

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
16 July 2009 (16.07.2009)

PCT

(10) International Publication Number
WO 2009/087605 A1

- (51) **International Patent Classification:**
F21V 17/04 (2006.01) F21Y 103/00 (2006.01)
F21V 7/00 (2006.01)
- (21) **International Application Number:**
PCT/IB2009/050084
- (22) **International Filing Date:** 9 January 2009 (09.01.2009)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
08305002.1 10 January 2008 (10.01.2008) EP
- (71) **Applicant (for all designated States except US):** KONINKLIJKE PHILIPS ELECTRONICS N.V. [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).
- (72) **Inventor; and**
- (75) **Inventor/Applicant (for US only):** MONTAGNE, Louis [FR/FR]; c/o PHILIPS IP & S - NL, High Tech Campus 44, NL-5656AE Eindhoven (NL).
- (74) **Agent:** BEKKERS, Joost; Philips Ip & s - NL, High Tech Campus 44, NL-5656AE Eindhoven, (NL).
- (81) **Designated States (unless otherwise indicated, for every kind of national protection available):** AE, AG, AL, AM,

AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) **Designated States (unless otherwise indicated, for every kind of regional protection available):** ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

Published:

— with international search report

(54) **Title:** EASY LAMP REPLACEMENT REFLECTOR.

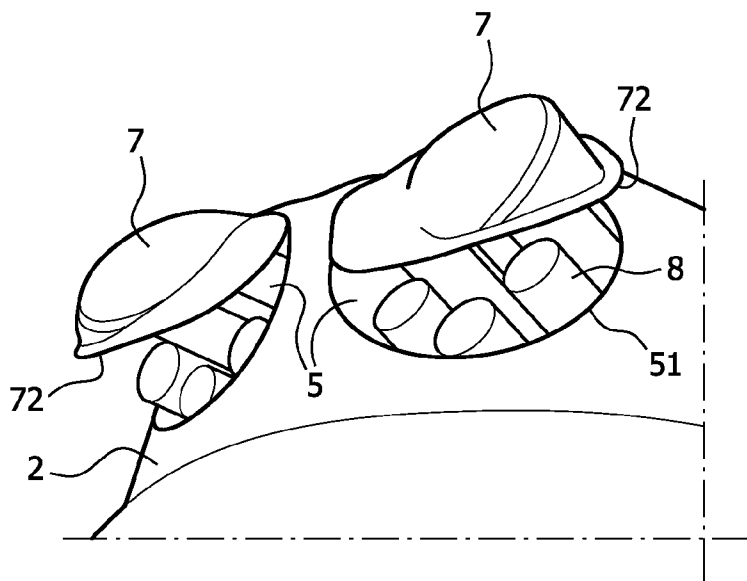


FIG. 4

(57) **Abstract:** This is an object of embodiment of the invention to provide a reflector (1) comprised of a light reflective wall (2) which defines a light ray outlet (3). The reflector wall (2) is provided with at least one lamp connection opening (4) and at least one lamp positioning aperture (5). Said aperture (5) is equipped with an aperture shutter device (7). Another aspect of the invention relates to a lighting assembly which comprises a reflector (1) and a lamp (8) inserted in the lamp connection opening (4).

WO 2009/087605 A1

EASY LAMP REPLACEMENT REFLECTOR

TECHNICAL FIELD

5 The invention relates to a reflector and a lamp assembly, the structure of which allows for an easy relamping and/or for optimizing the light performances of the luminary.

BACKGROUND OF THE INVENTION

10 In lamp assemblies, various factors must be addressed, among which miniaturization objectives or ease of relamping, i.e. installing and removing of the lamp. Moreover, certain types of lamps need that an optimal operating temperature be reached in order to provide more light.

 Two solutions have been considered to address the ease of relamping objective. 15 First, it is possible to provide a reflector which is larger than the greatest lamp dimension. However, this first option has many drawbacks: the reflector is bigger than necessary. Moreover, this option goes against the objective of miniaturization. Further, the manufacturing costs are greater.

 In the second option, which is particularly adapted to lamp assemblies where the 20 greatest dimension of the lamp is sensibly perpendicular to the lighting direction, the reflector has a lamp positioning aperture in which the lamp head may be inserted. Then the lamp is translated and the lamp plug is aligned with and introduced into the lamp socket. At this stage, the lamp head projects beyond the aperture in the reflector wall. Afterwards, the lamp is pushed in the socket, to connect the lamp to an electricity supply.

 Among the drawbacks of the latter option, the reflective surface of the reflector 25 wall is decreased with respect to a reflector without aperture (an "integral reflector"). Moreover, for certain lamps the temperature in the reflector is not as high as might be needed or is too high, resulting in a less efficient operation of the lamp. Lastly, light rays may leak through the aperture.

30

SUMMARY OF THE INVENTION

 It is an object of embodiments of the invention to provide a reflector which addresses the various drawbacks identified above as regards the prior art reflectors.

35 To this end, an embodiment of the invention proposes a reflector comprised of a light reflective wall which defines a light ray outlet. The reflector wall is provided with at least one lamp connection opening and at least one lamp positioning aperture. Said aperture is equipped with an aperture shutter device.

In another embodiment of the invention, said aperture shutter device is removable from the reflector.

In a further embodiment of the invention, said aperture shutter device is rotatable with respect to a hinge axis. In the latter case, said rotatable aperture shutter device may be
5 equipped with closing means, such as spring.

In an embodiment of the invention, when said aperture shutter device is rotatable, it may be positioned at one of the following positions: closed, opened or at least one intermediate position; the reflector being further arranged for selecting a desired position among the set of positions.

10 In a further embodiment, the aperture shutter device is elastically deformable, optionally to be deformed by the lamp during its positioning through the positioning aperture, while the aperture shutter device staying in position on the positioning aperture.

In a further embodiment, said aperture shutter device comprises baffles for trapping and/or redirecting the light coming from the lamp towards the inside of the reflector. The
15 periphery of the positioning aperture may be provided with baffles traps and/or redirects the light coming from the lamp towards the inside of the reflector

In a further embodiment of the invention, said aperture shutter device comprises a light reflective material. Moreover, it may have light reflecting properties, such that the shutter device is a lambertian or specular reflector in itself.

20 In still another embodiment of the invention, said lamp positioning aperture is located opposite said lamp connection opening on the light reflective wall.

Another aspect of the invention relate to a lighting assembly which comprises a reflector such as described above and a lamp inserted in the lamp connection opening.

25 These and other aspects, features and advantages of the invention will become apparent to those skilled in the art upon reading the disclosure provided here in connection with the attached drawings. The detailed description, while indicating preferred embodiments of the invention, is only given by way of illustration.

30 **BRIEF DESCRIPTION OF THE DRAWINGS**

The invention will now be described in more details by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a perspective view of a prior art reflector equipped with two compact fluorescent lamps.

35 Figure 2 shows a longitudinal section of the reflector depicted on figure 1.

Figure 3 shows a partial perspective view seen from below of a lamp assembly comprising an embodiment of a reflector and two compact fluorescent lamps.

Figure 4 shows a partial perspective view seen from above of the lamp assembly of figure 3.

Figures 5A-5D show cross-section views of an embodiment of a reflector and two compact fluorescent lamps, in different configurations.

5 Figure 6 shows a perspective view of a particular aperture shutter device to be mounted onto or fixed to a reflector.

DETAILED DESCRIPTION OF THE INVENTION

10 It must be noted that as used in this specification and the appended claims, the singular forms “a”, “an”, and “the” include plural referents unless the context clearly dictates otherwise. Unless defined otherwise, all technical and scientific terms herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs.

15 As depicted on the various figures, a reflector 1 comprises a light reflective wall 2 which has a brim 21. The surface defined by the brim 21 of the reflector 1, opposite to the lamp 8, and through which the light rays go, shall be referred to as the light ray outlet 3.

The wall 2 of the reflector has at least one lamp connection opening 4. When a lamp 8 is mounted in the reflector 1, the lamp plug projects through the lamp connection opening 4, and cooperates with and is electrically connected to a lamp socket 9.

20 In order to facilitate relamping, the reflector 2 is also equipped with a lamp positioning apertures 5 in the wall 2. Preferably, said apertures 5 are located opposite said openings 4, thus the lamp head may project through said lamp positioning aperture 5.

Figures 3 and 4 illustrate an embodiment of the invention wherein the lamp assembly comprises two lamps. However, a simple adaptation is needed to accommodate only one lamp in a reflector. In that case, the reflector wall only needs one lamp connection opening, one lamp positioning aperture which is equipped with an aperture shutter device.

According to an embodiment of the invention, the reflector 1 is further equipped with an aperture shutter device 7, as depicted on figures 3 and 4.

30 Various aperture shutter devices may be considered.

In a first embodiment, said shutter device 7 is a removable set-in flap or cover, which is interlocked on the brim 51 of the aperture 5. Thus, when relamping of the lamp assembly is needed, the shutter device 7 may be removed by unclipping it. Then, the old lamp is taken away and replaced by a new one. Afterwards, the shutter device 7 is repositioned over the aperture 5.

35 The shutter device prevents leaking of light rays emitted by the lamp. As the shutter device 7 is removable, it does not impede relamping.

In another embodiment of the invention, the shutter device 7 and the wall 2 of the reflector 1 are unitary, and the shutter device 7 is rotatable with respect to the wall 2 of the reflector 1. For instance, the shutter device 7 is a flap which may be bended around what may be considered as a hinge axis 71.

5 Figures 3 and 4 respectively show such an embodiment of the invention, where the shutter devices 7 are in the closed and open positions respectively. Preferably, the hinge axis 71 is positioned in the upper part of the brim of the aperture. This allows closing of the shutter device simply thanks to gravity.

10 However, when the lamp assembly is not designed to be installed in a position similar where gravity acts to close the shutter device 7, or when gravity is not sufficient, it may be useful to provide a rotatable aperture shutter device with closing means. The latter may be a spring or any equivalent means, in order to maintain the shutter device closed.

15 Depending on the kind of lamp which is, or will be, fitted in the lamp assembly, the optimal operating temperature may vary. To take this variability into account, the shutter device 7 may remain partially open. To select the appropriate opening position of the shutter device, the hinge axis of the shutter device may comprise a plurality of longitudinal grooves and flutings, each of which defining an intermediate position between the open and closed positions, which cooperate with complementary elements provided in the reflector 1. For example, the hinge axis is a stem fixed to the shutter device 7 and rotatable
20 in a sleeve fixed to the reflector 1, the outer surface of the sleeve comprising fingers adapted to cooperate with grooves to notch the open of the shutter device 7 at said intermediate positions (not shown).

 In an embodiment of the invention, the aperture shutter device 7 comprises a light reflective material in order to increase the reflective surface of the reflector 1.

25 In other words, said shutter device 7 may be made of a light reflective material such as metal foil, or it may have a light reflective layer at least on the surface of the shutter device 7 facing the lamp 8. For instance, said light reflective layer may be formed by coating, spraying or other methods known in the art.

30 Still in a further embodiment, the shutter device 7 is shaped so that the light reflective properties of the reflector 1 are comparable to those of an integral reflector. In particular, the junction between the brim 72 of the shutter device 7 and the brim 51 of the positioning aperture 5 may be designed so that parasite light reflection or refraction are avoided. To this purpose, and referring to Figures 5A to 5D, the inner surface of the shutter device 7 may also be provided with baffles 11 for trapping and/or redirecting the light
35 coming from the lamp 8 towards the inside of the reflector 1, while allowing hot air from inside escaping outside the reflector 1. Complementary lamellas 11' may also be provided at the periphery of the aperture 5 of the reflector 1 so as to impede the light leaving the reflector 1 by the sides of the aperture 5 when the shutter device 5 is close to or contacts

the reflector 1. Thus the shutter device 7 impedes the light from escaping the reflector 1, even if the shutter device 7 is not completely closed on the aperture 5, e.g. if the shutter device 7 is at an intermediate position (Figures 5B and 5C) around the hinge axis 71 as previously described referring to Figures 3-4. It is thus possible to choose an intermediate position for the shutter 7 so as to allow the internal heat escaping the reflector 1 while
5 impeding the light from the lamp leaving the reflector 1.

The shutter device 7 is of any material, as for example a deformable material or an elastically deformable material. In a particular embodiment, the shutter device 7 is of an elastic material, such as elastomere, which is further sufficiently deformable to be
10 deformed by the lamp during its positioning through the aperture 5, and thus to allow the re-lamping while the shutter device 7 stays positioned on the aperture 5. Thus, even during the relamping, the shutter device 7 impedes the light from escaping the reflector 1. Additionally or alternatively, the elastic shutter device 7 may be deformable towards the aperture 5. Thus, the shutter device 7 can not impede the montage of the reflector 1 on the
15 ceiling of the room to light, via the dedicated hole provided through the ceiling. An example of such a shutter device 7 is given on Figure 6: this shutter device 7 is a bellow closed on one side 75 and open on the other side 74 to be fixed onto or interlocked with the reflector 1. This kind of shutter device 7 can be definitely fixed onto the reflector 1 since there is no need to remove it for relamping.

20 Such a reflector may be manufactured according to known techniques such as moulding.

Another aspect of the invention relates to a lamp assembly which comprises a reflector as described above and a lamp inserted in the lamp connection opening. Other
25 equipments include, for instance, a lamp socket through which the lamp may be connected to an energy supply.

The foregoing description of preferred embodiments of the invention is not intended to be exhaustive or to limit the invention to the disclosed embodiments. Various
30 changes within the scope of the invention will become apparent to those skilled in the art and may be acquired from practice of the invention.

CLAIMS

1. A reflector (1) comprised of a light reflective wall (2) defining a light ray outlet (3), said wall being provided with at least one lamp connection opening (4) and at least one
5 lamp positioning aperture (5), wherein said aperture is equipped with an aperture shutter device (7).
2. The reflector of claim 1, wherein said aperture shutter device is removable from the reflector.
10
3. The reflector of claim 1, wherein said aperture shutter device (7) is rotatable with respect of a hinge axis (71).
4. The reflector of claim 3, wherein said rotatable aperture shutter device is equipped
15 with closing means.
5. The reflector of claim 4, wherein said closing means comprise a spring.
6. The reflector of claim 3, wherein said aperture shutter device is rotatable between
20 the following set of positions: closed, opened or at least one intermediate position; the reflector being further arranged for allowing a selection by a user of a desired position among the set of positions.
7. The reflector of claim 1, wherein the aperture shutter device is elastically
25 deformable.
8. The reflector of claim 7, wherein the material of the aperture shutter device is sufficiently deformable to be deformed by the lamp during its positioning through the positioning aperture, while the aperture shutter device staying in position on the
30 positioning aperture.
9. The reflector of claim 1, wherein said aperture shutter device comprises baffles adapted for trapping and/or redirecting the light coming from the lamp towards the inside of the reflector.
35
10. The reflector of claim 1, wherein the periphery of the positioning aperture is provided with baffles adapted for trapping and/or redirecting the light coming from the lamp towards the inside of the reflector.

11. The reflector of claim 1, wherein said aperture shutter device comprises a light reflective material.

5 12. The reflector of claim 1, wherein said lamp positioning aperture is located opposite said lamp connection opening on the light reflective wall.

13. A lighting assembly comprising a reflector as claimed in claim 1 and a lamp inserted in the lamp connection opening.

1/3

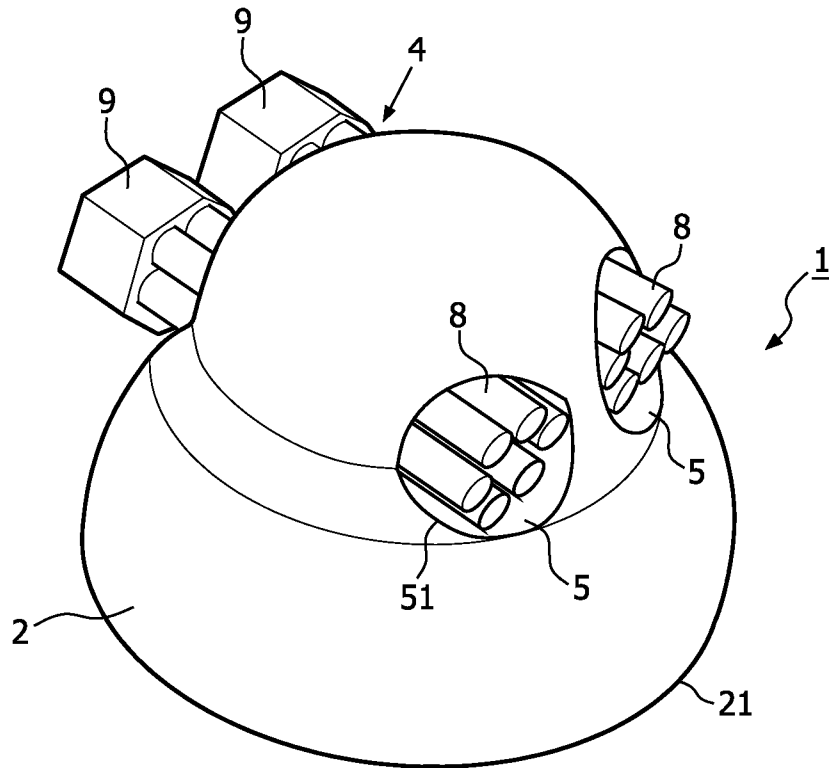


FIG. 1

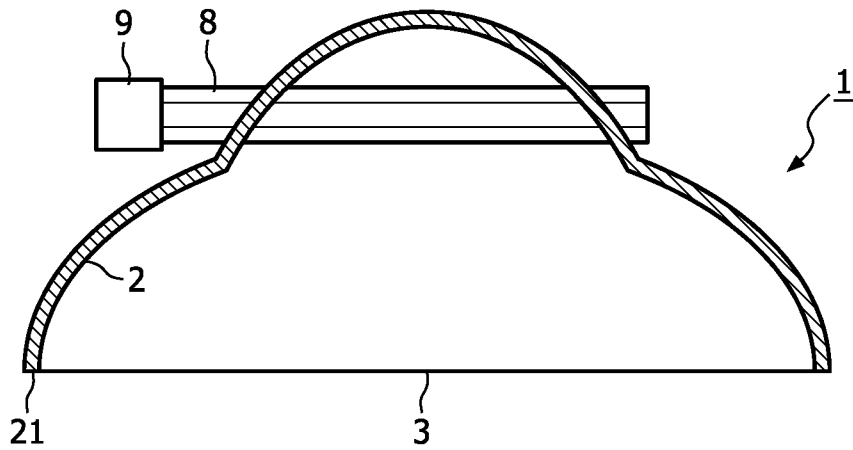


FIG. 2

2/3

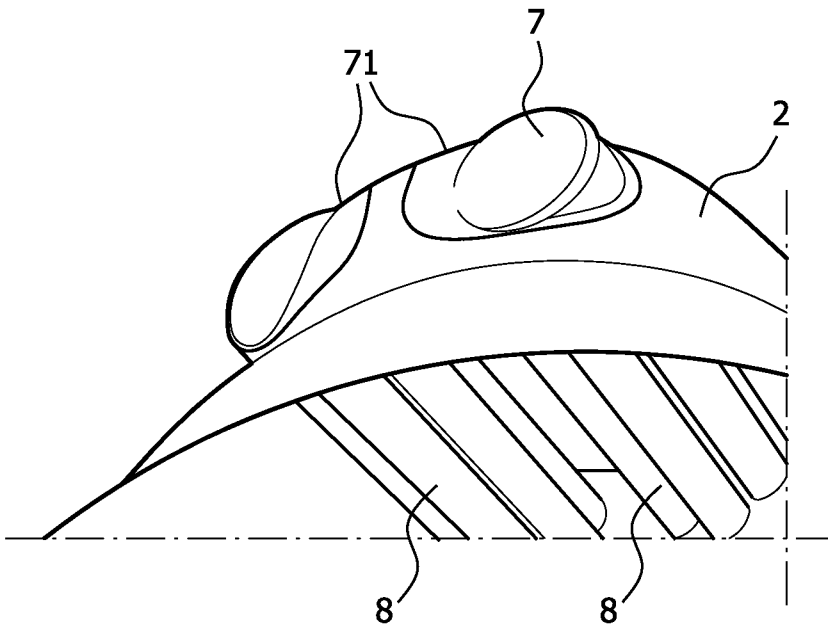


FIG. 3

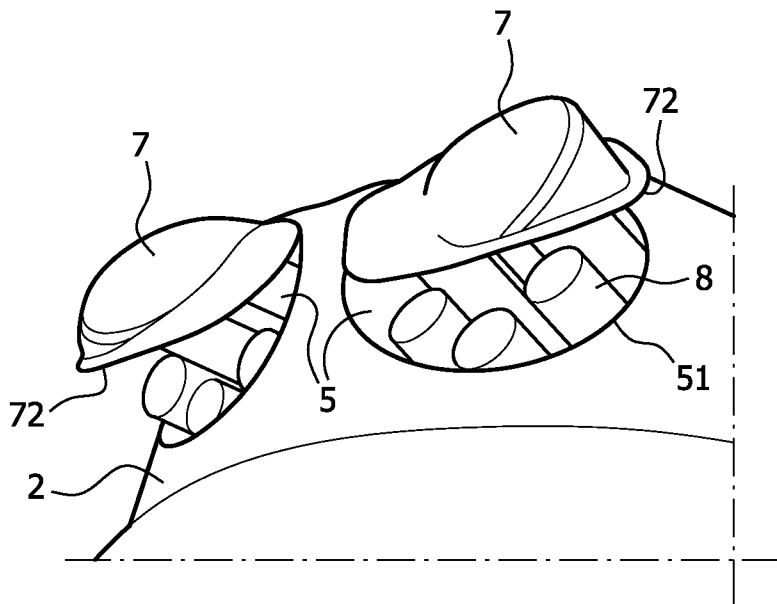


FIG. 4

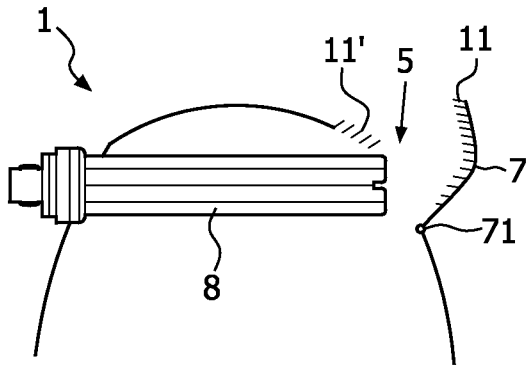


FIG. 5A

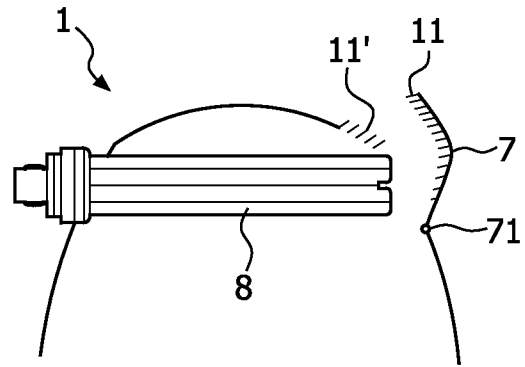


FIG. 5B

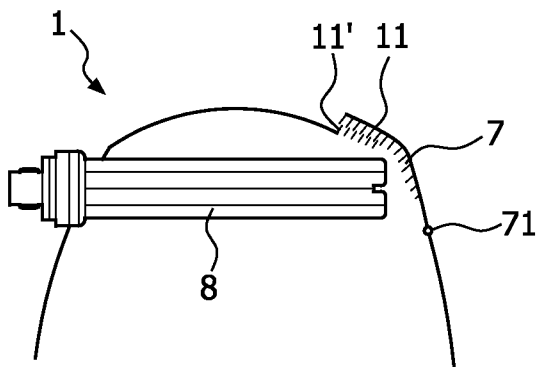


FIG. 5C

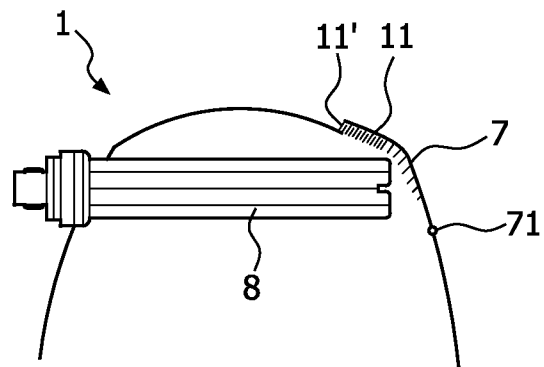


FIG. 5D

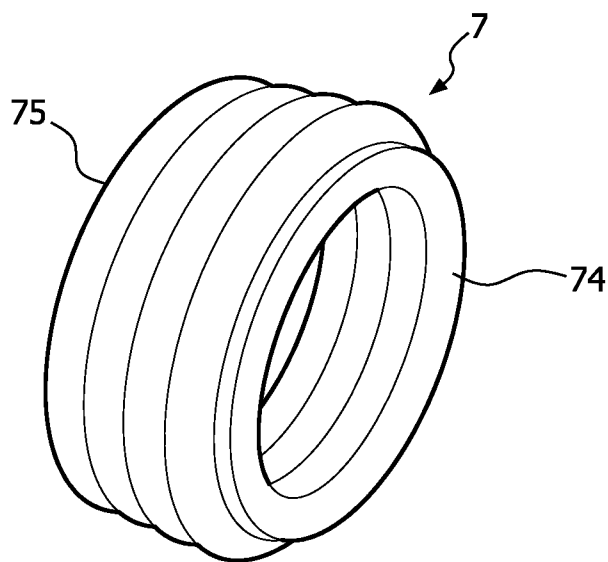


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2009/050084

A. CLASSIFICATION OF SUBJECT MATTER
INV. F21V17/04 F21V7/00
ADD. F21Y103/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F21V F21S

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|--|-----------------------|
| X | US 4 746 840 A (LIM KENNETH S [US]) 24 May 1988 (1988-05-24) column 4, line 20 - line 33 figures 1,2 | 1,2,7, 12,13 |
| Y | ----- | 3-6 |
| Y | US 2001/030869 A1 (ORELLANA ANGEL M [US]) 18 October 2001 (2001-10-18) paragraphs [0032], [0033] figures 5,11 | 3-6 |
| A | ----- | 1 |
| A | DE 44 34 124 A1 (HOLZER WALTER [DE]) 28 March 1996 (1996-03-28) figures 1,2 | 1 |
| A | ----- | 1 |
| A | DE 44 25 132 A1 (KOERFER WOLFGANG DIPL ING [DE]) 18 January 1996 (1996-01-18) figure 1b | 1 |
| | ----- | |

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *Z* document member of the same patent family

Date of the actual completion of the international search

6 April 2009

Date of mailing of the international search report

20/04/2009

Name and mailing address of the ISA/
European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Allen, Katie

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2009/050084

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|--|------------------|--|--------------------------|
| US 4746840 | A | 24-05-1988 EP WO 0368874 A1 8911727 A1 | 23-05-1990 30-11-1989 |
| US 2001030869 | A1 | 18-10-2001 | NONE |
| DE 4434124 | A1 | 28-03-1996 | NONE |
| DE 4425132 | A1 | 18-01-1996 | NONE |