

(19)



(11)

EP 2 877 777 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
30.12.2015 Bulletin 2015/53

(51) Int Cl.:
F21S 8/02 ^(2006.01) **B60Q 3/02** ^(2006.01)
F21V 21/04 ^(2006.01) **F21V 21/30** ^(2006.01)

(21) Application number: **13783541.9**

(86) International application number:
PCT/EP2013/072415

(22) Date of filing: **25.10.2013**

(87) International publication number:
WO 2015/058810 (30.04.2015 Gazette 2015/17)

(54) **RECESSED LIGHTING FIXTURE**

VERTIEFTE LEUCHTE

ÉQUIPEMENT D'ÉCLAIRAGE RENFONCÉ

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

(43) Date of publication of application:
03.06.2015 Bulletin 2015/23

(73) Proprietor: **SG Armaturen AS**
4794 Lillesand (NO)

(72) Inventor: **HELOE, Ola**
4790 Lillesand (NO)

(74) Representative: **Zacco Norway AS**
Haakon VII's gate 2
PO Box 2003 Vika
0125 Norway (NO)

(56) References cited:
EP-A2- 1 098 136 DE-U- 1 835 888
DE-U1-202007 003 286 US-B1- 6 511 208

EP 2 877 777 B1

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

Technical field

[0001] The present invention relates to recessed lighting fixtures. More specifically, the present invention relates to such fixtures comprising a lamp holder being rotatable around two substantially perpendicular axes, such that the light can be freely adjusted in many directions.

Background

[0002] A recessed lighting fixture is a lighting fixture that is installed into a hollow opening in a ceiling, wall or similar surface. When installed it appears to have light shining from a hole in the surface, concentrating the light as a broad floodlight or narrow spotlight. There are generally two parts to recessed lights, the trim and housing. The trim is the visible portion of the light. It is the insert that is seen when looking up into the fixture, and also includes the thin lining around the edge of the light. The housing is the fixture itself that is installed inside the ceiling and contains the lamp holder.

[0003] Adjustable trim allows for the adjustment of the direction of light whether it is eyeball style, which protrudes from the trim or gimbal ring style, which adjusts inside the recess.

[0004] An exemplary eyeball style lighting fixture is shown in WO 2012/126749. Such lighting fixtures protrude below their centre of rotation in order to grip around the ball-shaped lamp holder. Therefore, if the rotational centre is in level with the surface into which the fixture is mounted, the fixture protrudes from the surface, which is not always desirable for aesthetic reasons. Further, the protruding portion of the fixture limits the light beam emitted at substantial rotation of the lamp, possible casting shadows on surrounding surfaces. As an alternative, the lighting fixture could be designed such that its rotational center is further into the holes in the surface in which the fixture is mounted, such that the fixture does not protrude from the surface. That, on the other hand, requires a larger mounting depth for the fixture, which can be problematic when only little mounting depth is available.

[0005] Gimbal style lighting fixtures however, do not require the fixture to grip around the lamp, and hence, depending on design, may allow for a more shallow mounting depth than eyeball style fixtures. Further, they are easy to keep clean because of their smooth continuous surfaces.

[0006] An exemplary gimbal style recessed lighting fixture is SG Armaturen AS existing product "Quadrat" illustrated in Fig. 1. As shown, the fixture has housing with a central square opening in which a lamp holder is positioned. The lamp holder is attached to the housing using a gimbal mechanism comprising an outer ring hinged to the housing at opposite first portions of the ring for rota-

tion about a first rotational axis. The lamp holder is hinged to the outer ring at opposite second portions of the outer ring for rotation about a second rotational axis substantially perpendicular to the first rotational axis. Such a lighting fixture requires less mounting depth than the typical eyeball style lighting fixture. It can further be mounted flush with a ceiling or other surface with the rotational centre close to the ceiling or other surface, wherein its operational field of adjustment is large. However, the open mechanical system with the two pairs of axes of the gimbal mechanism are prone to collecting dust and are difficult to keep clean.

[0007] Therefore an improved recessed lighting fixture would be desirable, not suffering the above mentioned disadvantages.

Summary

[0008] An object of the invention is to provide a recessed lighting fixture which has low build depth, wide operational field of adjustment and is easy to keep clean.

[0009] According to a first aspect of the invention, this object is achieved by a lighting fixture comprising a lamp holder, and a housing provided with a central opening.

The central opening is surrounded by a first circumferential wall portion defining on the outside of the housing a recess for receiving the lamp holder. Further, the lamp holder is provided with a opposite second circumferential wall portion. The lamp holder is movably connected to the housing by means of a gimbal mechanism comprising a gimbal frame rotatably connected to the housing by one or more first connection means such that the gimbal frame is rotatable about a first rotational axis. The lamp holder is rotatably connected to the gimbal frame by one or more second connection means such that the lamp holder is rotatable about a second rotational axis substantially perpendicular to the first rotational axis. The gimbal frame is connected to the housing by the first connection means inside the housing and extends from said first connection means, over the first and second walls, and into the inside of the lamp holder through one or more recesses or openings in the lamp holder. The lamp holder is rotatably connected to the gimbal frame by said second connecting means inside the lamp holder.

[0010] Since the gimbal frame is connected to the housing by the first connection means on the inside of the housing, the first connection means are not visible and hence do not introduce any axes or other members around the lamp holder which would be difficult to keep clean. The same reasoning applies for the second connections means which are provided inside the lamp holder. At rotation of the lamp in arbitrary directions, portions of first and second wall portions will be made visible and will protect the inside of the housing and of the lamp holder from dust and dirt. Since the gimbal frame extends from said first connection means, over the first and second walls, and into the inside of the lamp holder through one or more recesses or openings in the lamp holder,

the gimbal frame will never be exposed from the outside of the lighting fixture and hence does not introduce any members around the lamp holder which would be difficult to keep clean. The inventive lighting fixture does not rely on an eyeball principle for securing the lamp holder to the housing, and therefore requires no extra protruding portions to grip around the lamp holder. Since no extra protruding portions are present, a wide operational field of adjustment of the lamp, and of the light pattern, is achieved. Hence, the inventive lighting fixture enables low build depth, and wide operational field of adjustment whilst still being easy to keep clean.

[0011] In an embodiment the central opening of the housing is circular, wherein the first wall of the housing and the second wall of the lamp holder are of semispherical shape. The semispherical shape of the lamp holder and of the first wall portion of the housing enables a substantially constant gap between the lamp holder and the first wall portion of the housing independently of which direction the lamp holder is tilted to. Thus, the lamp holder may be tilted without the gap increasing, such that there will not be an increased risk of dirt or dust entering in the gap. Further no unnecessary space has to be provided between housing and lamp holder to allow rotation of the lamp holder.

[0012] In an embodiment the first and second connections means and the gimbal frame are such positioned and configured that the second rotational axis pierces the first rotational axis. Providing the rotational axes so, enables tilting of the lamp holder without the optical axis/central axis of the light beam of the lamp translating along the rotational axes. This enables control of the central axis of the light beam such that it always passes through the same point in space, for example close to the centre of the opening of the housing.

[0013] In an embodiment the gimbal frame comprises a first substantially arch-shaped portion extending between two first connection means on opposite sides of the central opening. The gimbal frame comprises at least one arm extending from a central portion of the first arch-shaped portion and into the inside of the lamp holder through the recess or opening in the lamp holder. The lamp holder is rotatably connected to the at least one arm by the second connecting means inside the lamp holder. The arch-shaped body is connected to the housing by connection means separated on different sides of the opening of the housing, such that any momentum applied to the gimbal frame around another axis than the first rotational axis, is divided between the separated first connection means. In contrast and for comparison, should instead only one connection means have been used, that connection means would have had to be dimensioned such that such momentums could be handled by that single first connection means, which would require a comparatively strong connection means and which would also require the gimbal frame to internally take higher momentum without substantial deformation in order to keep the rotational axes static and rotational

movement controlled. Hence, the present design with two separate first connection means is stable and enables use of less strong components, thereby reducing material usage, weight and cost. Due to reduced momentum in each connection means, this design enables use of simple bearing designs, such as a direct metal to metal, metal to plastic, or plastic to plastic, thereby enabling use of fewer components and an easier manufacturing process with fewer operations.

[0014] In an embodiment the gimbal frame comprises two of said at least one arm. The two arms extend into the lamp holder on opposite sides of the lamp holder and the second connection means are provided at the respective ends of the arms such that the arms together define the second rotational axis. Following the above argumentation, such a design with separated connection means is stable and enables use of less strong components, thereby reducing material usage, weight and cost. Due to reduced momentum in each connection means, this design enables use of simple bearing designs, such as a direct metal to metal, metal to plastic, or plastic to plastic, thereby enabling use of fewer components and an easier manufacturing process with fewer operations.

[0015] In an embodiment the arm is rotatably connected at a lower portion of the lamp holder. The lamp holder is provided with an elongate recess configured to guide the arm relative to the lamp holder at rotation of the lamp holder about the second rotational axis. Since the arm is guided by the lamp holder, the second connection will be relieved and need not be able to take up as much momentum. Similar to the above argumentation, such a design is stable and enables use of less strong components, thereby reducing material usage, weight and cost. Due to reduced momentum in each connection means, this design enables use of simple bearing designs, such as a direct metal to metal, metal to plastic, or plastic to plastic, thereby enabling use of fewer components and an easier manufacturing process with fewer operations.

[0016] In an embodiment the arm comprises a planar portion oriented parallel to the elongate recess of the lamp holder. The planar portion prevents certain rotation of the arm within the elongate recess, thereby improving guiding and rigidity of the connection between lamp holder and gimbal frame.

[0017] In an embodiment each first connection means comprises a base member fixed to the housing, wherein the gimbal frame is rotatably connected to the base member(s). The base member enables improved freedom of selecting material for the housing, since any abrasion at rotation of the gimbal frame occurs on the base member instead of the housing, such that less wear resistant or surface treated materials may be used for the housing whilst abrasion resistive materials may be chosen for the various parts of the gimbal frame and the connection means.

[0018] In an embodiment the gimbal frame is made from sheet metal, wherein the at least one arm of the gimbal frame is a separate member attached or attach-

able to the first substantially arch-shaped portion. The first portion of the gimbal frame can thereby be pre-mounted to the housing, wherein the at least one arm can be mounted separately in the lamp holder, and wherein the lamp holder and the at least one arm is subsequently introduced into the housing and fixed to the first portion of the gimbal frame. Such design of the gimbal frame enables a higher degree of material utilization at production of the sheet metal parts, since the substantially arch-shaped portion and the at least one arm can both be made from elongate pieces of sheet metal when produced separately. If instead produced in one piece, they would likely a much larger piece of metal since the arms extend substantially perpendicular to the first portion before folding to desired shape. Such design of the gimbal frame also enables use of different lamps, lamp houses and arms without affecting the design of the first portion of the gimbal frame.

[0019] In an embodiment the lamp holder is provided with a bottom ring releasably attached to the second wall portion of the lamp holder for holding a lamp and/or glass in place within the lamp holder, and wherein the second attachment means connects the gimbal frame to the second wall portion of the lamp holder. Since the second wall portion of the lamp holder is connected to the gimbal frame, the lamp holder can stay mounted in the housing whilst the bottom ring is temporarily removed for replacement of the lamp and/or glass.

[0020] The invention will in the following be described in more detail, with reference to the appended drawings.

Description of figures

[0021]

Fig. 1 is a bottom view of a prior art recessed lighting fixture (Quadrat by SG Armaturen AS).

Figs. 2 and 3 are perspective views of a lighting fixture according to an embodiment of the invention, with the lamp holder in a neutral position not tilted about any of the two axes.

Figs. 4 and 5 are perspective views of a lighting fixture according to the embodiment also shown in Figs. 2 and 3, with the lamp holder in a fully tilted position rotated about both rotational axes.

Figs. 6 and 7 are perspective views of the lighting fixture of Figs. 1-5 with the fixture shown in a cross-sectional view in Fig. 7 in a plane through the second rotational axis.

Figs. 8 and 9 are perspective views of the lighting fixture of Figs. 1-7 with the fixture shown in a cross-sectional view in Fig. 9 in a plane through the first rotational axis. Figs. 10-20 show various views of a second embodiment of the invention; In Figs. 19 and 20 in exploded state.

recessed lighting fixture	1
housing	2

(continued)

base surface	3
central opening/recess of housing	4
first wall portion	5
lamp holder	6
gimbal frame	7
first connection means	8
first rotational axis	9
second connection means	10
second rotational axis	11
second wall portion	12
recess in lamp holder for gimbal frame	13
arm of gimbal frame	14
central portion of gimbal frame	15
arch-shaped first portion of gimbal frame	16
base member of first connection portion	17
bottom ring	18

Detailed description

[0022] Fig. 1 shows a prior art recessed lighting fixture comprising a lamp holder rotatable about two substantially perpendicular axes.

[0023] Figs. 2-9 show various simplified views of a first embodiment of the invention. Figs. 10-20 show various views of a second embodiment of the invention functioning according to the same principles as the first embodiment but developed with more details. Generally, the teachings of the following description will for a certain feature also be applicable to the corresponding feature of the other embodiment and vice versa.

[0024] A recessed lighting fixture 1 according to the second embodiment of the invention comprises a lamp holder 6 and a housing 2. The outer diameter of the housing 2 is approximately 80 mm. The lamp holder is, of course withing certain limits, freely rotatable relative to the housing 2 such that light can be directed in most any direction around the lighting fixture. Hence, this lighting fixture is rotatable relative to the housing 2 about more than one rotational axis. The housing 2 has a base surface 3 in the form of a ring with a central opening or recess 4. In other embodiments, the central opening or recess 4 and the base surface 3 may have other shapes, such as square. The housing 2 is provided with a first wall portion 5 extending circumferentially around the central opening 4. In this embodiment the first wall portion 5 is semispherical, within the context of this description meaning that its surface follows a spherical shape but is limited in extension; In the shown embodiment, limited to follow a bottom portion of a hemisphere. The first wall

portion 5 defines on the outside of the housing 2 a recess for receiving the lamp holder 6.

[0025] One should understand what within the context of this description is meant by the wording 'inside' and 'outside' used in relation to the housing and the lamp holder. The outside of the housing is the side on which the light is emitted and which normally can be touched when the lighting fixture is installed in a surface such as a wall or ceiling. Hence, the inside of the housing is the opposite side of the housing which is normally not visible, and which normally cannot be touched, for example space surrounding the first wall portion of the housing 2, not being the space in the recess for receiving the lamp holder. Similarly, the inside of the lamp holder is the side which is not visible at normal use of the lamp, but which may be exposed during change of lamp. The outside of the lamp holder is the side which in normal use faces the first wall portion of the housing or is exposed to the outside of the housing at tilting of the lamp holder. Further, the use of over, under and similar words, are to be construed as relative to a lighting fixture as mounted in a normal ceiling, but of course these follow reorientation of the lighting fixture as will be understood by the skilled person.

[0026] The lamp holder is provided with an a second circumferential wall portion opposite of the first wall portion of the housing. The second wall portion of the lamp holder is also semispherical. In a normal position, the circular bottom portion of the lamp holder is parallel to the base surface of the housing. Further, the outer diameter of the bottom portion of the lamp holder has substantially the same diameter as the circular central opening of the housing. Hence, in the normal position, one cannot normally see or feel much of the first or second surface portions. However, at rotation/tilting of the lamp holder, one portion of the lamp holder moves into the recess in the housing, wherein a portion of the first wall portion is exposed. Similarly, another portion of the lamp holder then moves out of the recess of the housing, wherein a portion of the second wall portion of the lamp holder is exposed. Hence, the provision of the first and second wall portions separates inside and outside of the housing and of the lamp holder respectively, and prevents exposure of the inside of the housing and of the lamp holder independently of the tilt/rotation of the lamp holder relative to the housing. Here, it should be understood that the second wall portion is a lower portion of the outer surface/wall of the lamp holder and that the outer wall may extend further than needed to prevent exposure of the inside of the lamp holder. Similarly, it should be understood that the first wall portion is a lower portion of the surface/wall of the lamp holder defining the recess for receiving the lamp holder, and that this wall may extend further than needed by the first portion to prevent exposure of the inside of the housing. However, if walls of the housing and of the lamp holder extend further than the first and second portions, recesses and/or openings may have to be provided in the extend-

ing wall portions to allow free movement of relevant parts of the lighting fixture at rotation of the lamp holder.

[0027] The semispherical shape of the first and second wall portions enables a substantially constant gap between the lamp holder and the first wall portion of the housing independently of which direction the lamp holder is tilted to. Thus, the lamp holder may be tilted without the gap increasing, such that there is no increased risk of dirt or dust entering in an enlarged gap.

[0028] The first and second wall portions may in other embodiments have other shapes, as long as the lamp holder is rotatable around the first and second axes of rotation, and as long as the first and second wall portions are adapted accordingly such that the insides of the housing and of the lamp holder are not exposed at rotation of the lamp holder, as described above.

[0029] The lamp holder is movably connected to the housing by means of a gimbal mechanism comprising a first substantially arch-shaped portion or element extending between two first connection means on opposite sides of the central opening such that the gimbal frame is rotatable about a first rotational axis.

[0030] The gimbal frame further comprises a substantially U-shaped mounted on a central portion of the first element. The U-shaped element is provided with two arms extending from the central portion of the first arch-shaped portion or element, through a recess or opening in the lamp holder and into the inside of the lamp holder, on opposite sides of the lamp holder. The two outer ends of the U-shaped element is provided with the second connection means by which the lamp holder is rotatably connected to the gimbal frame for rotation about a second rotational axis substantially perpendicular to the first rotational axis.

[0031] It should be understood that the arch-shaped element in other embodiments could have a different configuration, such as a ring around the lamp holder, with legs on opposite sides of the ring extending down to the two first connection portions.

[0032] The housing is provided with two protrusions at each provided with a spring for holding the lighting fixture inside the surface, such as a ceiling, into which the fixture is recessed.

[0033] The gimbal frame is made of metal, although other materials are possible. The lamp holder and the reflector are made of plastic, although other materials are possible. The various parts are attached by screws or rivets, although other alternatives, such as snap locking could be used, as understood by the person skilled in the art.

Claims

1. A recessed lighting fixture (1) comprising a lamp holder (6) and a housing (2), wherein the housing (2) is provided with a central opening(4), wherein the central opening (4) is surrounded by a first circum-

- ferential wall portion (5) defining on the outside of the housing (2) a recess for receiving the lamp holder (6), wherein the lamp holder (6) is provided with an opposite second circumferential wall portion (12), wherein the lamp holder (6) is movably connected to the housing (2) by means of a gimbal mechanism comprising a gimbal frame (7) rotatably connected to the housing (2) by one or more first connection means (8) such that the gimbal frame is rotatable about a first rotational axis (9), wherein the lamp holder (6) is rotatably connected to the gimbal frame (7) by one or more second connection means (10) such that the lamp holder (6) is rotatable about a second rotational axis (11) substantially perpendicular to the first rotational axis (9), **characterized in that** the gimbal frame (7) is connected to the housing (2) by the first connection means (8) inside the housing (2), wherein the gimbal frame (7) extends from said first connection means (8), over the first and second wall portions (5, 12), and into the inside of the lamp holder (6) through one or more recesses or openings (13) in the lamp holder (6), and wherein the lamp holder (6) is rotatably connected to the gimbal frame (7) by said second connecting means (10) inside the lamp holder (6).
2. A recessed lighting fixture (1) according to claim 1, wherein the central opening (4) of the housing (2) is circular, wherein the first wall portion (5) of the housing (2) is of semispherical shape, and wherein the second wall portion (12) of the lamp holder (6) is of semispherical shape.
 3. A recessed lighting fixture (1) according to claim 2, wherein the second rotational axis (11) pierces the first rotational axis (9).
 4. A recessed lighting fixture (1) according to any one of the preceding claims, wherein the gimbal frame (7) comprises a first substantially arch-shaped portion extending between two first connection means (8) on opposite sides of the central opening (4), and wherein the gimbal frame (7) comprises at least one arm (14) extending from a central portion (15) of the first arch-shaped portion and into the inside of the lamp holder (6) through the recess or opening (13) in the lamp holder, wherein the lamp holder (6) is rotatably connected to the at least one arm (14) by the second connecting means inside the lamp holder (6).
 5. A recessed lighting fixture according to claim 4, wherein the gimbal frame comprises two of said at least one arm (14), wherein the two arms extend into the lamp holder on opposite sides of the lamp holder, and wherein the second connection means are provided at the respective ends of the arms such that the arms together define the second rotational axis.
 6. A recessed lighting fixture according to claim 4, wherein the arm is rotatably connected at a lower portion of the lamp holder, and wherein the lamp holder is provided with an elongate recess configured to guide the arm relative to the lamp holder at rotation of the lamp holder about the second rotational axis.
 7. A recessed lighting fixture according to claim 6, wherein the arm comprises a planar portion oriented parallel to the elongate recess of the lamp holder.
 8. A recessed lighting fixture according to any one of the preceding claims, wherein each first connection means comprises a base member (17) fixed to the housing, wherein the gimbal frame is rotatably connected to the base member(s).
 9. A recessed lighting fixture according to any one of claims 4-8, wherein the gimbal frame is made from sheet metal and wherein the at least one arm (14) of the gimbal frame is a separate member attached or attachable to the first substantially arch-shaped portion.
 10. A recessed lighting fixture according to any one of the preceding claims, wherein the lamp holder is provided with a bottom ring (18) releasably attached to the second wall portion (12) of the lamp holder for holding a lamp and/or glass in place within the lamp holder, and wherein the second attachment means connects the gimbal frame to the second wall portion of the lamp holder.

Patentansprüche

1. Vertiefte Leuchte (1) umfassend einen Lampenhalter (6) und ein Gehäuse (2), wobei das Gehäuse (2) mit einer mittigen Öffnung (4) versehen ist, wobei die mittige Öffnung (4) von einem ersten umlaufenden Wandteil (5) umgeben ist, der außerhalb des Gehäuses (2) eine Vertiefung zum Empfangen des Lampenhalters (6) definiert, wobei der Lampenhalter (6) mit einem gegenüberliegenden zweiten umlaufenden Wandteil (12) versehen ist, wobei der Lampenhalter (6) mit dem Gehäuse (2) mittels einer Tragereinrichtung bewegbar verbunden ist, umfassend einen Tragrahmen (7), der durch ein oder mehrere erste Verbindungsmittel (8) mit dem Gehäuse (2) drehbar verbunden ist, so dass der Tragrahmen um eine erste Drehachse (9) drehbar ist, wobei der Lampenhalter (6) durch ein oder mehrere zweite Verbindungsmittel (10) mit dem Tragrahmen (7) drehbar verbunden ist, so dass der Lampenhalter (6) um eine im Wesentlichen zur ersten Drehachse (9) senkrechte zweite Drehachse (11) drehbar ist, **dadurch gekennzeichnet, dass** der Tragrahmen (7) durch die

- ersten Verbindungsmittel (8) im Inneren des Gehäuses (2) mit dem Gehäuse (2) verbunden ist, wobei der Tragrahmen (7) sich von dem ersten Verbindungsmittel (8) über den ersten und zweiten Wandteil (5, 12) und in das Innere des Lampenhalters (6) durch eine oder mehrere Vertiefungen oder Öffnungen (13) im Lampenhalter (6) erstreckt, und wobei der Lampenhalter (6) durch die zweiten Verbindungsmittel (10) im Inneren des Lampenhalters (6) mit dem Tragrahmen (7) drehbar verbunden ist. 5
2. Vertiefte Leuchte (1) nach Anspruch 1, wobei die mittige Öffnung (4) des Gehäuses (2) kreisförmig ist, wobei der erste Wandteil (5) des Gehäuses (2) eine halbsphärische Form aufweist, und wobei der zweite Wandteil (12) des Lampenhalters (6) eine halbsphärische Form aufweist. 10
3. Vertiefte Leuchte (1) nach Anspruch 2, wobei die zweite Drehachse (11) die erste Drehachse (9) durchdringt. 20
4. Vertiefte Leuchte (1) nach einem der vorgehenden Ansprüche, wobei der Tragrahmen (7) einen ersten im Wesentlichen bogenförmigen Teil umfasst, der sich zwischen zwei ersten Verbindungsmitteln (8) auf gegenüberliegenden Seiten der mittigen Öffnung (4) erstreckt, und wobei der Tragrahmen (7) zumindest einen Arm (14) umfasst, der sich von einem mittigen Teil (15) des ersten bogenförmigen Teils und in das Innere des Lampenhalters (6) durch die Vertiefung oder Öffnung (13) im Lampenhalter erstreckt, wobei der Lampenhalter (6) durch die zweiten Verbindungsmittel im Inneren des Lampenhalters (6) mit dem zumindest einen Arm (14) drehbar verbunden ist. 25 30 35
5. Vertiefte Leuchte nach Anspruch 4, wobei der Tragrahmen zwei des zumindest einen Arms (14) umfasst, wobei die beiden Arme in den Lampenhalter auf gegenüberliegenden Seiten des Lampenhalters hineinragen, und wobei die zweiten Verbindungsmittel an den jeweiligen Enden der Arme vorgesehen sind, so dass die Arme zusammen die zweite Drehachse definieren. 40 45
6. Vertiefte Leuchte nach Anspruch 4, wobei der Arm an einem unteren Teil des Lampenhalters drehbar verbunden ist, und wobei der Lampenhalter mit einer länglichen Vertiefung versehen ist, welche zur Führung des Arms in Bezug auf den Lampenhalter bei Drehung des Lampenhalters um die zweite Drehachse ausgelegt ist. 50
7. Vertiefte Leuchte nach Anspruch 6, wobei der Arm einen parallel zur länglichen Vertiefung des Lampenhalters ausgerichteten ebenen Teil umfasst. 55

8. Vertiefte Leuchte nach einem der vorgehenden Ansprüche, wobei jedes erste Verbindungsmittel ein am Gehäuse befestigtes Basiselement (17) umfasst, wobei der Tragrahmen mit dem Basiselement bzw. den Basiselementen drehbar verbunden ist.
9. Vertiefte Leuchte nach einem der Ansprüche 4-8, wobei der Tragrahmen aus einem Metallblech hergestellt ist, und wobei der zumindest eine Arm (14) des Tragrahmens ein getrenntes an dem ersten im Wesentlichen bogenförmigen Teil befestigtes oder an demselben befestigbares Element ist.
10. Vertiefte Leuchte nach einem der vorgehenden Ansprüche, wobei der Lampenhalter mit einem Grundring (18) versehen ist, der am zweiten Wandteil (12) des Lampenhalters zum Festhalten einer Lampe und/oder eines Glases im Lampenhalter lösbar befestigt ist, und wobei das zweite Befestigungsmittel den Tragrahmen mit dem zweiten Wandteil des Lampenhalters verbindet.

Revendications

1. Equipement d'éclairage renforcé (1) comprenant un support de lampe (6) et un boîtier (2), dans lequel le boîtier (2) est pourvu d'une ouverture centrale (4), dans lequel l'ouverture centrale (4) est entourée par une première portion de paroi circonférentielle (5) définissant sur l'extérieur du boîtier (2) un évidement destiné à recevoir le support de lampe (6), le support de lampe (6) étant pourvu d'une deuxième portion de paroi circonférentielle opposée (12), le support de lampe (6) étant relié de manière mobile au boîtier (2) au moyen d'un mécanisme à cardan comprenant un cadre de cardan (7) relié de manière rotative au boîtier (2) par un ou plusieurs premiers moyens de liaison (8) si bien que le cadre de cardan peut tourner autour d'un premier axe de rotation (9), le support de lampe (6) étant relié de manière rotative au cadre de cardan (7) par un ou plusieurs deuxièmes moyens de liaison (10) si bien que le support de lampe (6) peut tourner autour d'un deuxième axe de rotation (11) essentiellement perpendiculaire au premier axe de rotation (9), **caractérisé en ce que** le cadre de cardan (7) est relié au boîtier (2) par les premiers moyens de liaison (8) à l'intérieur du boîtier (2), dans lequel le cadre de cardan (7) s'étend à partir dudit premier moyen de liaison (8), sur les première et deuxième portions de paroi (5, 12), et à l'intérieur du support de lampe (6) à travers un ou plusieurs évidements ou ouvertures (13) dans le support de lampe (6), et dans lequel le support de lampe (6) est relié de manière rotative au cadre de cardan (7) par lesdits deuxièmes moyens de liaison (10) à l'intérieur du support de lampe (6).

2. Equipement d'éclairage renforcé (1) selon la revendication 1, dans lequel l'ouverture centrale (4) du boîtier (2) est circulaire, dans lequel la première portion de paroi (5) du boîtier (2) est de forme semi-sphérique, et dans lequel la deuxième portion de paroi (12) du support de lampe (6) est de forme semi-sphérique. 5
3. Equipement d'éclairage renforcé (1) selon la revendication 2, dans lequel le deuxième axe de rotation (11) perce le premier axe de rotation (9). 10
4. Equipement d'éclairage renforcé (1) selon l'une quelconque des revendications précédentes, dans lequel le cadre de cardan (7) comprend une première partie essentiellement en forme d'arc s'étendant entre deux premiers moyens de liaison (8) sur des côtés opposés de l'ouverture centrale (4), et dans lequel le cadre de cardan (7) comprend au moins un bras (14) s'étendant depuis une partie centrale (15) de la première partie en forme d'arc et à l'intérieur du support de lampe (6) à travers l'évidement ou l'ouverture (13) dans le support de lampe, et dans lequel le support de lampe (6) est relié de manière rotative à l'au moins un bras (14) par les deuxièmes moyens de liaison à l'intérieur du support de lampe (6). 15
20
25
5. Equipement d'éclairage renforcé selon la revendication 4, dans lequel le cadre de cardan comprend deux dudit au moins un bras (14), dans lequel les deux bras s'étendent dans le support de lampe sur les côtés opposés du support de lampe, et dans lequel les deuxièmes moyens de liaison sont prévus aux extrémités respectives des bras si bien que les bras définissent ensemble le deuxième axe de rotation. 30
35
6. Equipement d'éclairage renforcé selon la revendication 4, dans lequel le bras est relié de manière rotative à une partie inférieure du support de lampe, et dans lequel le support de lampe est pourvu d'un évidement allongé configuré pour guider le bras par rapport au support de lampe à la rotation du support de lampe autour du deuxième axe de rotation. 40
45
7. Equipement d'éclairage renforcé selon la revendication 6, dans lequel le bras comprend une partie plane orientée parallèlement à l'évidement allongé du support de lampe. 50
8. Equipement d'éclairage renforcé selon l'une quelconque des revendications précédentes, dans lequel chaque premier moyen de liaison comprend un élément de base (17) solidaire du boîtier, dans lequel le cadre de cardan est relié de manière rotative à l'élément ou aux éléments de base. 55
9. Equipement d'éclairage renforcé selon l'une quel-

conque des revendications 4 à 8, dans lequel le cadre de cardan est en tôle métallique et dans lequel l'au moins un bras (14) du cadre de cardan est un élément séparé fixé ou pouvant être fixé à la première partie essentiellement en forme d'arc.

10. Equipement d'éclairage renforcé selon l'une quelconque des revendications précédentes, dans lequel le support de lampe est pourvu d'une bague inférieure (18) fixée de manière amovible à la deuxième partie de paroi (12) du support de lampe pour maintenir une lampe et/ou un verre en place dans le support de lampe, et dans lequel le deuxième moyen de fixation relie le cadre de cardan à la deuxième portion de paroi du porte-lampe.

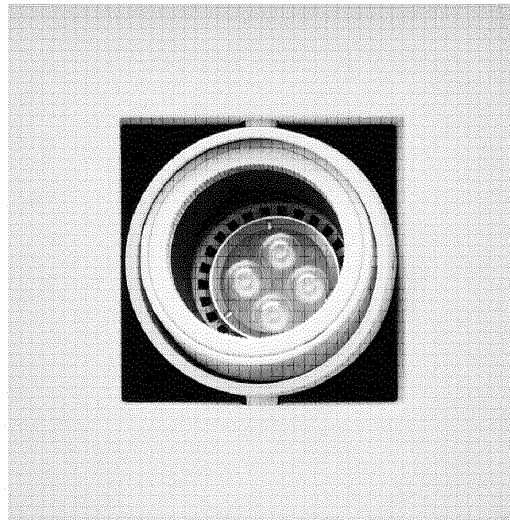


Fig. 1 - Prior Art

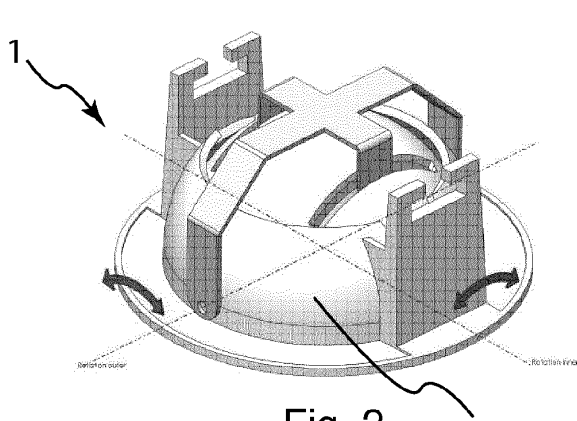


Fig. 2

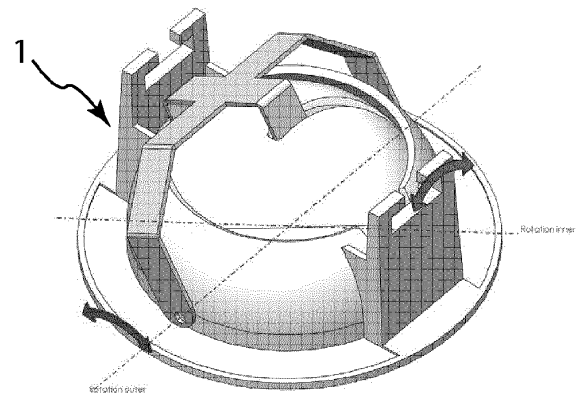


Fig. 4

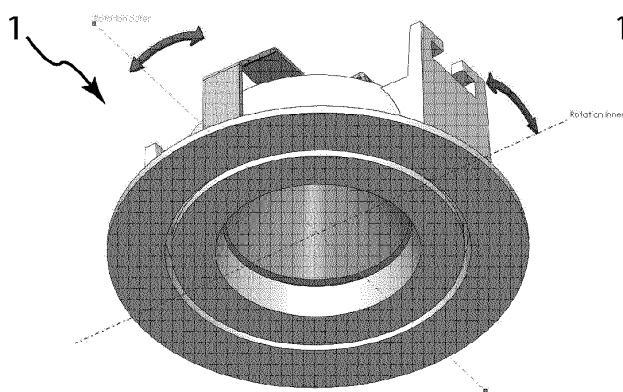


Fig. 3

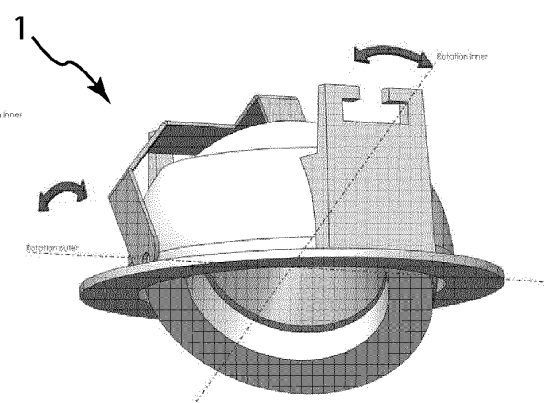


Fig. 5

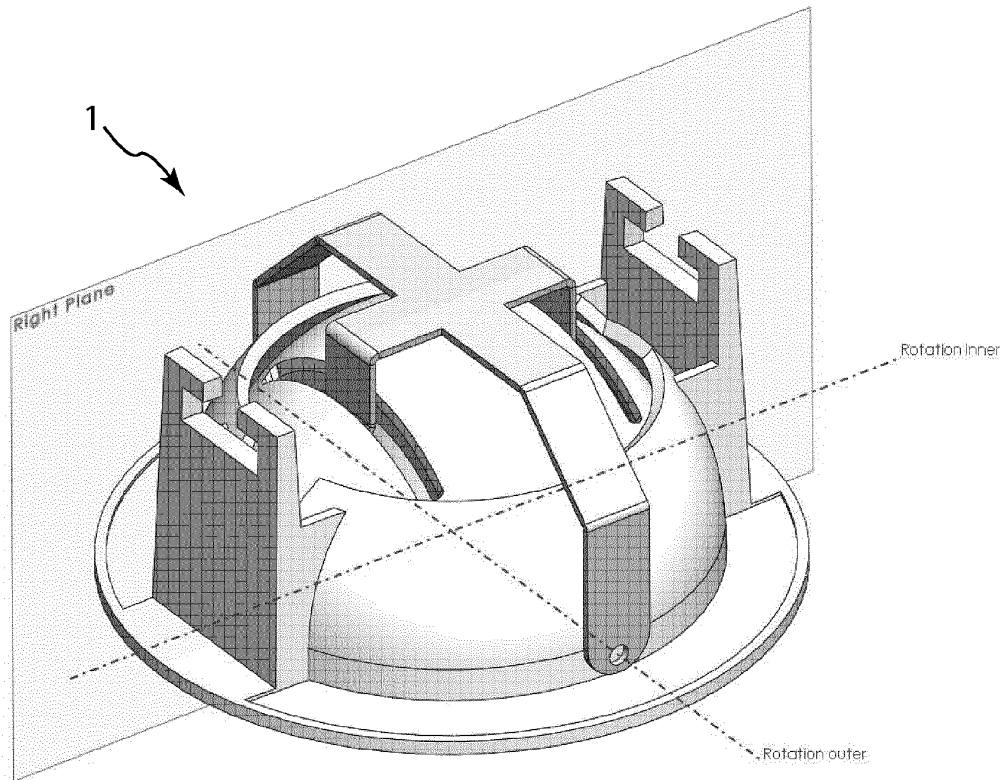


Fig. 6

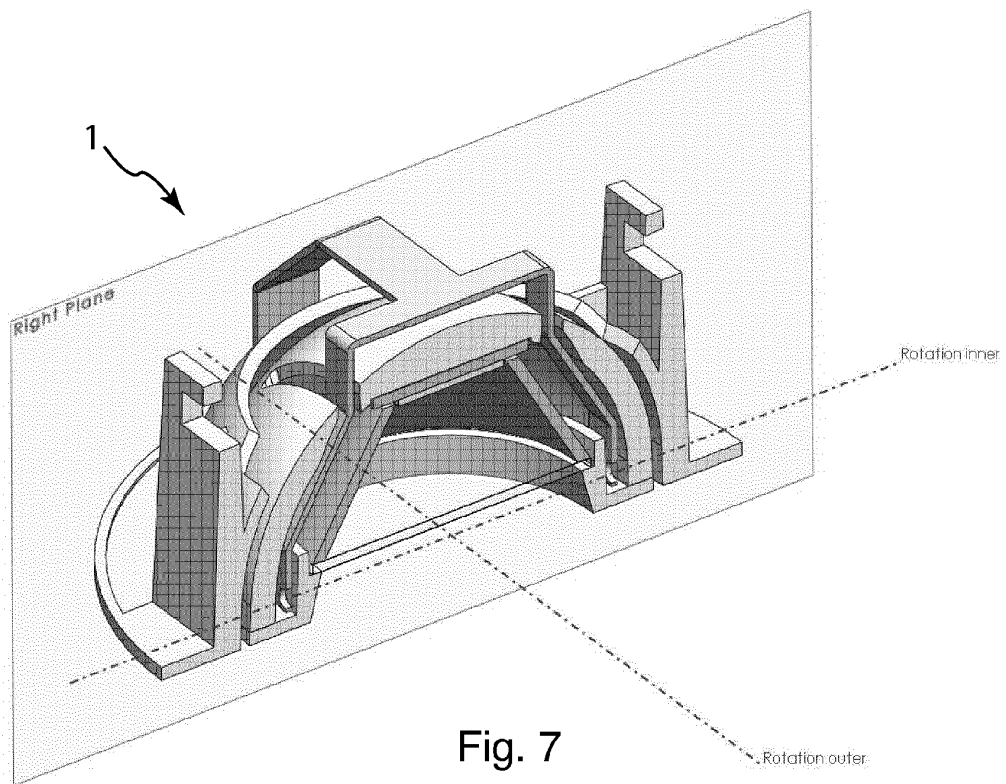


Fig. 7

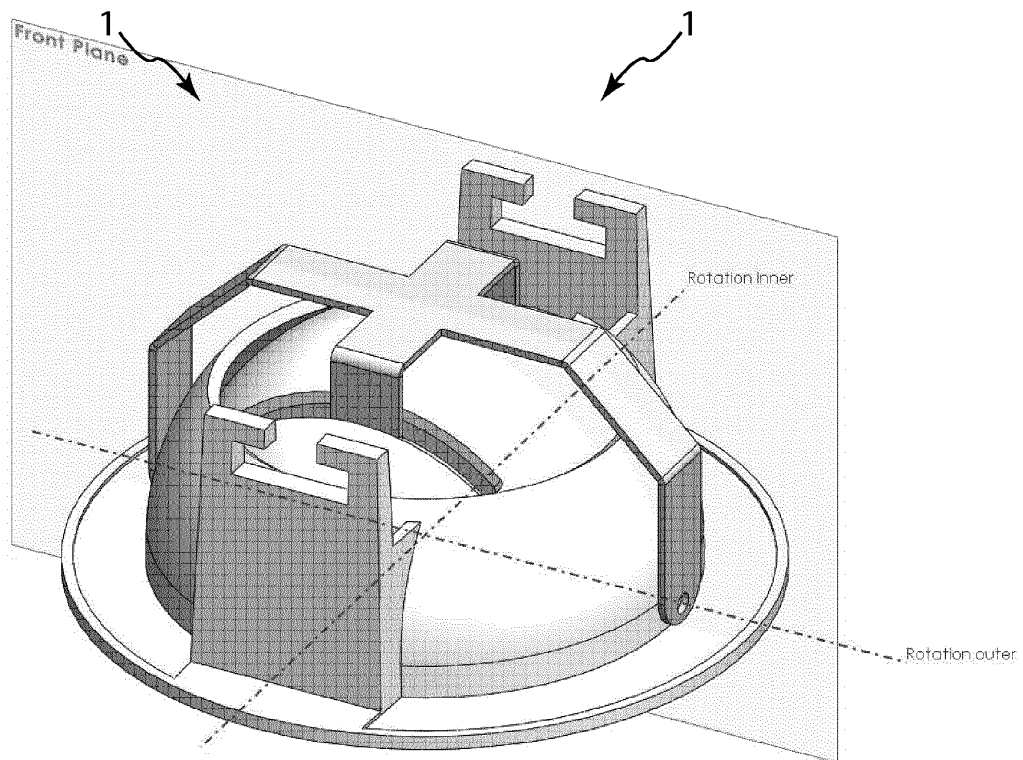


Fig. 8

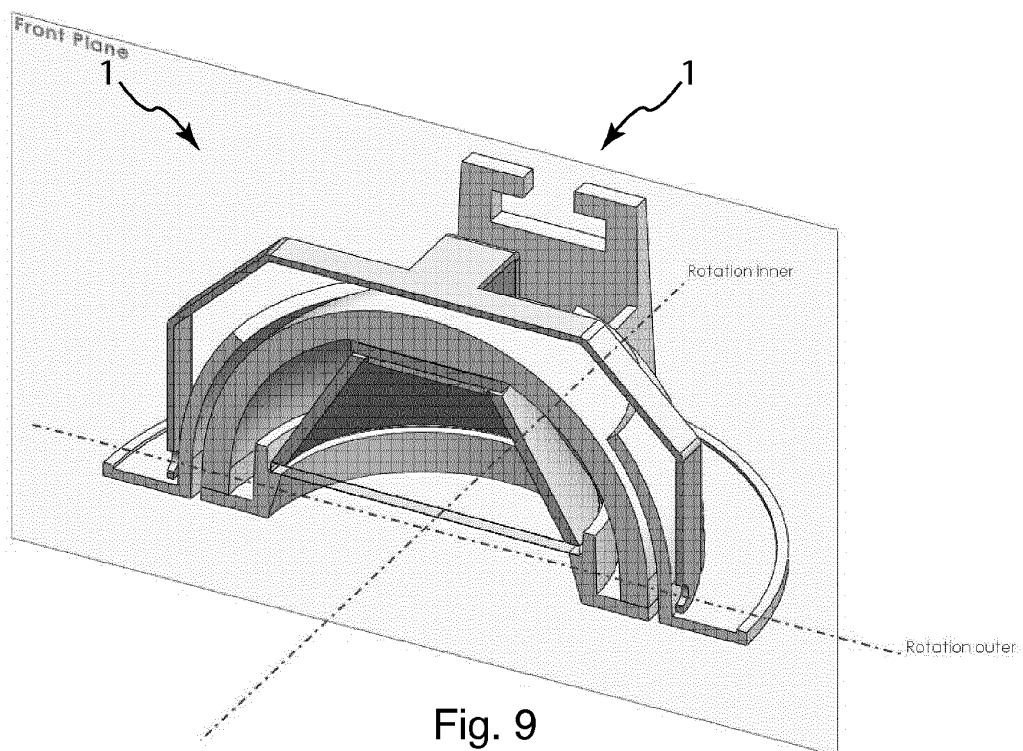
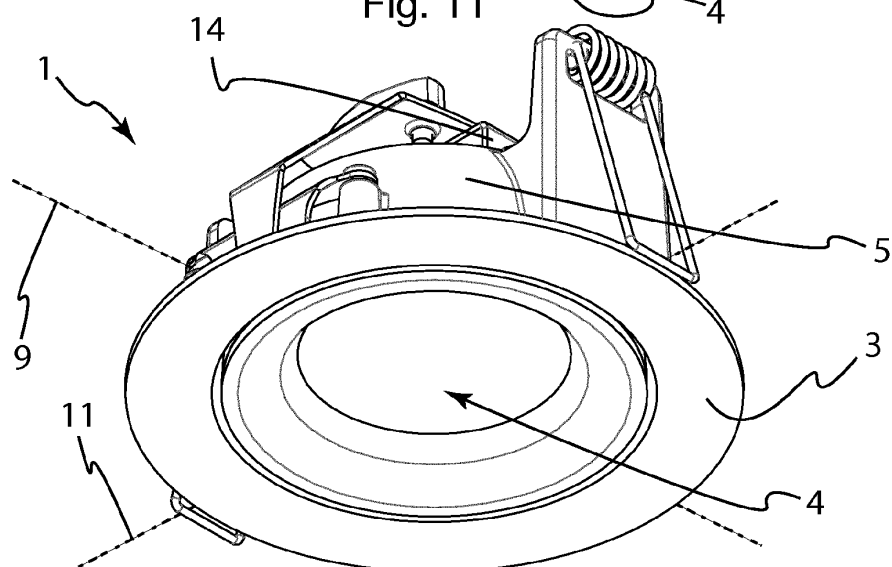
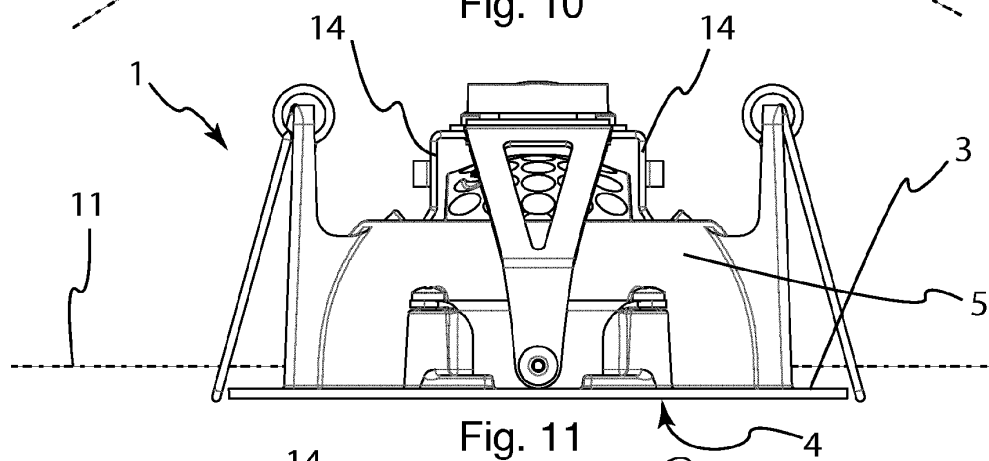
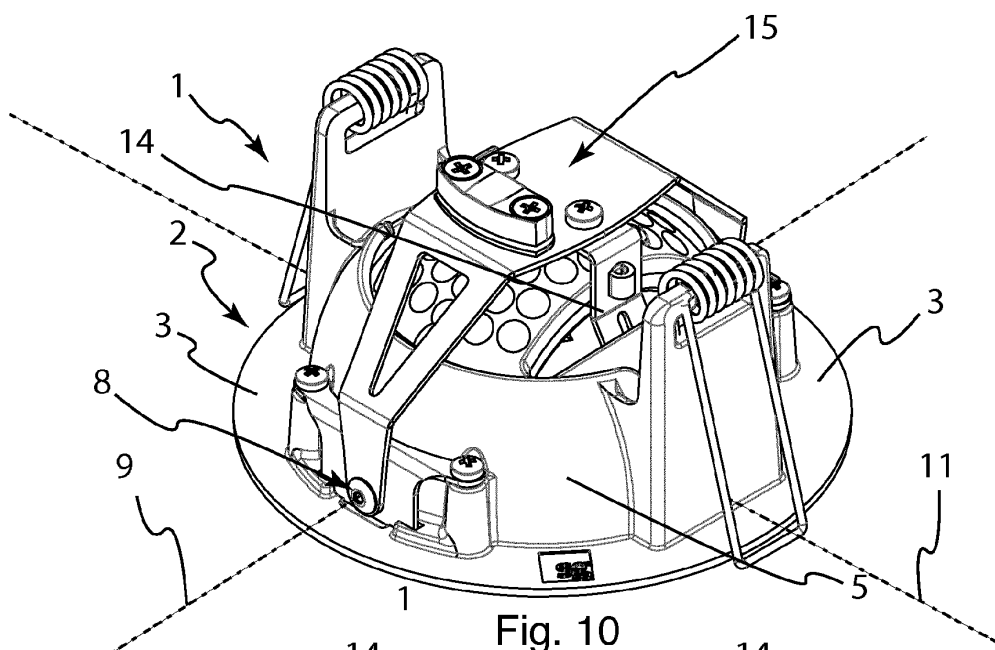


Fig. 9



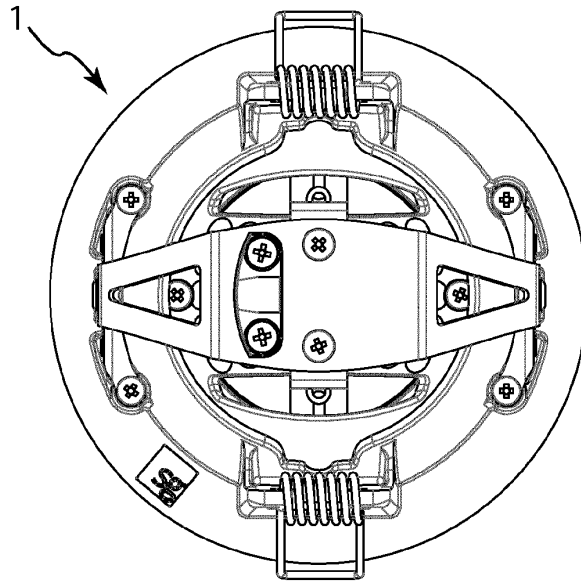


Fig. 13

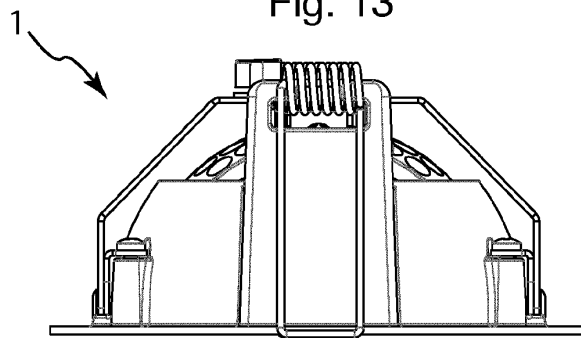


Fig. 14

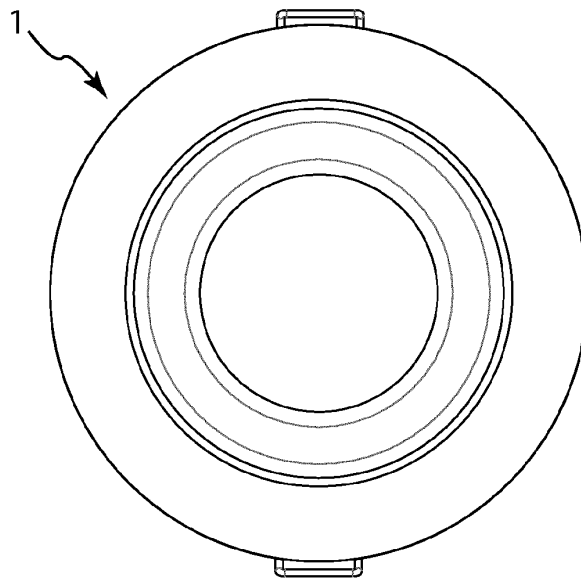


Fig. 15

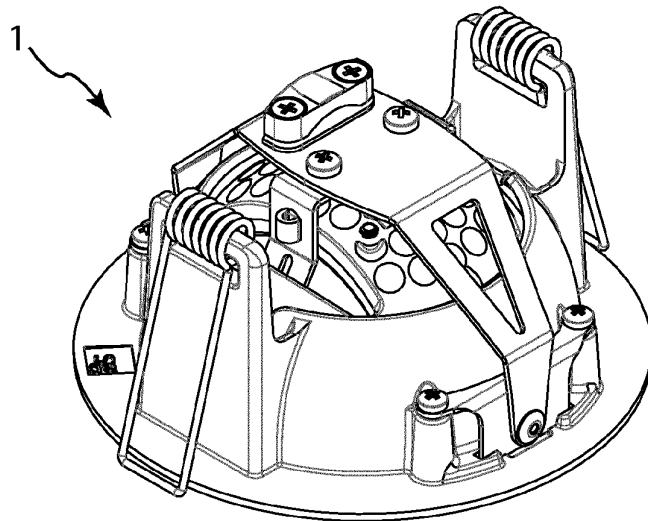


Fig. 16

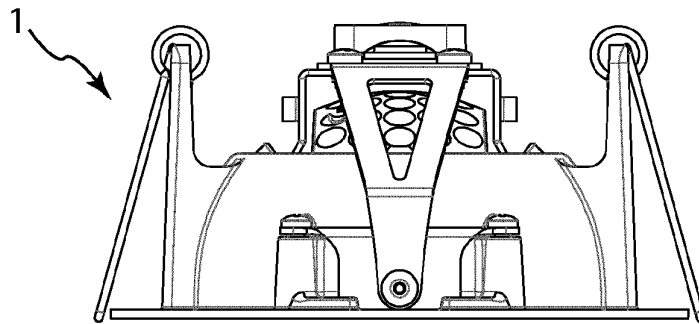


Fig. 17

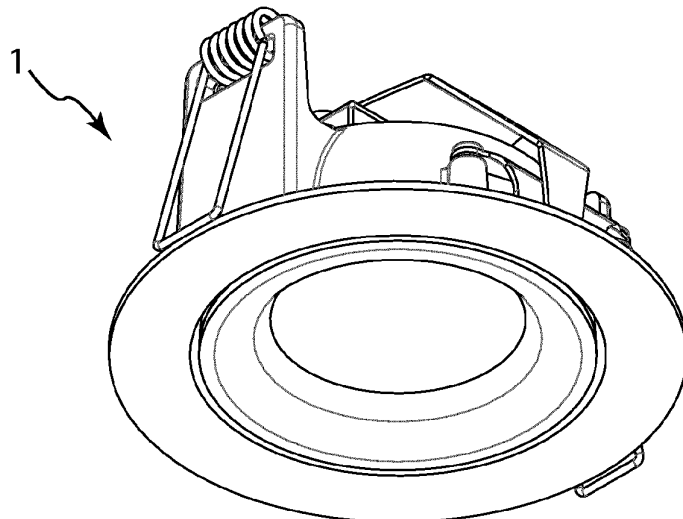


Fig. 18

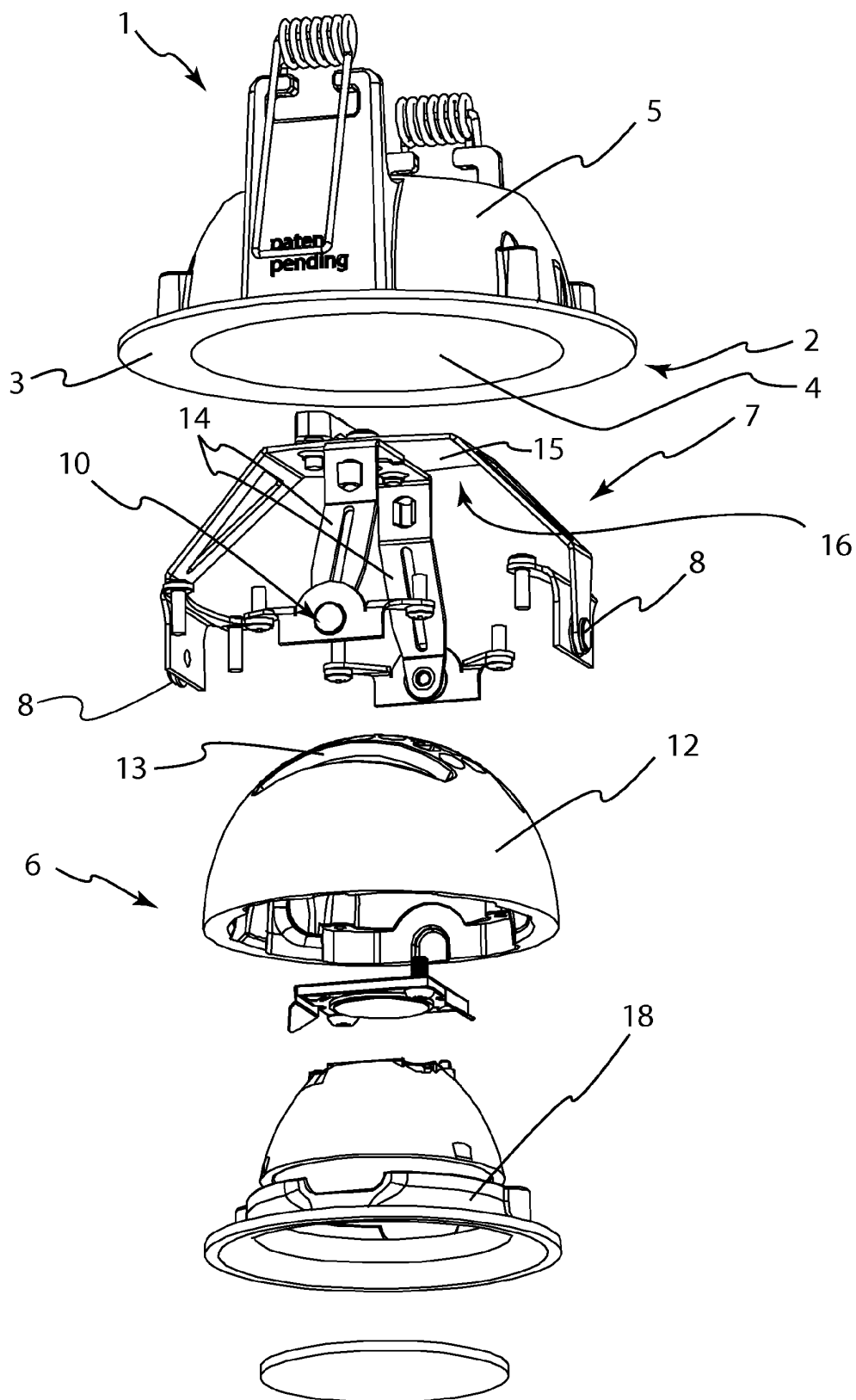


Fig. 19

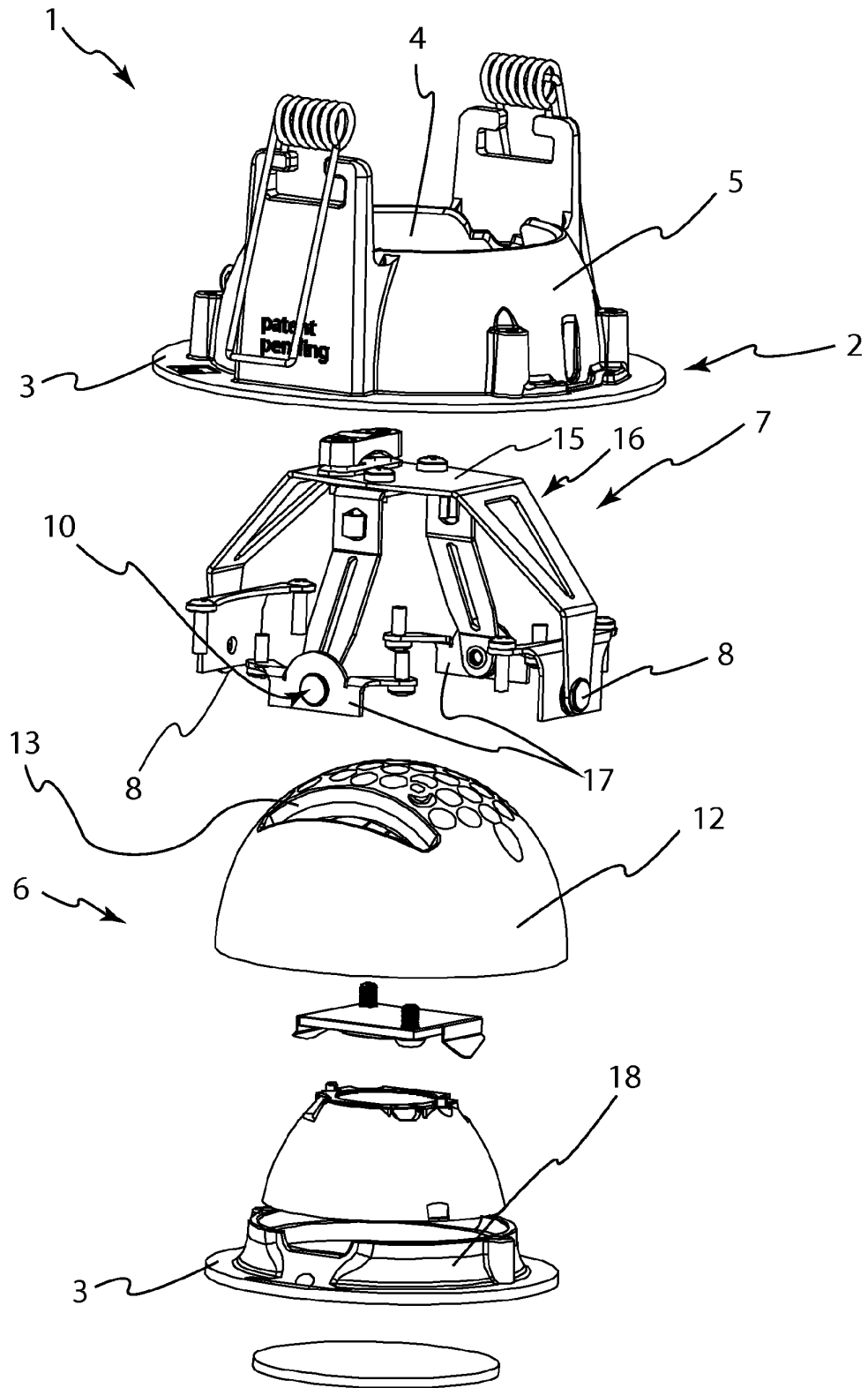


Fig. 20

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- WO 2012126749 A [0004]