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(54) **A LIGHTING DEVICE**

(57) A lighting device comprising a base element (2), a solid state lighting light source demountably mounted at the base element, and a light guiding optical unit (4) demountably mounted at the base element, for guiding light emitted by the light source. The base element com-

prises a support seat (5) arranged for receiving an external support protrusion, and electrical wiring connected with the light source and with a cable interface, and extending past the support seat.

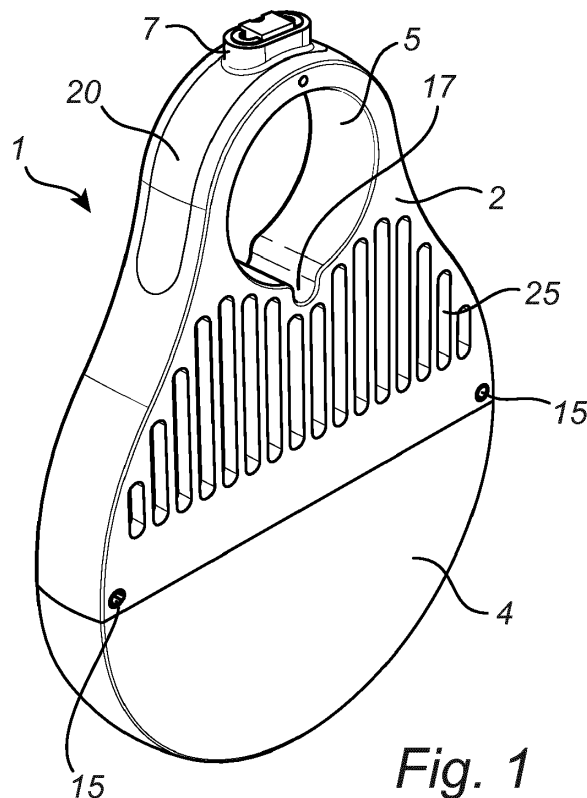


Fig. 1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to a lighting device with a solid state lighting light source.

BACKGROUND OF THE INVENTION

[0002] A conventional lighting device, such as a table lamp, a bed lamp, a or a ceiling lamp, has some kind of a supporting structure, such as a lamp foot, or a support plate to be fastened at a wall or in the ceiling, and further a lampshade or a reflector for screening or directing the light, and a socket for receiving an exchangeable bulb, such as an old style bulb, a spotlight, or a LED bulb. The lighting device also has electrical wiring and contacts integrated with the supporting structure and ending with a cable with a plug, for LED applications including a transformer, at the end to be inserted into a mains socket, or just loose wires to be connected to a wire holder, typically for mounting at the ceiling. Since the LED light sources have been developed to last for a long time, such as 10 000 hours or more, also lamps with fixed, i.e. non-exchangeable, LED light sources have been put on the market. They are supposed to last for many years and when the LED light source fails the lamp is supposed to have become outdated, so that the user will buy a new one.

[0003] From a sustainability point of view the lamps with a fixed light source are undesirable. As regards the lamps with replaceable LED bulbs there is still a risk that the user has become tired of the lamp when it is time to exchange the LED bulb and will throw away the whole lamp although that is not necessary from a perspective of functionality.

[0004] Because the lamps are complex products involving many different materials combined and mounted in a way that makes them difficult to recycle, they have or will become an environmental problem.

SUMMARY OF THE INVENTION

[0005] It would be advantageous to provide a LED lighting solution which avoids or at least reduces the sustainability problem of the current lighting devices.

[0006] To better address this concern, in a first aspect of the invention there is presented a lighting device comprising a base element, a solid state lighting light source demountably mounted at the base element, and a light guiding optical unit demountably mounted at the base element, for guiding light emitted by the light source. The base element comprises a support seat arranged for receiving an external support protrusion, electrical wiring connected with the light source and with a cable interface, and extending past the support seat. Thereby, the lighting device includes demountable parts and, in turn, is mountable at any kind of support protrusion. The support protrusion can be part of a very simple single material sup-

port structure, or easily separable and recyclable support structure, which can also be replaced at any time with another one. Further, the support structure can be a lamp foot, a flexible arm, or any kind of supporting structure, which is fully separated from the electrical parts, which are included in the very lighting device. Consequently, the sustainability problem has been solved or at least reduced.

[0007] It should be noted that the expression "solid state lighting" is well defined within the field of lighting devices, and is understood by the person skilled in the art as particular types of light sources such as LEDs (Light Emitting Diodes), and OLEDs (Organic Light Emitting Diodes), etc., and any similar light sources that may come in the future.

[0008] In accordance with an embodiment of the lighting device the support seat is constituted by a hole through the base element. This is a simple solution useful with a vast number of supporting structures.

[0009] In accordance with an embodiment of the lighting device the hole is generally circular and is provided with a rotation preventing portion at its periphery.

[0010] In accordance with an embodiment of the lighting device the cable interface comprises a connector, which is connectable with a mating connector of a cable. Thereby cable can be arranged individually at the supporting structure before connecting it to the connector of the cable interface.

[0011] In accordance with an embodiment of the lighting device the connector is a magnet connector for holding the connector of the cable.

[0012] In accordance with an embodiment of the lighting device the base element comprises a lid element covering a groove through which the electrical wiring passes adjacent to at least a portion of the support seat. This embodiment further facilitates assembling and disassembling the lighting interface.

[0013] In accordance with an embodiment of the lighting device the lid element includes the connector.

[0014] In accordance with an embodiment of the lighting device the base element is made of a metal and comprises cooling portions.

[0015] In accordance with an embodiment of the lighting device the base element comprises an elongated recess at one end thereof, wherein the light source is elongated and is demountably received in the recess.

[0016] In accordance with another aspect of the invention, there is provided a lighting system comprising a cable with a connector at each end thereof, and a light source driver device, wherein the light source driver device comprises a plug portion for mating with a mains socket, and several terminals, each arranged for mating with the connector of the cable. According to this aspect a further advantage is that several lighting devices can be connected to a single light source device.

[0017] In accordance with an embodiment of the lighting system the light source driver device comprises a mains socket, which is electrically connected with the

plug portion.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] The invention will now be described in more detail and with reference to the appended drawings in which:

Fig. 1 is a perspective view of an embodiment of a lighting device according to the present invention;
Fig. 2 is an exploded view of an embodiment of a lighting system according to the present invention; and
Fig. 3 is a perspective view of a part of the lighting device shown in Fig. 1.

DESCRIPTION OF EMBODIMENTS

[0019] According to an embodiment of the lighting device 1 it comprises base element 2, a solid state lighting light source 3, which is a LED light source, and a light guiding optical unit 4 for guiding light emitted by the light source. The base element 2 comprises a support seat 5 arranged for receiving an external support protrusion 8 of a support structure 16, and electrical wiring 6 connected with the light source 3 and with a cable interface 7 arranged at a first end 9 of the base element 2.

[0020] The light source 3 is demountably mounted at the base element 2. More particularly, the light source 3 is an elongated LED plate, which has been demountably received in a likewise elongated recess 10 at a second end 11 of the base element 2, opposite to the first end 9. The light source 3 is held in place by the optical unit 4, which is mechanically attached to the base element 2, and which covers the recess 10. More particularly, the optical unit 4 has an elongated protrusion 12, which extends into the recess 10 and which is provided with a retaining groove 13 at each end. The base element 2 further comprises a retaining pin seat 14 and a retaining pin, for instance a spring pin, 15 extending in the retaining pin seat 14 transversally of the base element 2, at each end of the recess 10. Each retaining groove 13 is aligned with the respective retaining pin seat 14 and extends in parallel with the retaining pin 15 and is engaged with the retaining pin 15. Thereby, the retaining pins 15 retain the optical unit 4 at the base element 2 while making the optical unit 4 easily demountable from the base element by just removing the retaining pins 15. It is obvious to the person skilled in the art that although this attachment of the optical unit 4 to the base element 2 is advantageous several other mechanical attachment solutions are possible, like different kinds of snap locks, spring biased locking elements, etc. The optical unit 4 can be any light guiding part, such as a prism, an opaque part, or any other suitable optical element affecting the emitted light by for example scattering, diffusing, or refracting the light.

[0021] In this embodiment, the support seat 5 is a through hole, which is generally circular, and which has

a rotation preventing portion 17 at its periphery. The rotation preventing portion 17 is a notch. The support protrusion 8 is provided with a corresponding ridge 18, which is received in the rotation preventing portion 17. Many other shapes of the support seat and the rotation preventing portion are feasible, as understood by the person skilled in the art, such as a triangular or polygonal hole, which are rotation preventing per se, and provides several distinct mounting positions for the lighting device 1, while the generally circular hole provides for a simple manufacturing of the support protrusion 8.

[0022] It should also be noted that the support structure exemplified in the drawings is of course just one of countless alternatives. All the support structure will need is a suitable support protrusion 8.

[0023] The base element 2 further comprises a passage 19, or duct, partly extending through the inner of the base element and partly as a groove of an edge surface of the base element covered by a demountable lid element 20. The groove part of the passage 19 is curved and extends past the support seat 5, adjacent to the support seat 5. The lid element 20 is correspondingly arc shaped and includes the cable interface 7. The electrical wiring 6 runs through the passage 19 between the cable interface 7 and the LED plate 3. The cable interface 7 comprises, and in this embodiment is constituted by, a connector, which is connectable with a mating connector 22 of a cable 23. The electrical wiring 6 is thus connected to the connector 7. The connectors 7, 22 preferably are arranged for a quick connection and disconnection. For instance, the connectors 7, 22 are magnet connectors for magnetically holding the connectors together, or they are female and male connectors being retained in a connected state by means of friction and/or a snap lock.

[0024] The cable interface 7 can alternatively comprise a fastener for directly attaching the wires of the cable 23.

[0025] The base element 2 is made of a metal, such as aluminum, and it is provided with cooling elements 25, such as the grooves indicated in the figures or flanges.

[0026] In accordance with an embodiment of a lighting system including the lighting device 1, the lighting system 30 furthermore comprises the cable 23 with a connector 22, 24 at each end thereof, and a light source driver device 27. The light source driver device 27 comprises a plug portion 28 for mating with a mains socket, and several terminals 29, each arranged for mating with the connector 24 of the cable 23 adapted for the terminals 29. The other connector 22 of the cable 23 is arranged for mating with the cable interface/connector 7 of the base element 2. The light source driver device 27 comprises a mains socket 31, which is electrically connected with the plug portion. Additionally, but not shown, the light source driver device 27 comprises an interiorly mounted transformer and rectifier arrangement for converting the mains power to DC power suitable for driving the LED plate 3. A dimmer 32 is optionally mounted at the cable 23.

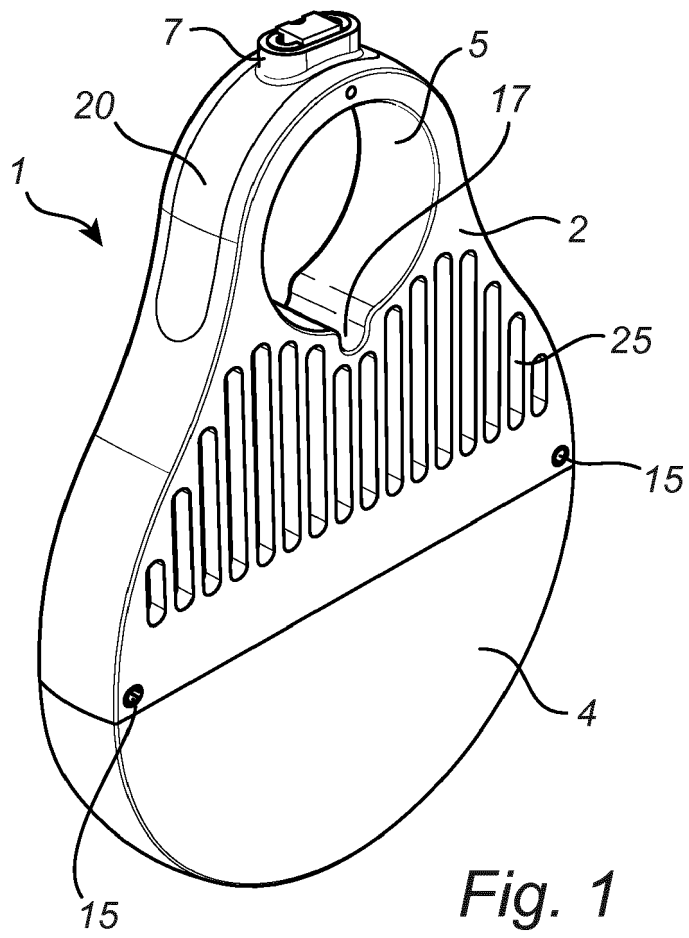
[0027] As is evident from the description above, the lighting device 1 is arranged to be easily demounted into different materials in order to facilitate recycling thereof.

[0028] While the invention has been illustrated and described in detail in the drawings and foregoing description, such illustration and description are to be considered illustrative or exemplary and not restrictive; the invention is not limited to the disclosed embodiments.

[0029] Other variations to the disclosed embodiments can be understood and effected by those skilled in the art in practicing the claimed invention, from a study of the drawings, the disclosure, and the appended claims. In the claims, the word "comprising" does not exclude other elements or steps, and the indefinite article "a" or "an" does not exclude a plurality. The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage. Any reference signs in the claims should not be construed as limiting the scope.

Claims

1. A lighting device (1) comprising a base element (2),
a solid state lighting light source (3) demountably
mounted at the base element, and a light guiding
optical unit (4) demountably mounted at the base
element, for guiding light emitted by the light source,
wherein the base element comprises a support seat
(5) arranged for receiving an external support pro-
trusion, and electrical wiring (6) connected with the
light source and with a cable interface (7), and ex-
tending past the support seat.
2. The lighting device according to claim 1, wherein the
support seat (5) is constituted by a hole through the
base element (2).
3. The lighting device according to claim 1 or 2, wherein
the hole (5) is generally circular and is provided with
a rotation preventing portion (17) at its periphery.
4. The lighting device according to any one of the pre-
ceding claims,
wherein the cable interface comprises a connector
(7), which is connectable with a mating connector
(22) of a cable (23).
5. The lighting device according to claim 4, wherein the
connector (7) is a magnet connector for magnetically
holding the connector (22) of the cable (23).
6. The lighting device according to any one of the pre-
ceding claims,
wherein the base element (2) comprises a lid ele-
ment (20) covering a groove (19) through which the
electrical wiring (6) passes adjacent to at least a por-
tion of the support seat (5).
7. The lighting device according to claim 6 when de-
pendent on claim 4 or 5, wherein the lid element (20)
includes the connector (7).
8. The lighting device according to any one of the pre-
ceding claims,
wherein the base element (2) made of a metal and
comprises cooling portions (25).
9. The lighting device according to any one of the pre-
ceding claims,
wherein the base element (2) comprises an elongat-
ed recess (10) at one end (11) thereof, wherein the
light source (3) is elongated and is demountably re-
ceived in the recess.
10. A lighting system (30) comprising a lighting device
(1) according to any one of the preceding claims, a
cable (23) with a connector (22, 24) at each end
thereof, and a light source driver device (27), wherein
the light source driver device comprises a plug por-
tion (28) for mating with a mains socket, and several
terminals (29), each arranged for mating with the
connector (24) of the cable.



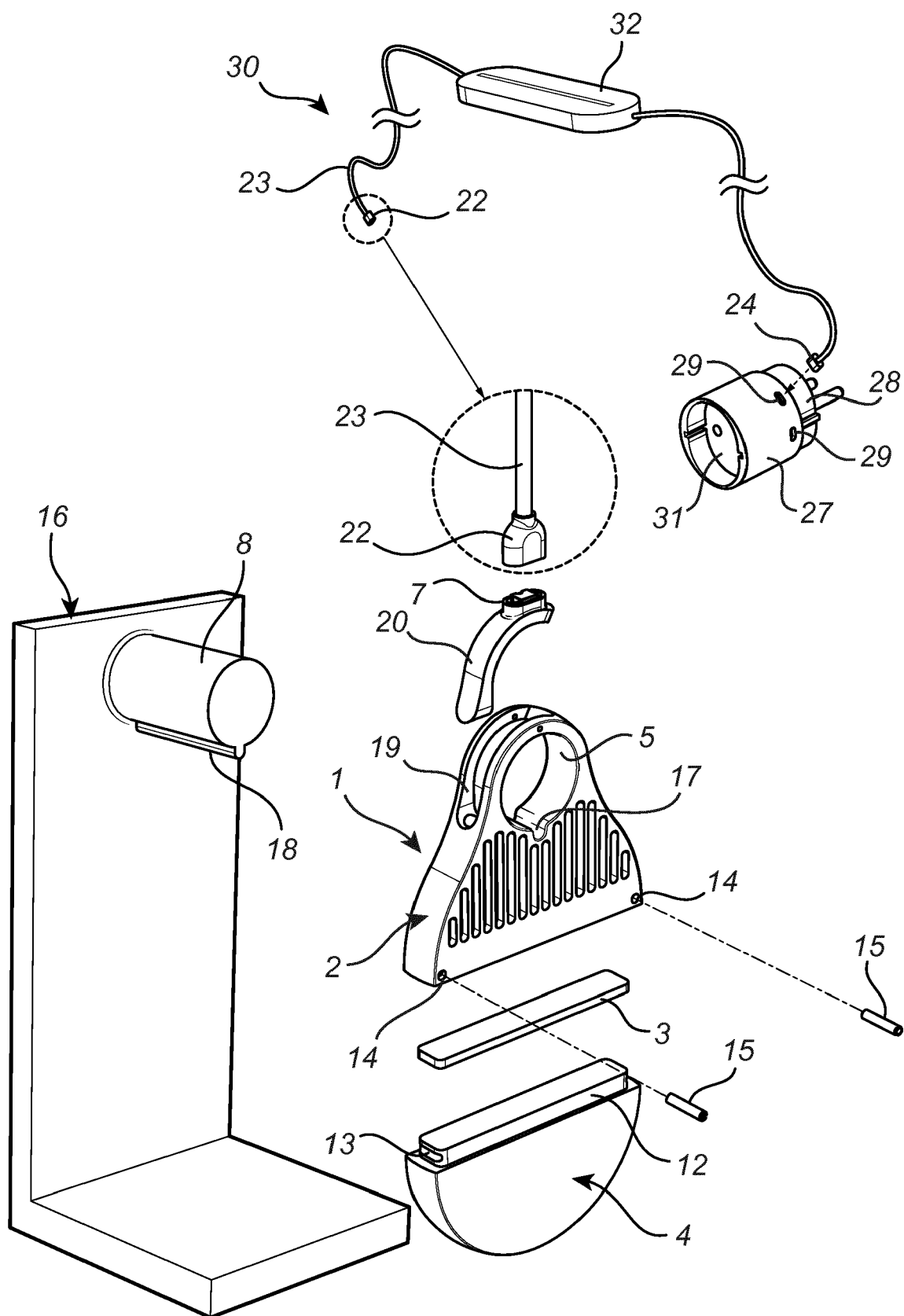


Fig. 2

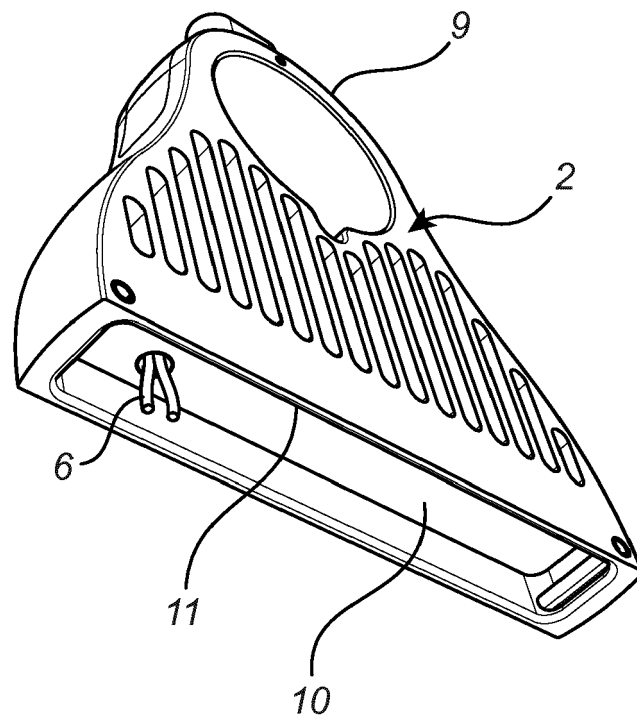


Fig. 3



EUROPEAN SEARCH REPORT

Application Number
EP 17 15 1638

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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		5 April 2017	Allen, Katie
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 17 15 1638

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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