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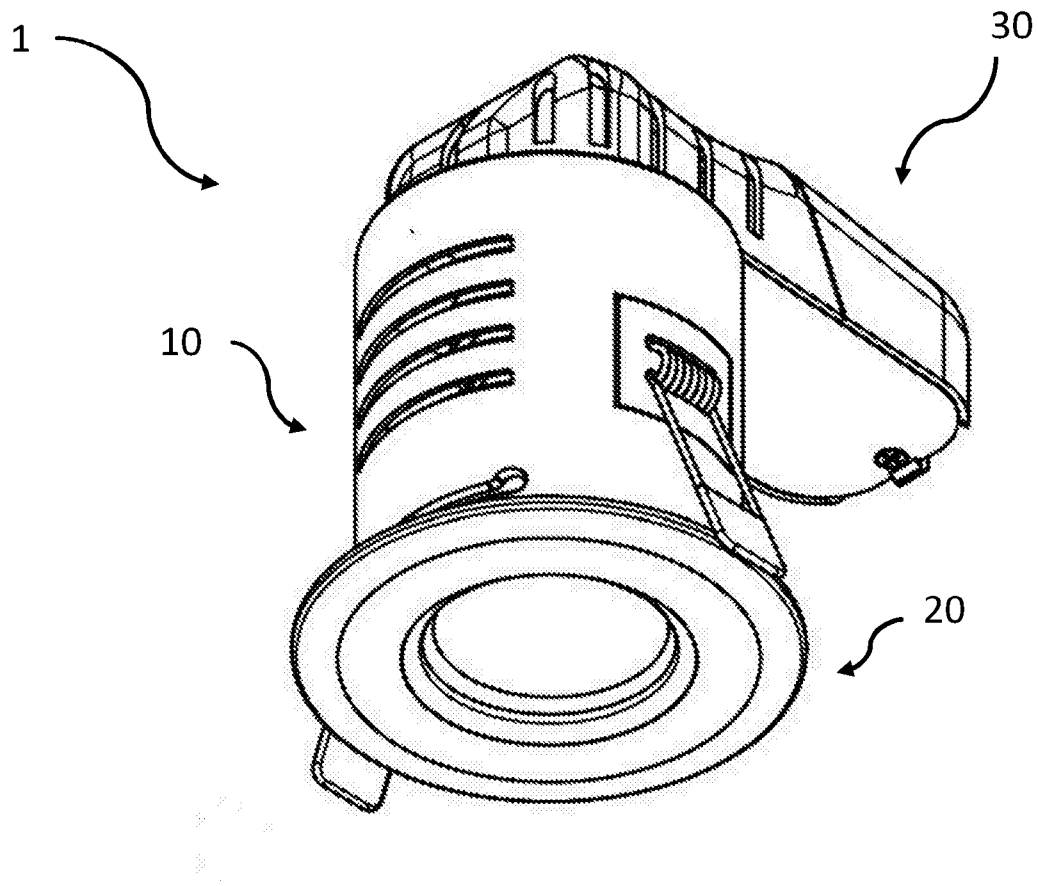


FIGURE 1

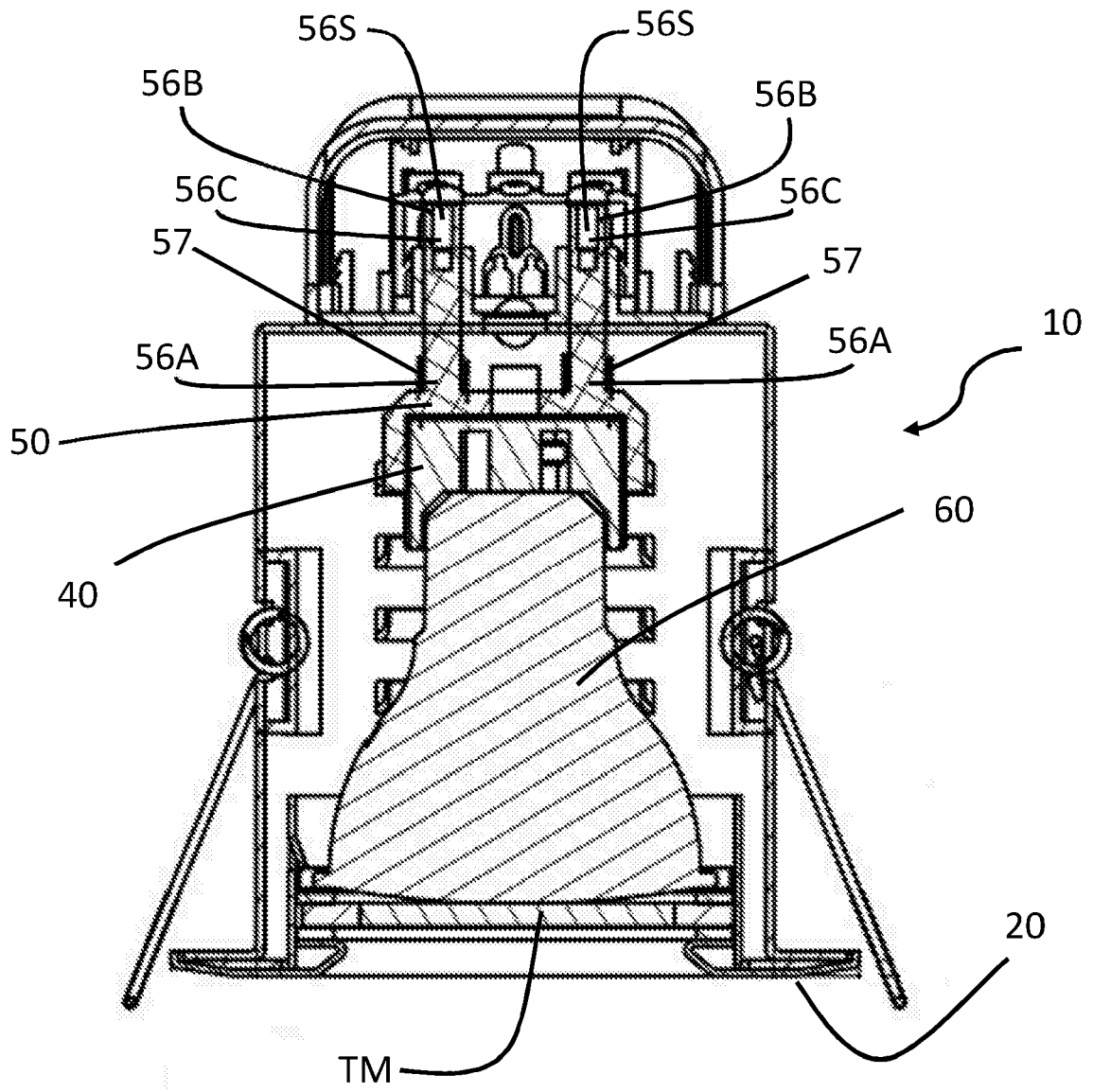


FIGURE 2

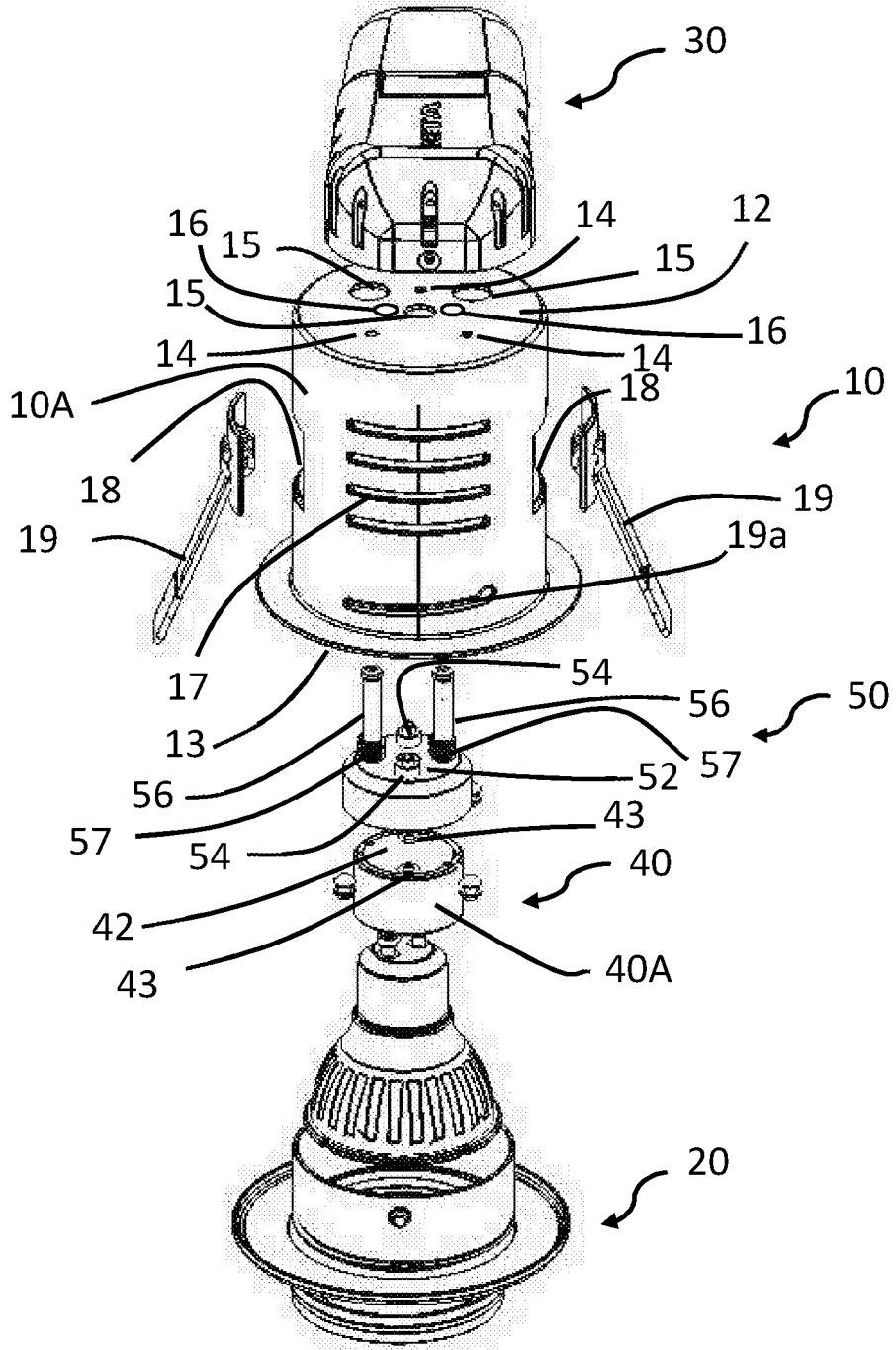


FIGURE 3

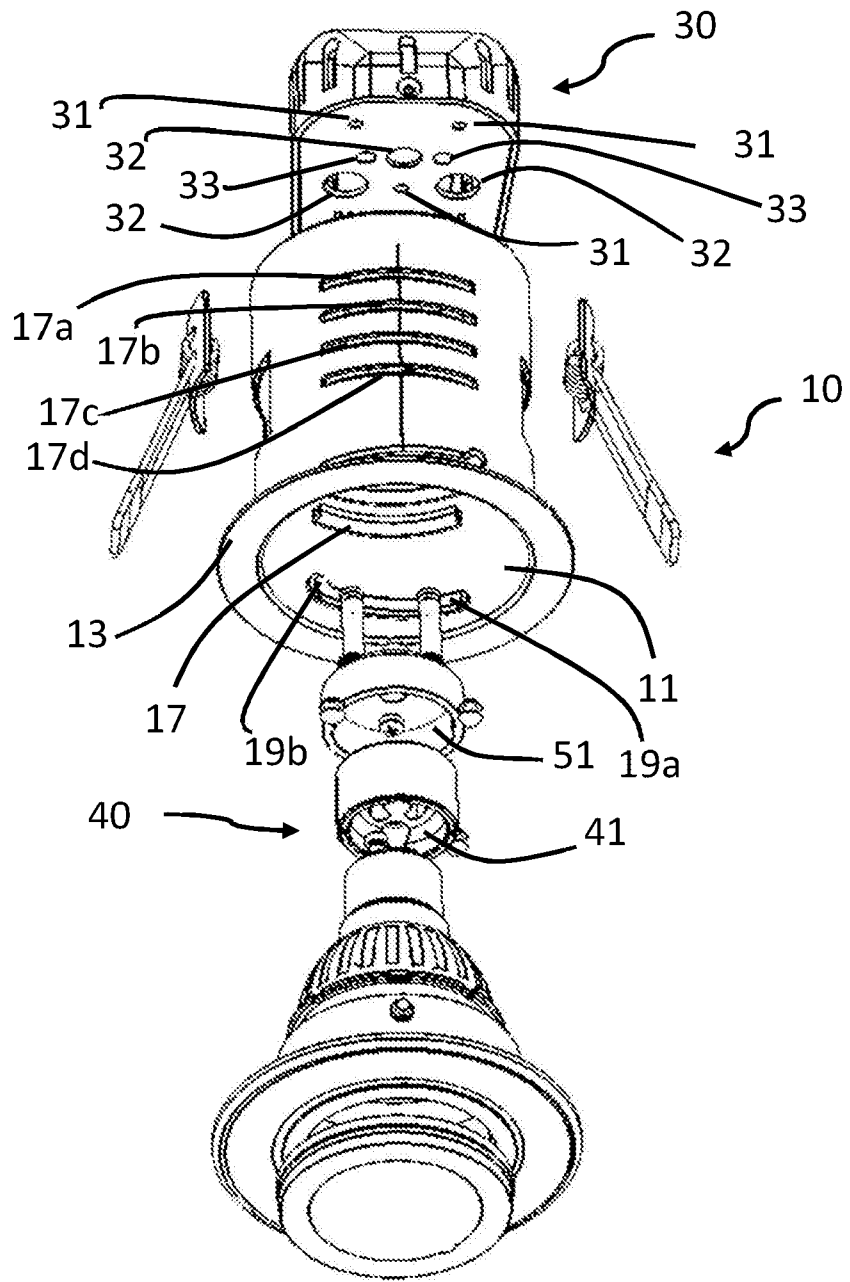


FIGURE 4

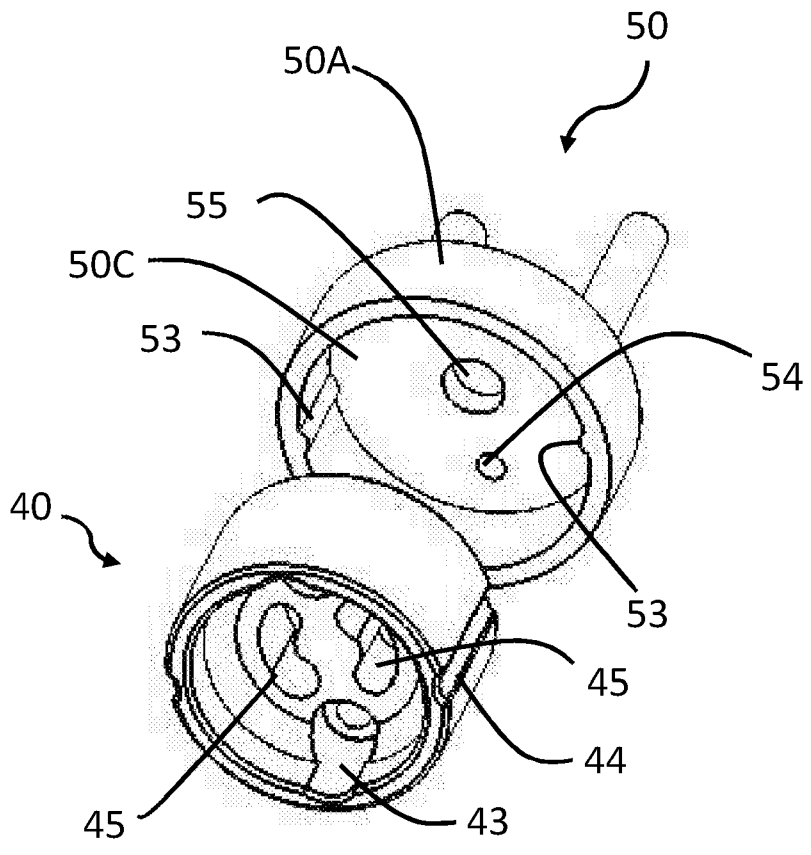


FIGURE 5

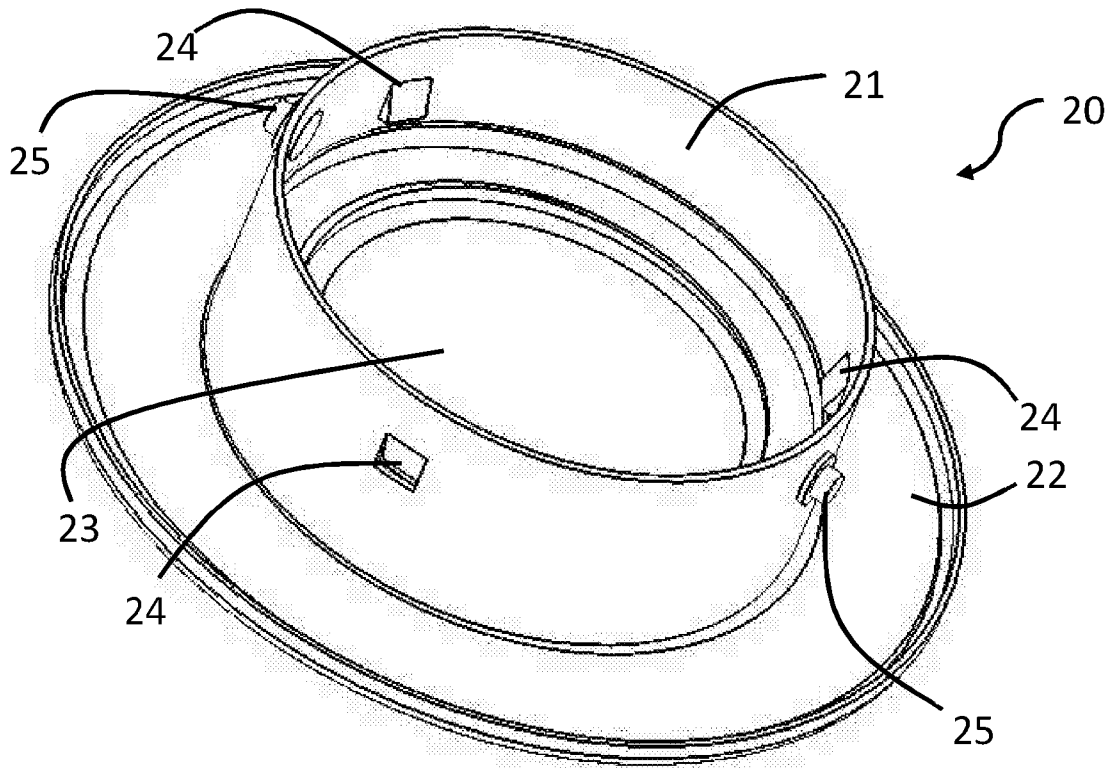


FIGURE 6

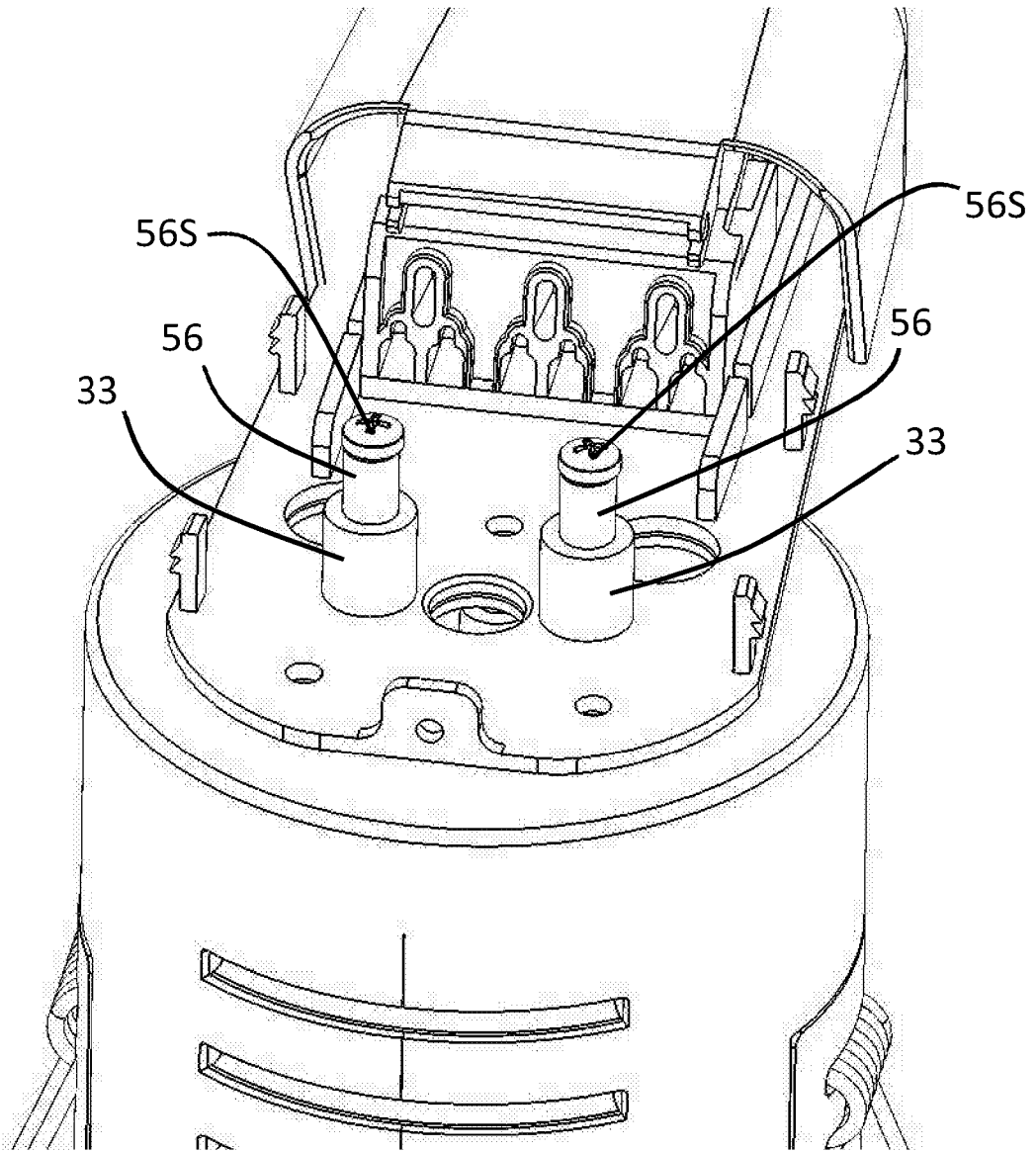


FIGURE 7



## Lights

This invention relates to lights, specifically, but not exclusively, to downlights, for example, fire-rated downlights.

5 In the United Kingdom (at least) over the past decade or so downlights have become increasingly popular. A downlight (or recessed light or pot light) is a light fixture which is installed in a recess in a ceiling (although it could also be installed on a floor or other surface). The downlight typically has three components, a housing (or can), a lamp and a trim. The housing will usually include a connector for providing electrical connection to the lamp (for example a supply of electricity) and the housing which is hidden and located in the ceiling  
10 typically includes a lamp holder for retaining the lamp.

15 Whilst lamps tend to have standard connection pins for connecting to a source of electricity (e.g. GU10) there is no single standard height for lamps suitable for downlights in the lighting industry. Accordingly, the height of a manufacturer's lamps may vary from that of another manufacturer. Moreover, as the current technologies such as LED, halogen and so on develop and new lamp technologies (potentially with different height requirements) emerge, it will be difficult and costly to manufacture a downlight with a specific housing for every lamp height available on the market. Furthermore, utilising an unsuitable downlight with a lamp having a shorter or longer height can result in the lamp being in an unintended position inside the downlight, that is either the lamp protruding from the housing or the lamp being retained within  
20 the housing and creating larger beam angle which may be undesirable.

25 An existing solution in the industry includes employing hanging lamp holders suspended on electrical wires inside the housing of a downlight, however, such a solution has major disadvantages. For instance, when the trim (or bezel) is removed, it is either difficult to reach the lamp if the electrical wires are designed to be short to retain the lamp within the housing or the electrical wires are long and consequently it is difficult to push the electrical wires back through holes of the housing to reposition the lamp inside the downlight housing. Further, if or when the lamp is twisted to be removed or replaced, the wires can become damaged. Clearly, the removal and replacement of the lamp can be difficult.

It is an object of the invention to at least mitigate one or more of the problems of the prior art.

30 Accordingly, a first aspect of the invention provides a lamp housing in accordance with Claim 1.

Advantageously, the resilient biasing means causes the light source (e.g. the lamp) to be located at a desired location within the housing and/or allows the lamp housing to

accommodate different sizes (heights) of lamps. The resilient biasing means ensures that this is so even if the lamp holder is not located in a vertical orientation.

Said resilient biasing means may be a helical spring, for example a helical compression spring. Other resilient biasing means can be employed, for example a compressible rubber portion.

5 The holder may comprise a bearing surface against which said resilient biasing means bears, as may the body.

The holder may comprise a first part and a second part. The resilient biasing means may bare against the first part. The second part may be received within the first part, for example nestably received within the first part. The first part and the second part may comprise  
10 cooperating members, for example male and female cooperating members. In an embodiment one of the first and second parts comprises at least one elongate slot and the other of the second and first members comprises a matched elongate protrusion, the one or more protrusion being receivable or received within the respective slot.

The second part may comprise a connection portion for connection to a lamp.

11 11 22 15 The first part comprises posts, for example for location of said resilient biasing means. Said resilient biasing means may be located about said posts. In an embodiment the first part comprises plural posts, for example two or three posts. A resilient biaser may be provided about each of said posts.

11 20 Said posts may be slidably received in a or respective mounts. posts may be fixedly secured for slidable movement within said mount or mounts. The posts may be secured within the respective mounts by a fixing member which is sized to interfere with the mount and thereby prevent disengagement of the mount and post. The mount or mounts may be provided on or adjacent an exterior surface of the body.

25 The lamp holder may further comprise electric circuitry to make an electrical connection to a light source. The electrical circuitry may extend through the holder. A box may be located on the body for connection to a power supply, for example a mains electricity power supply. The box is preferably electrically insulating and houses contacts to facilitate connection of the electrical circuitry to a power supply, e.g. a mains electricity power supply.

30 A further aspect of the invention provides a downlight or other light comprising a lamp housing in accordance with Claim 12.

A yet further aspect of the invention provides a method of securing a light source within a lamp housing in accordance with Claim 14.

There is also disclosed a lamp housing comprising a body for receiving a light source and a holder located within the body for retaining a light source, the holder comprising one or more posts extending through the body and slidably retained with respect to the body.

5 Because the one or more posts are slidably retained in the body the light source will adopt a desired location within the body when the lamp housing is vertically oriented.

Preferably a resilient biasing means bears between holder and the body. The posts may be slidably received in mounts. The mounts may be located on or proximate an exterior surface of the body. The resilient biasing means may be located within the body.

The securing device may be a bezel which provides a fascia for the lamp.

10 The lamp holder and/or the light may include a transparent member located between the securing device and the light source, the transparent member may be heat-resistant. The transparent member preferably comprises glass, for example borosilicate or other heat-resistant glass. Accordingly, the lamp holder and/or light may be fire-rated, for example a fire-rated downlight.

15 The body may comprise one or more spring clips to retain it at a site of use, for example a hole made in a ceiling.

20 Because the lamp holder is resiliently urged away from the can the lamp holder can accommodate lamps having different lengths. Further, because of the resilient urging, when the securing device or bezel is removed from the body, the lamp is urged out of the housing which makes replacement of lamps easier.

By providing plural posts, the desired or appropriate orientation of the lamp holder within the body is readily discerned.

One or more embodiments of the invention will now be described by way of example only, with reference to the accompanying drawings, in which:

25 Figure 1 shows a downlight.

Figure 2 shows cross-sectional view of Figure 1.

Figure 3 shows an exploded perspective view of the fire rated downlight in Figure 1 from above.

30 Figure 4 shows an exploded perspective view of the fire rated downlight in Figure 1 from below.

Figure 5 shows a lamp holder and a plunger assembly of the downlight of Figure 1.

Figure 6 shows a bezel of the downlight of Figure 1.

Figure 7 shows inside a terminal housing of the downlight in Figure 1.

A downlight, for example a fire rated downlight, 1 according to an embodiment of the present invention is shown in Figure 1. The fire rated downlight comprises a lamp housing or can 10, a bezel 20 and a terminal housing 30. The can 10 houses a lamp holder 40, a plunger assembly 50 and a lamp 60, as illustrated in Figure 2.

With reference to Figures 2 to 4, the can 10 has a substantially open first end 11 and a substantially closed second end 12, and a substantially cylindrical body 10A extending therebetween. The open end 11 is bound by a peripheral flange 13. The closed end 12 comprises three fixing aperture 14, three air flow apertures 15 and a pair of holes 16 (see Figure 3).

The can 10 also comprises two diametrically opposed vents 17 on the body 10A. As shown, and in this embodiment, the vents 17 comprise four parallel elongate openings 17a-17d running substantially parallel to the open end 11. From the lower edge of each individual elongate opening (e.g. a first elongate opening 17a) a wall projects into the cavity defined by the can 10 and is bent such that the free end of the wall extends towards the closed end 12 to form an L-shaped cover for each elongate opening 17a-17d.

The can 10 further comprises two diametrically opposed rectangular recesses 18 on the body 10A, equi spaced between the open end 11 and the closed end 12. Each of the rectangular recesses 18 provides a connection points for a respective spring clips 19.

Further, the can 10 comprises two elongate diametrically opposed slots 19a located proximate the open end 11. The run of each slot 19a is not parallel with respect to the flange 13 and each slot 19a includes a widened portion 19b at the point furthest from the open end 11.

With reference to Figures 2 to 5, the lamp holder 40 is a substantially cylindrical body 40A, comprising a substantially open end 41 and a substantially closed end 42. The closed end 42 of the lamp holder 40 comprises a flat surface with two diametrically opposed fixing apertures 43 at the periphery of the flat surface. With reference to Figure 5, the lamp holder 40 also comprises two diametrically opposed grooves 44 on the body 40A running from the open end 41 to the closed end 42. The open end 41 also comprises two matched, substantially kidney-shaped, cavities 45 located about the centre.

The plunger assembly 50 defines a cup-shaped body 50A having a substantially open end 51 and a substantially closed end 52. Within the cavity 50C defined by the cup shaped body 50A, a pair of diametrically opposed ridges 53 run from the open end 51 to the closed end 52. A pair of fixing apertures 54 and a central open hole 55 extend through the closed end 52. A pair of diametrically opposed rods 56 extend outwardly from the closed end 52. Each rod 56 is

located inboard of the periphery of the closed end 52. About each rod 56, there is provided a bias spring 57, located at a respective proximal end 56A of the rod 56. The bias spring 57 is circular, cylindrically shaped with a centre through hole. At a distal end of 56B of each of the rods 56 comprises an opening 56C is provided.

- 5 With reference to Figure 6, the bezel 20 comprises a substantially cylindrical upstanding wall 21 and a flange 22. The bezel 20 comprises a fire-rated glass assembly 23. The upstanding wall 21 comprises three vertically angled inward recesses 24 and two diametrically opposed pins 25 orthogonally positioned on the outer surface thereof.

10 With reference to Figure 4, the terminal housing 30 has the form of an elongate box. A surface of the terminal housing 30 comprises three fixing apertures 31, three air flow apertures 32 and a pair of holes with an inward column 33.

15 Referring to Figure 5, the plunger assembly 50 is mounted on the lamp holder 40. The mounting is guided by the ridges 53 of the plunger assembly 50 being received in the grooves 44 of the lamp holder 40. The lamp holder 40 and plunger assembly 50 are fixed together by the passage of fixing elements, for example, bolts and/or screws through the fixing apertures 43 and 54. The central open hole of the plunger assembly 50 allows passage of electrical cables (not shown) through to the lamp holder 40.

20 The plunger assembly 50 and the lamp holder 40 are housed inside the can 10 with each of the rods 56 received in a respective one of the pair of holes 16 extending through the closed end 12, as is best illustrated in Figure 2. The configuration is such that the diameter of the holes 16 is smaller than the internal diameter of the bias springs 57 located at the proximal end 56A of the rods 56, whereby, the bias springs 57 bear against the closed end 52 of the plunger assembly 50 and the closed end 12 of the can 10 and interfere against full insertion of the vertical rods 56 when an external force is applied. The terminal housing 30 mounts on  
25 the closed end 12 of the can 10 through the fixing apertures 31, configured to mirror the three fixing apertures 14 on the closed end 12 of the can 10. Additionally, the air flow apertures 15 of the can 10 and the air flow apertures 32 of the terminal housing 30 are aligned for clear passage of air between the two components.

30 With reference to Figure 7, the columns 33 of the terminal housing 30 are suitable for receiving the rods 56 of the plunger assembly 50 when the terminal housing 30 is mounted on the can 10. the openings 56C at the distal end 56B of the rods 56 are filled with bolts or screws 56S with a larger head diameter than the inner diameter of the columns 33 such that after the bolts or screws are mounted, the rods 56 may only pass through the columns 33 down to the distal end 56B, any further downward movement being blocked by the bolts or screw head 56S.

As is well known, lamps 60 for downlights have a pair of connection pins (for example the GU5.3 lamp or the GU10 lamp). In use, if the lamp 60 is of the GU10 type it is installed in the lamp holder 40 by a twist mechanism (GU5.3 lamps 60 are typically inserted by a push mechanism). Once the lamp 60 is mounted in the lamp holder 40, the bezel 20 is located in the open end 11 of the can 10. The bezel 20 is twisted such that the pins 25 slide on the slanted upper edge of the slots 19a to urge the lamp 60 towards the closed end and cause the rods 56 to travel within the columns 53. The motion of the lamp holder 50 causes the bias springs 57 to become compressed and hence resist the motion of the lamp holder 50.

When the spring clips 19 are pulled open, there is an elastic force tending to bring the spring clips 19 back to the equilibrium position. The elastic force can help to fix the downlight onto a ceiling or a wall.

The plunger assembly 50 allows movement of the lamp holder 40, this movement and the force exerted by the bias spring 57 allows lamps with different heights to be installed conveniently. Additionally, regardless of the height of the lamp 60, the lamp 60 is always located closest to the glass creating a larger (optimum) lamp beam angle. Since the lamp is secured in the can 10 by the bezel 20, when the bezel 20 is removed, the force from the bias springs 57 push the lamp 60 in a direction wherein part of the lamp 60 protrudes from the can 10, thus allowing convenient access to the lamp. Furthermore, as the plunger assembly 50 comprises two rods 56, the lamp holder 40 would not rotate as bezel 20 is twisted when removing/replacing the lamp 60.

Furthermore, it should be noted the vent 17 may comprise fewer or more opening as suitable in any other orientation in other embodiments.

It is preferred that the light is a downlight, and particularly (although not exclusively) a fire-rated downlight and accordingly may comprise a borosilicate glass fascia TM (see Figure 2), which typically sits between the bezel and the lamp.

All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

Each feature disclosed in this specification (including any accompanying claims, abstract and drawings), may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

The invention is not restricted to the details of any foregoing embodiments. The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed. The claims  
5 should not be construed to cover merely the foregoing embodiments, but also any embodiments which fall within the scope of the claims.

## Claims

1. A lamp housing comprising a body for receiving a light source and a holder located within the body for retaining a light source, and further comprising plural resilient biasing means to bear between the body and the holder to urge the holder away from the body, wherein the holder comprises a first part and a second part, wherein the first part comprises a substantially open first end and a substantially closed second end and plural posts extend outwardly from the closed end, wherein one of said resilient biasing means is provided about each post.
2. A lamp housing according to Claim 1, wherein said resilient biasing means are helical springs.
3. A lamp housing according to Claim 1 or 2, wherein the holder comprises a bearing surface against which said resilient biasing means bears.
4. A lamp housing according to Claim 1, 2 or 3, wherein the body comprises a bearing surface against which said resilient biasing means bears.
5. A lamp housing according to any preceding Claim, wherein the resilient biasing means bare against the first part.
6. A lamp housing according to any preceding Claim, wherein the second part is nestably received within the first part.
7. A lamp housing according to any preceding Claim, wherein the second part comprises a connection portion for connection to a light source.
8. A lamp housing according to any preceding Claim, wherein the posts are slidably received in respective mounts.
9. A lamp housing according to Claim 8, wherein the posts are fixedly secured for slidable movement within said respective mounts.
10. A lamp housing according to Claim 8 or 9, wherein said mounts are provided on an exterior surface of the body.
11. A lamp housing according to any preceding Claim, further comprising electric circuitry to make an electrical connection to a light source.

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12. A light comprising a lamp housing according to any preceding Claim, a light source and a securing device, wherein the light source is received within the body and retained by the lamp holder and the securing device engages the body to hold the light source in place, the resilient biasing means urging the light source in a direction out of the body.

5

13. A light according to Claim 12, further comprising a transparent member located between the securing device and the light source.

10

14. A method of securing a light source within a lamp housing according to any of Claims 1 to 11, the method comprising engaging a light source with a lamp holder, forcing the light source and lamp holder into a body of the lamp housing against the urging of resilient biasing means and securing the light source and lamp holder in the body using a securing device which engages the body.

15

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