 803 so that the strap forms a "C" shape. Thus, the bends 802 and 803 divide the length of the strap 801 into three portions: a middle portion 804; and two legs 805 and 806 extending from respective ends of the middle portion 804.

[0034] An end portion 807A adjacent to the end of the leg 805 is shaped to define latching elements 808A and 809A on the outside of the C-shaped strap. The latching elements 808A and 809A are each in the form of a triangular-shaped tooth of a similar form to teeth 308A and 309A of device 204.

[0035] An end portion 807B adjacent to the end of the leg 806 is similarly shaped to define latching elements 808B and 809B.

[0036] The retaining device 800 differs from retaining device 204 in that it does not have outwardly extending arms. Instead, device 800 has a resilient pad 820 located on the inside of the C-shaped strap 801 on its middle portion 804. In use, the pad 820 presses against the lamp cap and is deformed under pressure. The degree of deformation depends on the particular depth of the lamp cap. When the retaining device is removed from the lamp, for replacement of the lamp, the resilient pad springs back towards its original shape.

[0037] Thus, the retaining device 800 has a single contact member (resilient pad 820) that is configured to be springy to allow for variation in dimensions of lamps to be retained, while the retaining device 204 has two contact members (arms 312 and 313).

[0038] Although each of the retaining devices 204 and 800 have two teeth on each leg, other embodiments are envisaged in which three or more teeth are provided on each leg.

Claims

1. An electric light (101) comprising:

a light fitting (202);
a plate (402) located within said light fitting, said plate defining a pair of apertures (407); and
a lamp (201, 603, 605) connected to a lamp holder (501) within said light fitting,

characterised in that said electric light further comprises a retaining device (204) for increasing mechanical stability of said lamp within said light fitting, said retaining device comprising:

a strap (301) having a substantially C-shaped form and having a respective end portion (307A, 307B) adjacent to each of the two ends of the strap; and
latching means (308A, 308B, 309A and 309B) located on each of said end portions latching the respective end portion within one of said apertures, said latching means comprising a plurality of latching elements (308A, 308B, 309A and 309B) spaced along each of said end portions to allow said device to accommodate a variety of types of lamp (201, 603, 605) having a variety of dimensions.

2. An electric light according to claim 1 wherein said device has at least one contact member (312, 313) for applying a force to a lamp during use, and said contact member is configured to be springy to allow for variation in dimensions of lamps to be retained by said device.

3. An electric light according to claim 2 wherein said device comprises a plurality of contact members each contact member comprising an arm extending from said strap.

4. An electric light according to claim 3 wherein a first one of said arms extends to one side of the plane of said C-shaped strap, and another one of said arms extends to the opposite side of said plane.

5. An electric light according to claim 3 or claim 4 wherein said arms are curved such that when said end-portions extend around a lamp cap, said arms extend around the lamp cap.

6. An electric light according to any of claims 3 to 5 wherein each of said arms form a curve having a point of inflection (314) for facilitating the positioning of said arms around a lamp cap.

7. An electric light according to any of claims 3 to 6 wherein said device is formed by moulding and said arms are arranged in a staggered relationship to facilitate said moulding.

8. An electric light according to any of claims 1 to 7 wherein said device is colourless.

9. An electric light according to any of claims 1 to 8 wherein said device is translucent.

10. An electric light according to any one of claims 1 to 9 wherein said lamp is a fluorescent lamp and said plate supports electrical components configured to supply electrical power to said lamp.

11. A method of retaining a lamp (201) within a lamp holder (501) mounted on a plate (402) within a light fixture (202), said method comprising the steps of:

obtaining a retaining device (204) having a strap (301) with a substantially C-shaped form and latching means (308A, 308B, 309A and 309B) located on each of two end portions of said strap adjacent to the ends of said strap, said latching means comprising a plurality of latching elements (308A, 308B, 309A and 309B) spaced along each of said end portions to allow said device to accommodate a variety of types of lamp having a variety of dimensions;
positioning said retaining device over the lamp cap (405) of said lamp and positioning each said end portion within a respective aperture (407) formed in said plate, so that one of said latching elements of each end portion latches behind said plate.

12. A method of retaining a lamp within a lamp holder according to claim 11, wherein said retaining device comprises a resilient contact member (312, 313) and said method comprises pushing said retaining device such that said contact member resiliently deforms and applies a force to said lamp cap.

13. A method of retaining a lamp within a lamp holder according to claim 12 wherein said device comprises a plurality of contact members each contact member comprising an arm extending from said strap.

14. A method of retaining a lamp within a lamp holder according to claim 13 wherein a first one of said arms extends to one side of the plane of said C-shaped strap, and another one of said arms extends to the opposite side of said plane.

15. A method of retaining a lamp within a lamp holder according to claim 13 or claim 14 wherein said arms are curved such that when said end-portions extend around a lamp cap, said arms extend around the lamp cap.

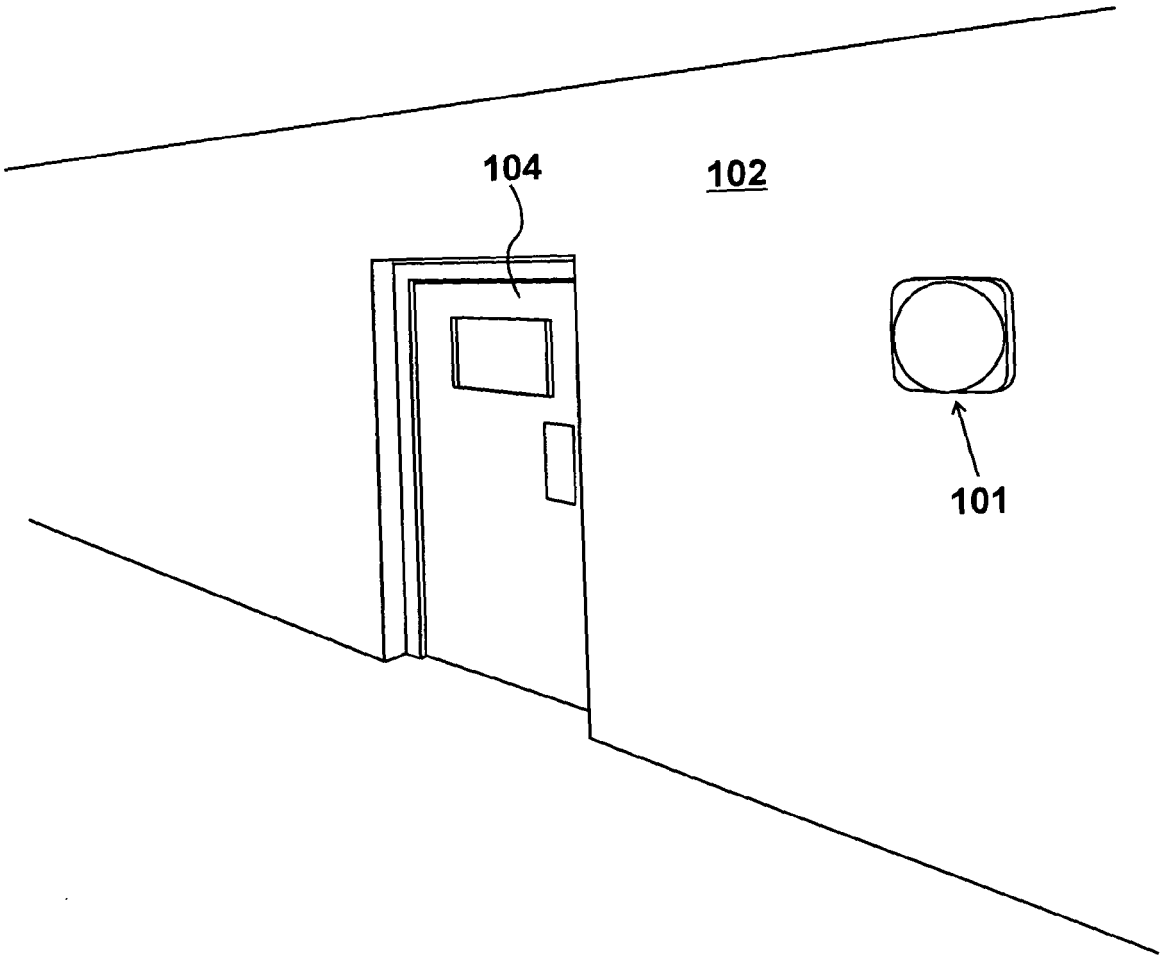

Figure 1

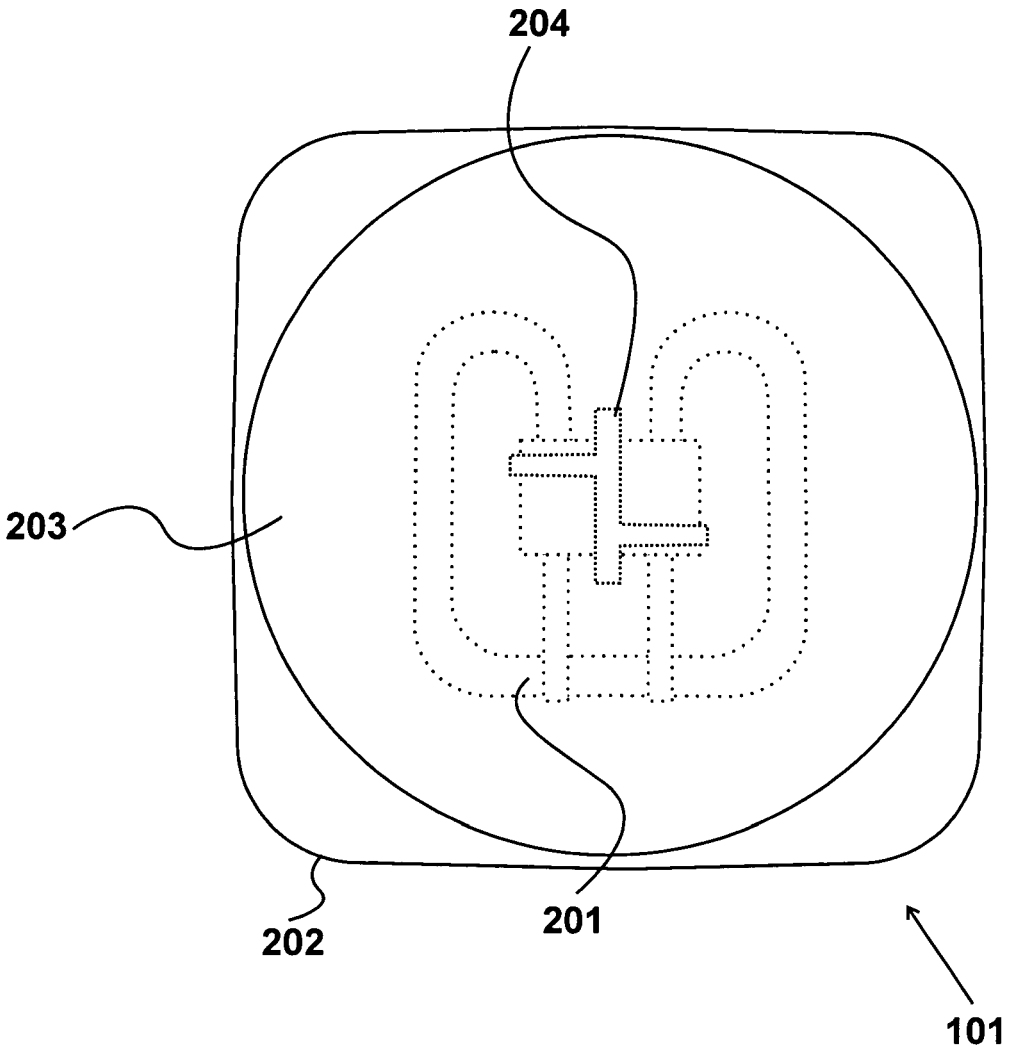

Figure 2

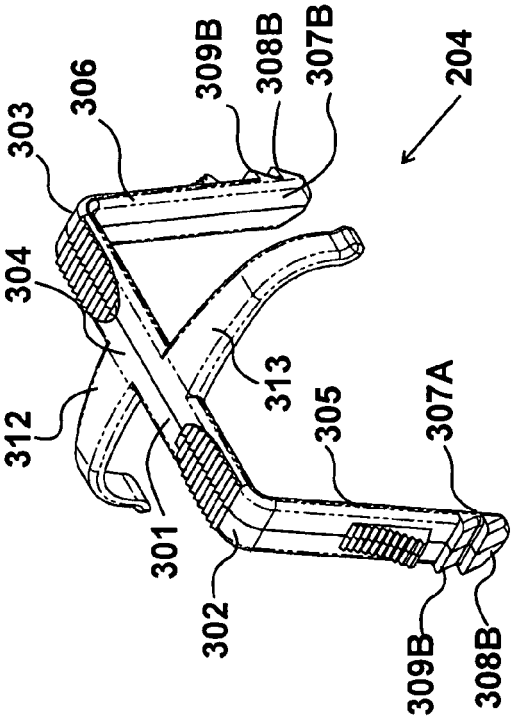

Figure 3A

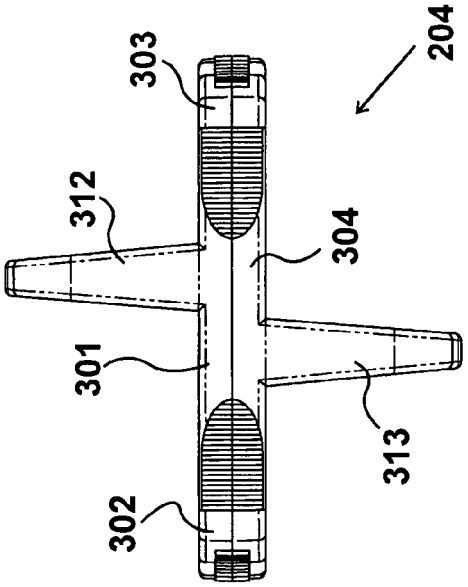

Figure 3B

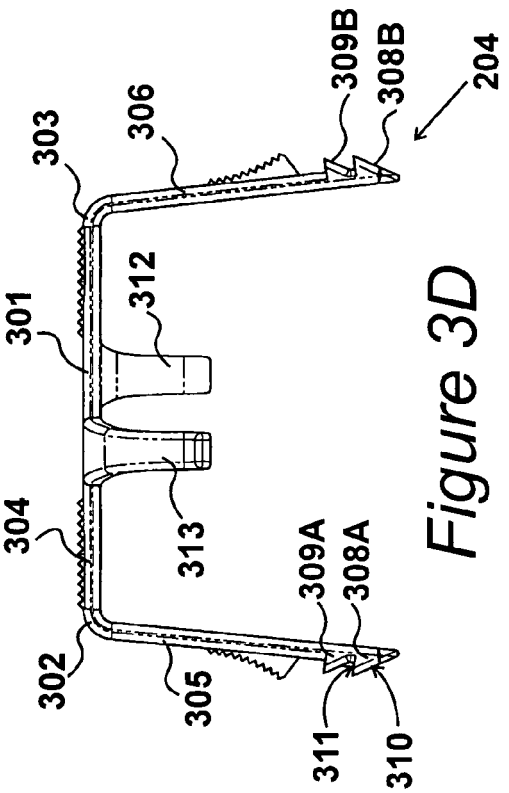

Figure 3D

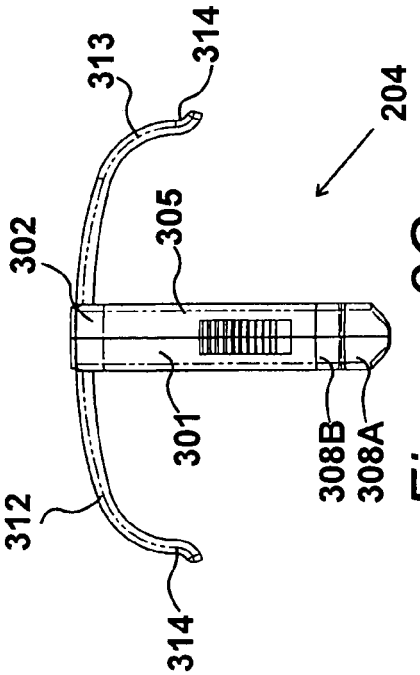

Figure 3C

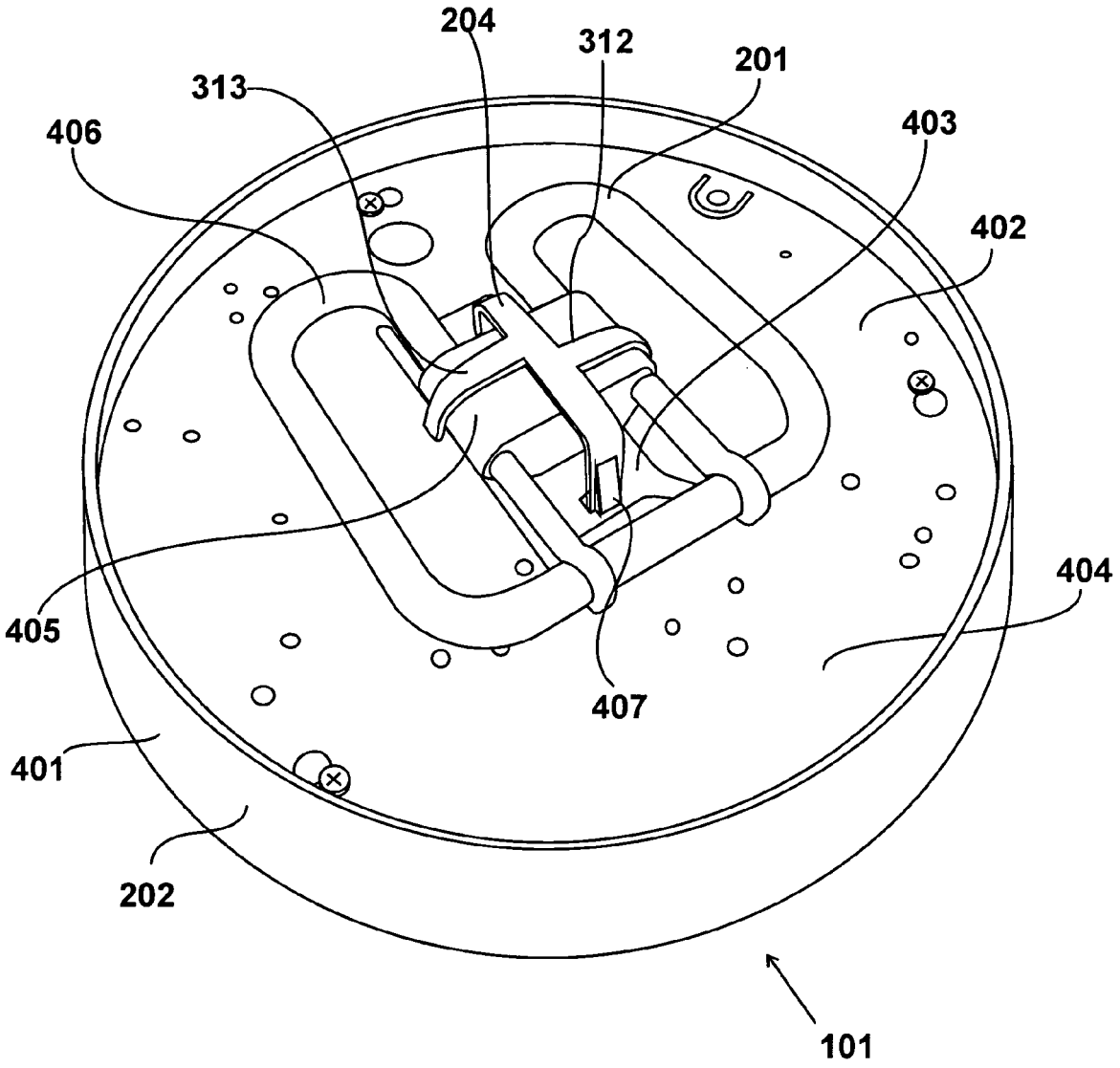

Figure 4

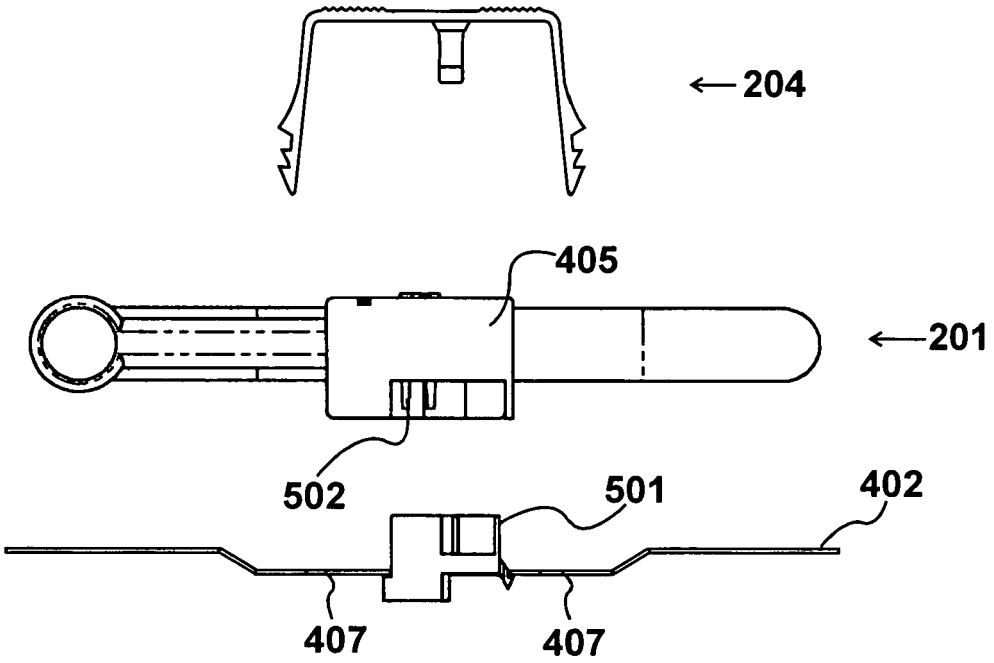

Figure 5A

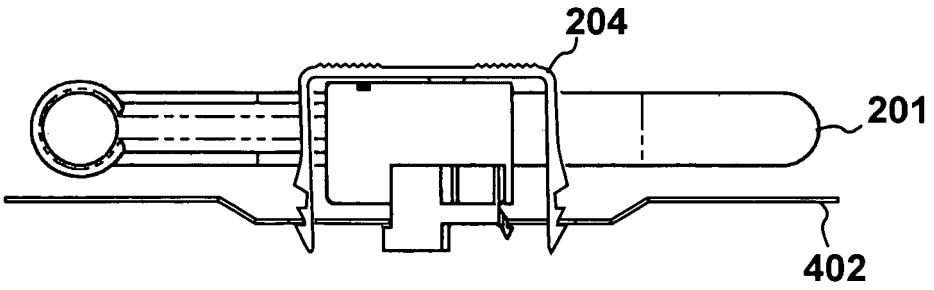

Figure 5B

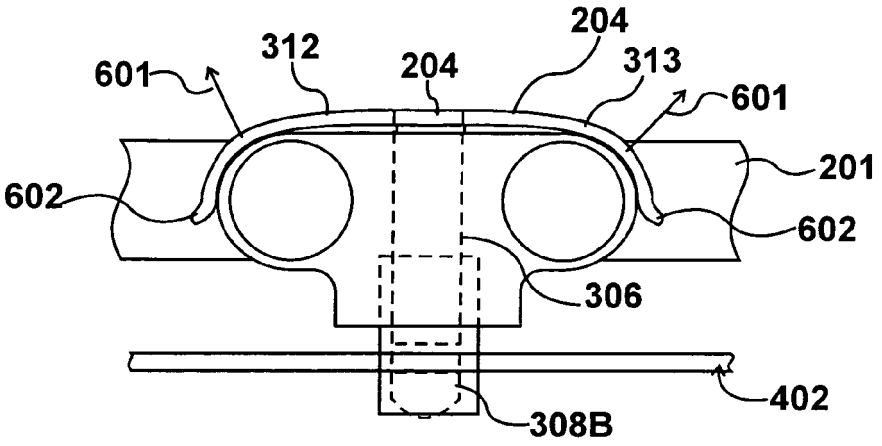

Figure 6A

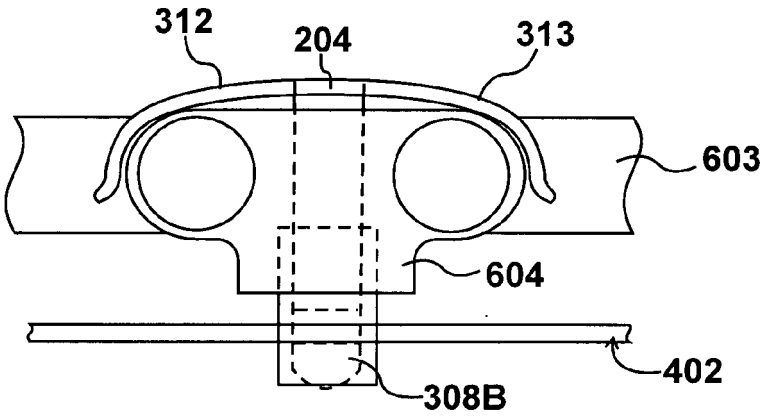

Figure 6B

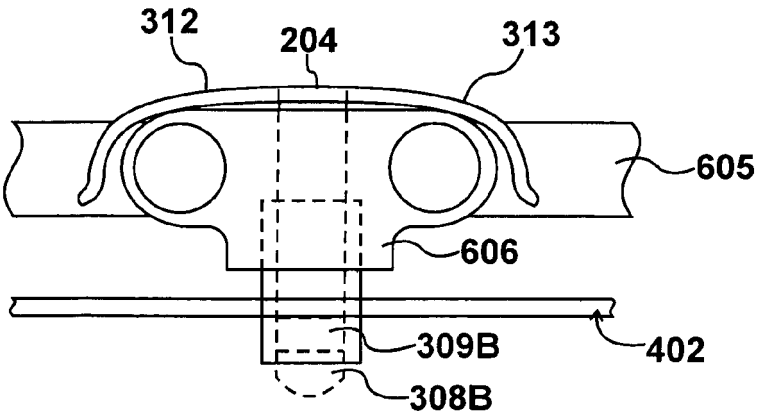

Figure 6C

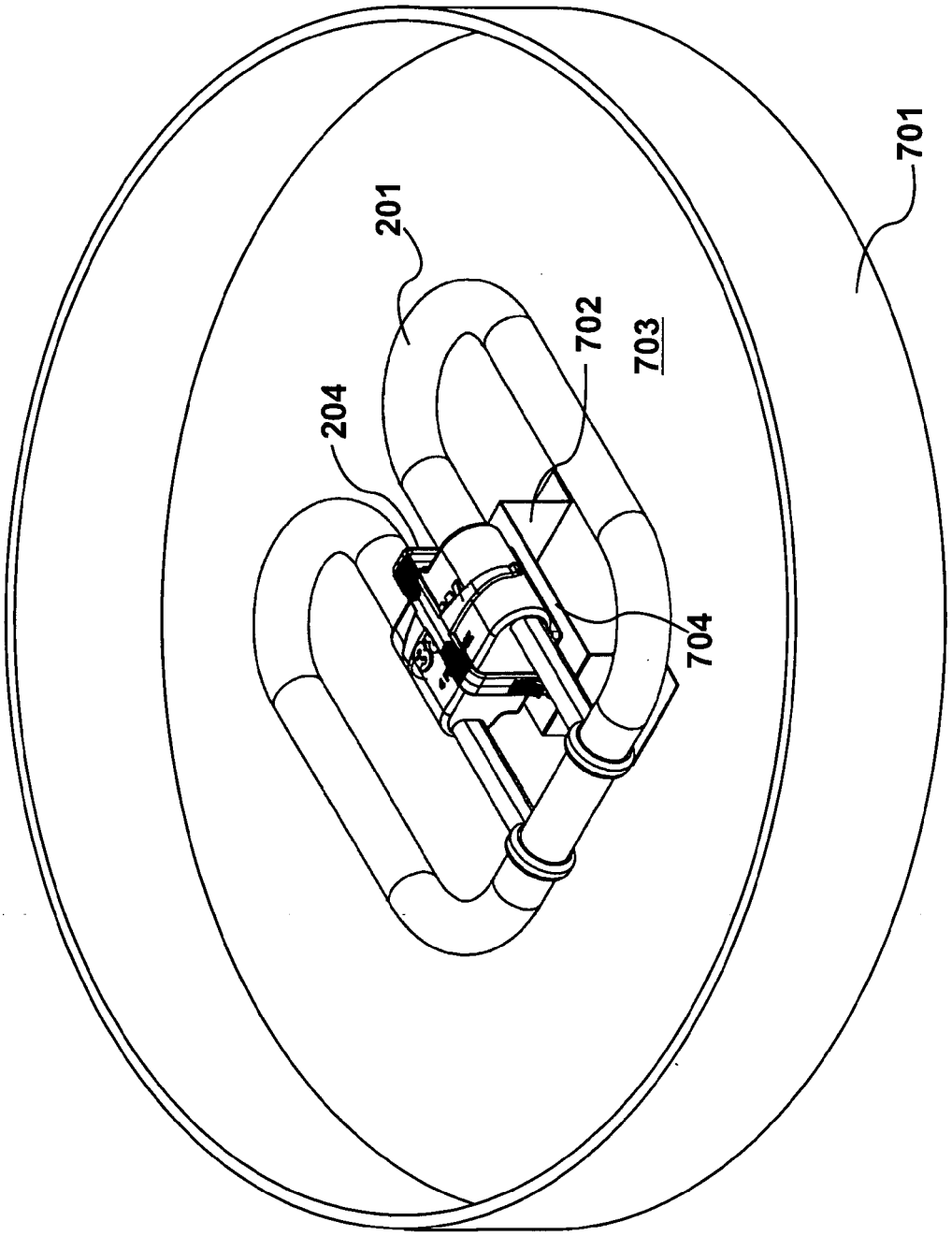

Figure 7

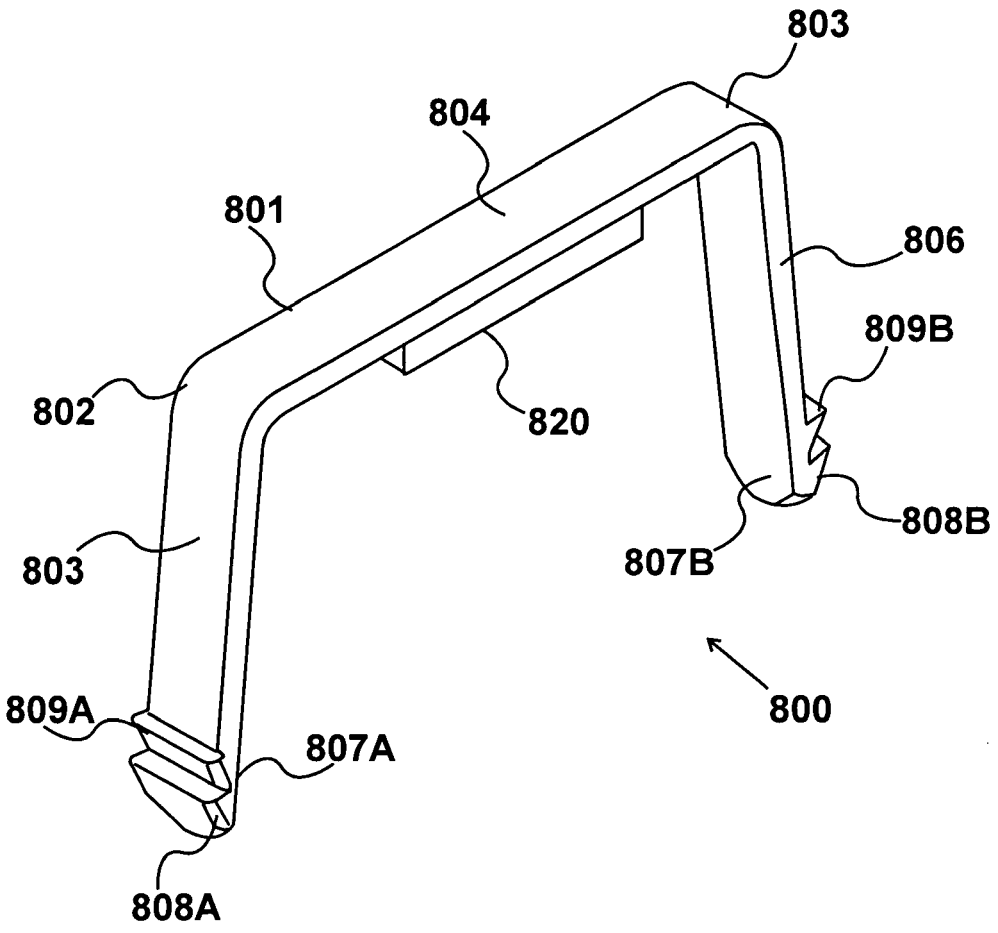

Figure 8

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 08 25 3769

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 1 491 817 A (OSRAM SYLVANIA INC [US]) 29 December 2004 (2004-12-29) * paragraph [0013] - paragraph [0020]; figures 1-4 *	1-15	INV. F21V19/00
A	US 2003/002279 A1 (FIENE DALE E [US]) 2 January 2003 (2003-01-02) * paragraph [0029] - paragraph [0051]; figures 1-6 *	1-15	
A	EP 0 854 663 A (OSRAM SYLVANIA INC [US]) 22 July 1998 (1998-07-22) * column 3, line 45 - column 6, line 20; figures 1-4 *	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

F21S
F21V

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	27 February 2009	Arboreanu, Antoniu

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

1

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 08 25 3769

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

27-02-2009

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1491817 A	29-12-2004	CA 2459154 A1	25-12-2004
		CN 1577719 A	09-02-2005
		JP 2005019382 A	20-01-2005
		KR 20050001421 A	06-01-2005
		US 2004264194 A1	30-12-2004
US 2003002279 A1	02-01-2003	NONE	
EP 0854663 A	22-07-1998	AT 217141 T	15-05-2002
		CA 2225767 A1	09-07-1998
		DE 69805107 D1	06-06-2002
		DE 69805107 T2	05-02-2004
		US 5766032 A	16-06-1998

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82