

LIGHTING DEVICE

The present invention relates to a lighting device for cavity mounting, for example to a downlighter for installation in the ceiling-floor cavity of a building.

During the late 1970's and early 1980's, much research was carried out into the production of light sources having the higher luminous efficiency of discharge lamps while having an envelope at least approximating to that of a conventional incandescent lamp.

A number of different lamp configurations have become available. One such lamp forms a direct replacement for an incandescent bulb, having a conventional bayonet or screw type connector, and a single enclosure housing both ballast circuitry and the discharge tube itself. This lamp has generally larger dimensions than a conventional incandescent lamp.

A second type of lamp has a generally U-shaped tube with the tube ends connected together by a common base which supports plug-type connectors for mating with a counterpart socket member. The tube is generally elongate and the axial length is greater than that of a conventional incandescent lamp, while the transverse width is less than that of an incandescent lamp. The second type of lamp is connected via the above-mentioned socket member to control or ballast circuitry. The control or ballast circuitry may be relatively remote from the lamp and is typically provided in a housing having trailing wires connected to the socket member.

The second lamp has a cost advantage over the first type of lamp, in that when the tube needs to be replaced, it is not necessary at the same time to replace the ballast circuitry.

As previously mentioned, compact discharge lamps, hereinafter referred to as compact fluorescent lamps, have a higher luminous efficiency than incandescent lamps. Therefore they are attractive for business and commercial use, where it is especially desirable to reduce costs and where light sources may be switched on for substantial periods of time. Such lamps are also attractive in that they have a considerably longer life than incandescent lamps, which means that replacements are necessary less frequently. This in turn means that both maintenance costs and disturbances caused by lamp changes will be reduced.

One popular type of light source is the so-called "downlighter", mounted within the ceiling space of a building to provide light from an aperture therein. Downlighters are known using compact fluorescent lamps. However compact fluorescent lamps tend to be axially long and to produce more light in a transverse direction than in the axial direction. To fit such lamps within the restricted height available and to provide good light output such lamps are frequently mounted horizontally in downlighters. To avoid large diameter downlighters, the connecting socket for the compact fluorescent lamp is thus often outside the usually circular cylindrical envelope of the downlighter structure. This means that installation through a circular aperture is difficult, requiring insertion of the upper part of the downlighter, and then rotation about a horizontal axis for completed installation. Height restrictions during installation dictate that any ballast circuitry must be outside the above-mentioned envelope of a lighting device installed in this way. This in turn creates further installation difficulties, described more fully later herein.

Furthermore access to the lamp in known downlighters using compact fluorescent lamps is difficult. This makes it a problem to change the lamp.

It is accordingly an object of the present invention to at least partially mitigate the above-mentioned difficulties.

According to the present invention there is provided a lighting device for cavity mounting, having a body portion and a lamp support portion for supporting at least one compact fluorescent light source, wherein the lamp support portion is moveable between a mounting position in which the lamp support portion lies within the periphery of the body portion, and a use position wherein at least part of the lamp support portion extends beyond said periphery.

Preferably the lamp support portion is pivotally secured to the body portion for movement between said mounting position and said use position.

Advantageously the lighting device has a longitudinal axis, and in said mounting position the lamp support portion extends such that a compact fluorescent light source supported thereby is disposed substantially parallel to the axis; and in the use position said lamp support portion extends such that said light source is disposed substantially transverse to the axis.

Conveniently the body portion comprises a lamp chamber defined by a peripheral wall portion and an end wall portion, the peripheral wall portion having a peripheral wall cut-out section, whereby the or each compact fluorescent light source extends from said lamp support portion into said lamp chamber through said section when the lamp support portion is in the use position.

Preferably the end wall portion has an end wall cut-out section, corresponding to the peripheral wall cut-out section, whereby the or each compact fluorescent light source extends

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through said section from the lamp support portion into the lamp chamber when the lamp support portion is in the mounting position.

Advantageously the lamp support portion in said use position is disposed at least partly outside the lamp chamber whereby at least a portion of a compact fluorescent light source supported thereby is outside said chamber.

Conveniently the lamp chamber wall portions reflect light from the or each compact fluorescent light source.

Preferably a reflector member is secured to said lamp support portion whereby in the use position of the lamp support portion, the reflector member extends across the end wall cut-out section.

Advantageously the lighting device has a portion housing ballast circuitry for the or each compact fluorescent light source, said portion being disposed with the periphery of said body portion.

Conveniently the periphery of the body portion is substantially circular.

Preferably the body portion has attachments for securing the lighting device within the cavity.

Advantageously the lamp support portion is adapted to support only one compact fluorescent light source.

Conveniently the lamp support portion is adapted to support only two compact fluorescent light sources.

Preferably the lighting device is adapted for disposition

within a ceiling void, whereby said lighting device is a downlighter.

An embodiment of the invention will now be described with reference to the accompanying drawings in which:-

Figure 1 is a cut-away view through a known lighting device using a compact fluorescent lamp;

Figure 2 is a cut-away view through a second lighting device using a compact fluorescent lamp;

Figure 3 shows a partial sectional view through a lighting device in accordance with an embodiment of the present invention shown in the mounting position;

Figure 4 shows a partial sectional view through a lighting device in accordance with an embodiment of the present invention shown in the use position;

Figure 5 is a view along the line V-V of Figure 3;

Figure 6 is a view along the line VI-VI of Figure 4;

Figure 7 is a view along the line VII-VII of Figure 4 showing the disposition of a supplementary reflector member;

Figure 8 is a perspective view of the embodiment corresponding to Figure 3, in the mounting position;

Figure 9 is a perspective view of the embodiment corresponding to Figure 4, in the use position;

Figure 10 is a perspective view of the embodiment corresponding to Figure 4, in the use position, but with the

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supplementary reflector member cut-away.

In the figures, like reference numerals show like parts.

Referring to Figure 1 a first known downlighter (1) is shown mounted in the void above a ceiling (2). The downlighter consists of a generally cylindrical lamp chamber (15) defined by a side wall (3) and an end wall (4). A compact fluorescent lamp (5) is disposed substantially horizontally within the chamber (15) so as to provide light downwardly from the downlighter. The downlighter has a ring portion (6) which extends transversally from the cylindrical wall (3) to hide any gap between the cylindrical wall and the aperture in ceiling (2). Fastening devices (not shown) are used to retain the downlighter in place. Typically these may be screws, or clips engaging with the ceiling (2).

The compact fluorescent lamp (5) has an end connection portion (7) which is connected to a downlighter-mounted socket (8) disposed in a housing (9) disposed outside of the lamp chamber (15) and off to one side. Also within housing (9) there is contained ballast circuitry (10) which is connected by wires (not shown) to the socket (8) and to an external power lead (11).

As will be seen in Figure 1, the axial length of the compact fluorescent lamp (5) is considerable, and this makes it difficult to insert or extract the lamp from the socket (8). In one known arrangement, the horizontal extent of the lamp chamber is increased to provide sufficient clearance for extraction or insertion of the lamp.

In most installations, the void above the ceiling (2) is limited by the next floor (13). The space between the floor (13) and ceiling (2) causes installation difficulties for the downlighter (1), as will now be described:-

As shown in Figure 1, the overall shape of the downlighter is of a letter "L". To install the downlighter from below ceiling (2), as is conventionally done, the housing (9) is first inserted through the ceiling aperture and the downlighter is then rotated about a horizontal axis until the orientation shown in Figure 1 is achieved. The weight of ballast circuitry (10) causes the downlighter (1) to be asymmetrically balanced and as a consequence of the complexity of the operations and the weight distribution of the downlighter, installation, typically from the top of a ladder, is difficult.

Where high output downlighters are required, two compact fluorescent lamps (5) may be used.

Referring now to Figure 2 a second known downlighter (21) is shown. Downlighter (21) is generally similar to downlighter (1) except that it uses two high output compact fluorescent lamps (25). The size and weight of ballast required for such lamps makes the configuration shown in Figure 1 unwieldy. Specifically the housing (9) of Figure 1 would need to be extended even further horizontally, which would make installation in the available void space even more difficult - due to space limitations on inserting the housing (9) and turning it to the correct orientation. Also the weight of the ballast would be far offset from the axis of the downlighter cavity, providing a high turning moment difficult to support by the installer and causing problems for mounting devices.

Accordingly the ballast circuitry is provided in a separate housing (20) connected to the downlighter itself by trailing wires (22). Installation of the downlighter (21) thus requires the ballast housing (20) to be inserted into the void before the downlighter itself is manipulated into position. As the ballast housing (20) is conventionally secured either to the ceiling or to the floor above, access must be provided, either

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through the floor above or through the ceiling below to allow for securing to take place.

In the downlighter of Figure 2, the socket (8) is pivotally mounted in the housing (9) by a pivot member (12). This allows the distal end of lamp (5) to be lowered by a few degrees for somewhat improved access.

Both of the known downlighters are thus difficult to install. Neither of the known downlighters provides sufficient access to the compact fluorescent lamp for easy insertion or extraction of the lamp.

Referring now to Figures 3 and 4, the concept of the present invention will now be described:-

Figure 3 shows an embodiment of the lighting device of the present invention. The compact fluorescent lamp (25) has plug (7) connected to socket member (8), as has been previously described with respect to Figures 1 and 2. However, socket member (8) is carried by a lamp support portion (31), which in the mounting position of the lamp shown in Figure 3 is within the periphery of the body portion of the lighting device. Ballast circuitry (30), mounted within an enclosure, is also disposed within the periphery of the lighting device. This disposition of the ballast circuitry is possible because insertion of the downlighter into the ceiling aperture is by a single upward movement, with no requirement for rotation. Referring to Figure 4, once the downlighter has been installed, the lamp support portion (31) is moved to a conventional orientation horizontally outside the periphery of the downlighter such that the compact lamps (25) are disposed substantially horizontally within the lamp chamber (15) defined by cylindrical wall (3) and end wall (4).

Referring now to Figures 5 and 6, there are shown two views corresponding respectively to the dispositions shown in

Figures 3 and 4. As seen in Figure 5, the end wall portion (4) has a cut-out section (50) which is removed to enable the lamps (25) to be disposed in the position shown in Figure 3, i.e. vertically. As will be seen most clearly in Figure 6, the lamp support portion (31) is a generally U-shaped member which is pivotally attached at the distal ends of its shank portions (61) via pivot pins (62) to support members (63) secured to the body of the downlighter. As will be seen in Figure 6, the absence of portion (50), described with respect to Figure 5, would reduce the effectiveness of the reflecting rear wall (4).

Referring now to Figure 7, a reflecting member (71) may be carried by the lamp support portion (31). The reflecting member (71) is disposed substantially parallel to the axis of lamps (25) supported by the lamp supporting portion (31) and the reflecting member is shaped so as to extend across the cut-out section (50), effectively completing the reflective rear wall (4).

Referring once again to Figure 6, it will be seen that in the use position the lamp support portion (31) is disposed such that part of the lamp (25) is disposed outside the lamp chamber (15). In the arrangement shown in Figure 6, part of the plug member (7) is outside the lamp chamber (15). Thus the maximum extent of the lamp chamber is illuminated by the lamps (25). Put another way, this arrangement allows for the maximum possible length of lamp to be disposed within the lamp chamber (15), or for the minimum possible diameter of lamp chamber to be used with a given length of lamp.

Referring now to Figure 8, a perspective view of a lighting device in accordance with the invention is shown with the lamp support member (31) in the mounting position. After the lighting device has been inserted into position, attachments (not shown) such as spring clips are used to secure it to the

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upper face of the ceiling. Then the lamp support portion (31) is left in the mounting position to facilitate insertion of the compact fluorescent lamps (25). In the mounting position, the socket members (8) are disposed substantially vertically downwardly open, which simplifies insertion of a lamp. This is because a user can see the orientation of the socket and can visually follow the insertion until complete. Once the two, in the embodiment shown, lamps have been inserted, the lamps themselves are used to turn the assembly consisting of the lamp support member, the shank portions (61), the lamps themselves, and the socket (8) to the use position shown in Figures 9 and 10. This is performed within the lamp chamber (15).

Referring now to Figure 10, the lighting device is shown with the reflector member (71) carried by the lamp support portion (31) being cut away. It will be seen from Figure 10 that the lamps (25), in the use position, extend transversally across the lamp chamber and are substantially horizontal. Figure 9 shows the same view as Figure 10, but with the reflector member (71) not cut-away. It will be seen that the reflector member (71) extends across the portion of the end wall (4) which is cut out to allow the lamps and the support portion to move between the use and mounting positions.

Referring once again to Figure 8, it will be seen that a portion of the cylindrical wall (3) is cut out. This cylindrical wall cut-out portion enables the lamps (25) to extend into the lamp cavity, as is best seen in Figure 10. The cut-out section of the cylindrical wall corresponds to the cut-out portion of the end wall (4).

Also referring to Figure 8, there are illustrated cables (80,81) which connect the ballast circuitry (30) to the respective lamps (25). These cables are long enough to allow

connection between the lamps and the ballast circuitry when the lamp support portion (31) is in the use position shown with respect to Figure 10 and sufficiently flexible to allow the lamp support portion (31) to be moved to the mounting position shown in Figure 8 substantially with no tendency to cause the lamp support portion to "spring" back.

Although an embodiment of the invention has been described, the invention itself is not intended to be limited to the features of the embodiment. Alternative arrangements to those shown in the embodiment are envisaged provided they fall within the scope of the appended claims. It will be clear to one skilled in the art that where compact fluorescent light sources are used which have integral ballast or control circuitry, there will be no need for a separate ballast or control arrangement. Although the embodiment shown has a pivotal connection between the lamp support portion (31) and the body of the lighting device, other arrangements are clearly possible. Specifically, the lamp support portion need not be secured to the body of the lighting device when in the mounting position, so long as it is capable of being configured to lie within the periphery of the body portion for mounting. The lamp support portion could then be secured, for example by fastenings, in the use position. Equally, although the present embodiment uses two compact lamps, applications frequently occur where only a single lamp is used. In this event the lamp support portion need only carry a single socket member (8). It is also possible for more than one lamp support portion to be provided, each carrying one or more lamps.

Finally although the invention has been described particularly as applied to a downlighter for disposition within a ceiling void, it would be apparent to one skilled in the art that other applications are possible, the special advantage of the invention lying in disposition within cavities having restricted access, and facilitating insertion, extraction and changing of lamps.

CLAIMS:

1. A lighting device for cavity mounting, having a body portion and a lamp support portion for supporting at least one compact fluorescent light source, wherein the lamp support portion is moveable between a mounting position in which the lamp support portion lies within the periphery of the body portion, and a use position wherein at least part of the lamp support portion extends beyond said periphery.
2. A lighting device for cavity mounting according to claim 1, wherein the lamp support portion is pivotally secured to the body portion for movement between said mounting position and said use position.
3. A lighting device for cavity mounting according to claim 2, wherein the lighting device has a longitudinal axis, and in said mounting position the lamp support portion extends such that a compact fluorescent light source supported thereby is disposed substantially parallel to the axis; and in the use position said lamp support portion extends such that said light source is disposed substantially transverse to the axis.
4. A lighting device for cavity mounting according to claim 3, wherein the body portion comprises a lamp chamber defined by a peripheral wall portion and an end wall portion, the peripheral wall portion having a peripheral wall cut-out section, whereby the or each compact fluorescent light source extends from said lamp support portion into said lamp chamber through said section when the lamp support portion is in the use position.
5. A lighting device for cavity mounting according to claim 4, wherein the end wall portion has an end wall cut-out



section, corresponding to the peripheral wall cut-out section, whereby the or each compact fluorescent light source extends through said end wall cut-out section from the lamp support portion into the lamp chamber when the lamp support portion is in the mounting position.

6. A lighting device for cavity mounting according to claim 5, wherein the lamp support portion in said use position is disposed at least partly outside the lamp chamber whereby at least a portion of a compact fluorescent light source supported thereby is outside said chamber.

7. A lighting device for cavity mounting as claimed in claim 5 or 6, wherein the lamp chamber wall portions reflect light from the or each compact fluorescent light source.

8. A lighting device for cavity mounting as claimed in claim 6, wherein a reflector member is secured to said lamp support portion whereby in the use position of the lamp support portion, the reflector member extends across the end wall cut-out section.

9. A lighting device for cavity mounting according to any preceding claim having a portion housing ballast circuitry for the or each compact fluorescent light source, said portion being disposed with the periphery of said body portion.

10. A lighting device for cavity mounting according to any preceding claim, wherein said periphery of the body portion is substantially circular.

11. A lighting device for cavity mounting according to any preceding claim, wherein the body portion has attachments for securing the lighting device within the cavity.



12. A lighting device for cavity mounting according to any preceding claim wherein the lamp support portion is adapted to support only one compact fluorescent light source.

13. A lighting device for cavity mounting according to any one of claims 1-11, wherein the lamp support portion is adapted to support only two compact fluorescent light sources.

14. A lighting device for cavity mounting according to any preceding claim adapted for disposition within a ceiling void, whereby said lighting device is a downlighter.

15. A lighting device for cavity mounting constructed and arranged substantially as herein described with reference to and as illustrated in Figures 3-10 of the accompanying drawings.

