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(54) **LED light**

LED-Licht

Éclairage à DEL

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US-A1- 2011 058 358

EP 2 584 253 B1

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Description

Field of the invention

[0001] The invention relates to a LED light with a housing. The housing has a body formed by an essentially U-formed profile with a rear panel and two side walls, wherein the U-formed profile defines a preferential direction of the housing. The LED light further comprises an encapsulated LED module, the LED module being inserted into the housing. The invention relates as well to the LED module.

Description of the related art

[0002] LED (light emitting diode) lighting systems offer significant advantages over traditional incandescent, HID and fluorescent lamps. LEDs are of smaller size, offer higher reliability, longer operational life and lower energy consumption. This is specifically important for lighting systems where high reliability and robustness is required. However, there are specific requirements when using LEDs. As increased operating temperature significantly reduces lifetime, cooling is of high importance.

[0003] US 2007/0274084 addresses the thermal management of LED lights and suggests for an improved of the thermal management to provide a housing with two separate and thermally isolated compartments. One of the compartments contains electronic driver means for the LEDs and the other compartment contains a base supporting the LEDs. The LEDs and the electronic driver components are thermally connected via separate heat sinks to the housing, for dissipating the heat they generate.

[0004] US 2011/0058358 A1 discloses a lighting device with two lighting modules. The lighting modules are coupled by brackets. Each lighting module has a separate case, a light emitter seated on a bottom plate of the case, a reflector and a diffuser plate covering the light emitter and closing the case.

[0005] DE 20 2006 013 054 U1 discloses as well a LED-light. The LED light has a U-shaped profile as lower housing part. The housing is closed by a transparent cover with a dome like cross section spanning from one free leg of the profile to the other free leg of the profile. The two parallel free legs of the U-shaped profile each have notches being opposed to each other as sliding guides and accommodate rims of a carrier. The carrier supports a printed circuit board for bonding LEDs in recesses of the printed circuit board via gold wires. The LEDs may be glued to the carrier

[0006] DE 20 2010 017 009 U1 discloses a rod like lighting device. The lighting device has a transparent hollow cylindrical housing with end caps. The housing accommodates a two third cylindrical profile with a transparent front cover. The profile has means for accommodating LED-modules 16 to 18. The space being enclosed by the profile and the front cover has open ends which

are closed only if the profile and the front cover are mounted to the housing.

Summary of the invention

[0007] The invention is based on the observation that an efficient thermal management of LED-lights according to the prior art is complicated and thus expensive. Simple solutions, however, are less efficient. Further, mounting of LED lights is complicated, because the housing of the LED-lights according to the prior art is part of the thermal management. Thus it is an object of the invention to provide a simple LED light with an enhanced thermal management that enables to mount it easily to wall or a ceiling. Further, it is an object of the invention to enable an easy replacement of the LEDs in case of failure.

[0008] Solutions of the problem are described in the independent claims. The dependent claims relate to further improvements of the invention.

[0009] A LED light of the invention comprises at least a housing with a body. The body is formed by a profile with a rear plane and two side walls. The body may for example have the form of an essentially U-formed profile with a central leg in between of two free legs. The free legs function as side walls of the housing and the central leg as rear panel. The profile defines a preferential direction. An encapsulated LED module is inserted into the housing.

[0010] The side walls of the body comprise opposing ribs forming at least two sliding guides into which the LED-module is inserted parallel to the preferential direction. This enables to insert the LED-module from the respective narrow side. Thus, the housing can be mounted and subsequently the LED-module can be inserted into the housing by simply sliding it in.

[0011] The LED-light housing preferably has at least one removable end cap limiting the movement of the LED module. This enables to close the housing by simply attaching the end cap to a narrow side of the housing and to prevent at the same time the LED module from uncontrolled sliding in the housing.

[0012] A LED module of the invention may have a casing comprising a base and cover. The base supports a power-supply unit and a LED-carrier unit. Thus, in case of failure it is sufficient to replace the LED-module by a new one.

[0013] The base has preferably two separation bars, in between of which the power-supply unit is positioned. The power-supply may be press fitted between the separation bars.

[0014] Preferably, the power-supply is thermally connected to the LED-light base by a preferably thermally conducting potting or sealant. This enables to obtain a perfect thermal coupling, because the surface, to which the potting or sealant thermally connects with the power-supply unit is integrated surface of all devices of the power supply unit. In addition, the cross section of the potting may be large, compared with the cross section of typical

heat sinks and the potting may thermally connect to a large surface of the base, yielding in very good dissipation of heat from the power the power supply unit to the casing. Heat may be transferred from the casing to the housing by convection of air in a space between the casing and the housing. Thus, the design of the housing is less governed by the thermal management.

[0015] The potting may comprise a thermally conducting filler for an enhanced dissipation of heat.

[0016] The LED-module is sealed. It may be connected via a cable directly with the power line or with connection means of the housing. The connection means, e.g. a connection block, are preferably arranged in a separate and preferably enclosed compartment of the housing. In the latter case the housing thus has at least two separate compartments, a connection compartment for connecting the cable with the power line and a LED-module compartment for inserting the LED module. This enables to vent the LED-module and at the same time ensure that the components for attaching the cable to the power line are well protected, e.g. against being contacted by persons and or dust and/or water. In a preferred embodiment is the connection compartment sealed and may be included in an end cap of the housing. This facilitates mounting of the LED-light.

[0017] The housing may have vents for enabling a convection of air and thereby transport heat out of the housing. Preferably are vents in a LED-module compartment of the housing. In particular is sealing of the housing and more particular of the LED-module compartment not necessary.

Description of Drawings

[0018] In the following the invention will be described by way of example, without limitation of the general inventive concept, on examples of embodiment with reference to the drawings.

Figure 1 shows a partially mounted LED-light.

Figure 2 shows a top view of LED module.

Figure 3 shows the cross section along plane B-B of the LED module in Fig. 2

Figure 4 shows the cross section along plane A-A of the LED module in Fig. 2

Figure 5 shows a detail of a cross section of an alternative embodiment.

Figure 6 shows a detail of a cross section of an alternative embodiment.

[0019] Figure 1 shows a LED light 1 with a housing 10 and a partially inserted LED module 100. The housing 10 comprises a profile 11 or body 11, with a rear plane

15 and two side walls 17, 18. The profile 11 has a preferential direction, as indicated by a double arrow 5. The preferential direction 5 is parallel to the symmetry axis of the rear plane 15. End caps 12,14 may be attached to the open narrow sides of the profile 11. The end cap 12 provides a sealed connection compartment enclosing connection means, e.g. a connector block for connecting a cable 8 with the power line, in Europe typically (230VAC, 50Hz). The space between the end caps 12, 14 and the side walls 17, 18 of the profile form a non sealed LED compartment for inserting the LED module, 100. The side walls 17, 18 of the profile 11 may have opposing lips forming a groove like sliding guide 16 at each of the distal ends of the side walls 17, 18. Parallel to the preferential direction 5 is a LED module 100 partially inserted into the housing. The LED-module 100 fits with protrusions 118 into the sliding guides 16 as explained below.

[0020] For mounting the LED-light 1 it is sufficient to mount the housing 10 to a wall, a ceiling or the like, connect the cable 8 with a connector block in the end cap 12 attach a connector 9 at the end of the cable 8 to the LED module 100 and insert the LED module 100 into the housing 10. Subsequently end cap 14 is attached to the open side of the housing and may be secured by screws or the like. The LED module 100 is now fixed in the sliding guides 16 and between the end caps 12, 14.

[0021] A LED module 100 for being inserted into the housing 10 is depicted in the figures 2 to 4. The LED module 100 has a tub like base 110, which is closed by a transparent cover 120 and thus encapsulates the electronic components of the LED-light, like a LED carrier 111 with LEDs 150 and a power supply 115 (cf. Fig. 4).

[0022] The cover 120 may have a rim 122, which may be inserted in a complementary groove 114 of the base 110 (cf. Fig. 3). The rim 122 may be glued to the cover 120; preferably there is a seal between the rim 122 and the cover 120. The groove 124 may be formed between two ribs 125 of the base 110. The ribs 125 form a thickening which may be the ceiling or wall facing side of the protrusion 118. The cover may have a recess 126, which forms the opposite side of the protrusion 118. Thus, the sliding guides 16 of the cover 120 spans over the protrusion 118 end thus embrace the cover 120 and the base 110.

[0023] The base 110 may have dome like support structures 117 for a LED-carrier plate 111, e.g. a printed circuit board (cf. Fig. 3). Between the bottom of the base 110 and the LED carrier 111 may be a power supply 115, comprising driving circuitry for the LEDs 150. The power supply 115 connects the LEDs 150 to the power line and controls the LED current (cf. Fig. 4).

[0024] The power supply 115 typically consists of a base plate 114 to which electronic components, like diodes, transistors, capacitors and the like, are mounted. The power supply 115 is preferably mounted in a compartment of the base, which may be bounded by the side walls 112 of the base and two separation bars 113. The

separation walls 113 may be integrated in the base plate 114 or in the base 110. The space between the base plate 114 of the power supply 115, the side walls 112 and the separation walls 113 may be filled with a thermally conductive potting. Thus, the power supply may be thermally connected to the side walls 110 of the housing 110. In the preferential direction is the depicted compartment bounded by the two separations bars 113. These separation bars 113 may be at least partly omitted. In this case is the compartment is bounded by the side walls 112 and the narrow sides of the base 110.

[0025] The power supply 115 is connected via a cable 116 to a connector assembly 130. The connector assembly 130 has a mechanical part 131, being part of the base 110 and a connection pin holder 133 with connection pins 134. The connection pin holder 134 is removable attached to the bottom of the base 110, such that the connections pins protrude in a whole of the base 110, being surrounded by a thread 135. This enables an easy assembly of the LED module 100

[0026] In Figure 5 a further example of potting a power supply 115 to the base 110 is depicted. In this example not only the LED-carrier plate facing side of the power supply 115 is potted, but as well the base 110 facing side. This enables even better heat dissipation. Like in the example of Figures 2 to 4 is the compartment not closed but open like a tub. The LED carrier 111 is thus not thermally shielded from the power supply 115.

[0027] Figure 6 depicts the LED module of figure 6, however, like in figures 2 to 4 only the "top", i.e. LED carrier plate facing side of the power supply potted. None of the shown embodiments requires a separate power supply housing, as the potting isolates the circuitry.

List of reference numerals

[0028]

1	LED light
5	preferential direction
8	cable
9	connector
10	housing
11	body
12	end cap
14	end cap
15	rear panel
16	sliding guides
17	side wall
18	side wall
19	rib
100	LED module
110	base
111	LED carrier
112	side wall of the base
113	separation bar
114	base plate
115	power-supply unit

116	cable
117	support structure
118	protrusion
120	cover
5 122	rim
124	groove of base
125	ribs of base forming groove 124
126	recess
130	connector assembly
10 131	mechanical part of connector assembly
133	pin holder
134	connection pin
135	thread
150	LEDs
15 151	lens and/or reflector

Claims

- 20 1. A LED light (1) comprising at least:
- a housing (10) with a body (11) formed by a profile with a rear panel (15) and two side walls (17, 18), wherein the profile defines a preferential direction (5) of the housing (10) and wherein the side walls (17, 18) comprise opposing ribs (19) forming at least two sliding guides (16)
 - a LED module (100), the LED module (100) being inserted into the housing (10).

characterized in that

- the LEDmodule (100) is an encapsulated sealed module (100) comprising a base and a cover, wherein the base supports a power supply unit and a LED-carrier unit, and
- the encapsulated module (100) is inserted parallel to the preferential direction (5) into said sliding guides (16).

- 40 2. The LED light (1) of claim 1, **characterized in that** the LED-light housing (10) has at least one removable end cap (12, 14), limiting a movement of the LED module (100) in the preferential direction (5).

- 45 3. The LED-light (1) of claim 1 or 2 **characterized in that** the base (110) has two separation bars (113), in between of which the power-supply unit (115) is positioned.

- 50 4. The LED-light of claim 3 **characterized in that** the power-supply unit (115) is thermally connected to the base (11) by potting.

- 55 5. The LED-light of claim 4

characterized in that
the potting comprises thermally conducting filler.

6. The LED light (1) of one of the preceding claims **characterized in that** the housing comprises a connection compartment for connecting the cable with the power line and a LED-module compartment for inserting the LED module.
7. The LED light (1) of one of the preceding claims **characterized in that** the connection compartment is sealed.
8. The LED light (1) of one of the preceding claims **characterized in that** the housing has vents for permitting convection of air.

Patentansprüche

1. Eine LED-Leuchte (1) umfassend zumindest:
- ein Gehäuse (10) mit einem Körper (11), ausgebildet durch ein Profil mit einer Rückwand (15) und zwei Seitenwänden (17, 18), wobei das Profil eine bevorzugte Richtung (5) des Gehäuses (10) definiert, und wobei die Seitenwände (17, 18) gegenüberliegende Rippen (19) umfassen, welche zumindest zwei Gleitführungen (16) bilden
 - ein LED-Modul (100), welches in das Gehäuse (10) eingesetzt wird,

dadurch gekennzeichnet, dass

- das LED-Modul (100) ein gekapseltes, abgedichtetes Modul (100) umfassend einen Sockel und eine Abdeckung ist, wobei der Sockel eine Stromversorgungseinheit und eine LED-Trägerleinheit trägt, und
- das eingekapselte Modul (100) parallel zu der Vorzugsrichtung (5) in die Gleitführungen (16) eingesetzt ist.

2. LED-Leuchte (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** das LED-Leuchtengehäuse (10) zumindest eine entfernbare Endkappe (12, 14) hat, welche die Bewegung des LED-Moduls (100) in der Vorzugsrichtung (5) begrenzt.
3. LED-Leuchte (1) nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** der Sockel (110) zwei Trennstege (113) hat, zwischen welchen die Stromversorgungseinheit (115) positioniert ist.

4. LED-Leuchte nach Anspruch 3, **dadurch gekennzeichnet, dass** die Stromversorgungseinheit (115) thermisch mit dem Sockel (11) durch Vergussmasse verbunden ist.

5. LED-Leuchte nach Anspruch 4 **dadurch gekennzeichnet, dass** die Vergussmasse einen thermisch leitenden Füllstoff umfasst.

6. LED-Leuchte (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Gehäuse eine Anschlusskammer zum Anschließen des Kabels an die Stromleitung, und eine LED-Modulkammer zum Einsetzen des LED-Moduls umfasst.

7. LED-Leuchte (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Verbindungskammer abgedichtet ist.

8. LED-Leuchte (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Gehäuse Lüftungsöffnungen hat, die Luftkonvektion ermöglichen.

Revendications

1. Une lumière DEL (1) comprenant au moins :

- un boîtier (10) avec un corps (11) formé par un profil avec un panneau arrière (15) et deux parois latérales (17, 18), où le profil définit une direction préférentielle (5) du boîtier (10) et où les parois latérales (17, 18) comprennent des bords opposés (19) formant au moins deux guides coulissants (16)
- un module DEL (100), le module DEL (100) étant inséré dans le boîtier (10).

Caractérisée en ce que

- Le module DEL (100) est un module scellé encapsulé (100) comprenant une base et un couvercle, où la base soutient une unité d'alimentation électrique et une unité porteuse de DEL, et
- le module encapsulé (100) est inséré de façon parallèle à la direction préférentielle (5) dans les dites guides coulissants (16).

2. La lumière DEL (1) de la revendication 1, **Caractérisée en ce que** Le boîtier de la lumière DEL (10) possède au moins

une extrémité amovible (12, 14), limitant un mouvement du module DEL (100) dans la direction préférentielle (5).

3. La lumière DEL (1) des revendications 1 ou 2 5
Caractérisée par
 Les deux barres de séparation (113) de la base (110), entre lesquelles l'unité d'alimentation électrique (115) est positionnée. 10
4. La lumière DEL de la revendications 3,
Caractérisée en ce que
 L'unité d'alimentation électrique (115) est thermiquement connectée à la base (11) par un remplissage. 15
5. La lumière DEL de la revendication 4,
Caractérisée en ce que
 Le remplissage comprend un fond de remplissage thermiquement conducteur. 20
6. La lumière DEL (1) de l'une des revendications précédentes,
Caractérisée en ce que
 Le boîtier comprend un compartiment de connexion pour connecter le câble avec la ligne électrique et un compartiment de module DEL pour insérer le module DEL. 25
7. La lumière DEL (1) de l'une des revendications précédentes 30
Caractérisée en ce que
 Le compartiment de connexion est scellé.
8. La lumière DEL (1) de l'une des revendications précédentes 35
Caractérisée en ce que
 Le boîtier possède des événements pour permettre une convection de l'air. 40

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50

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Fig. 1

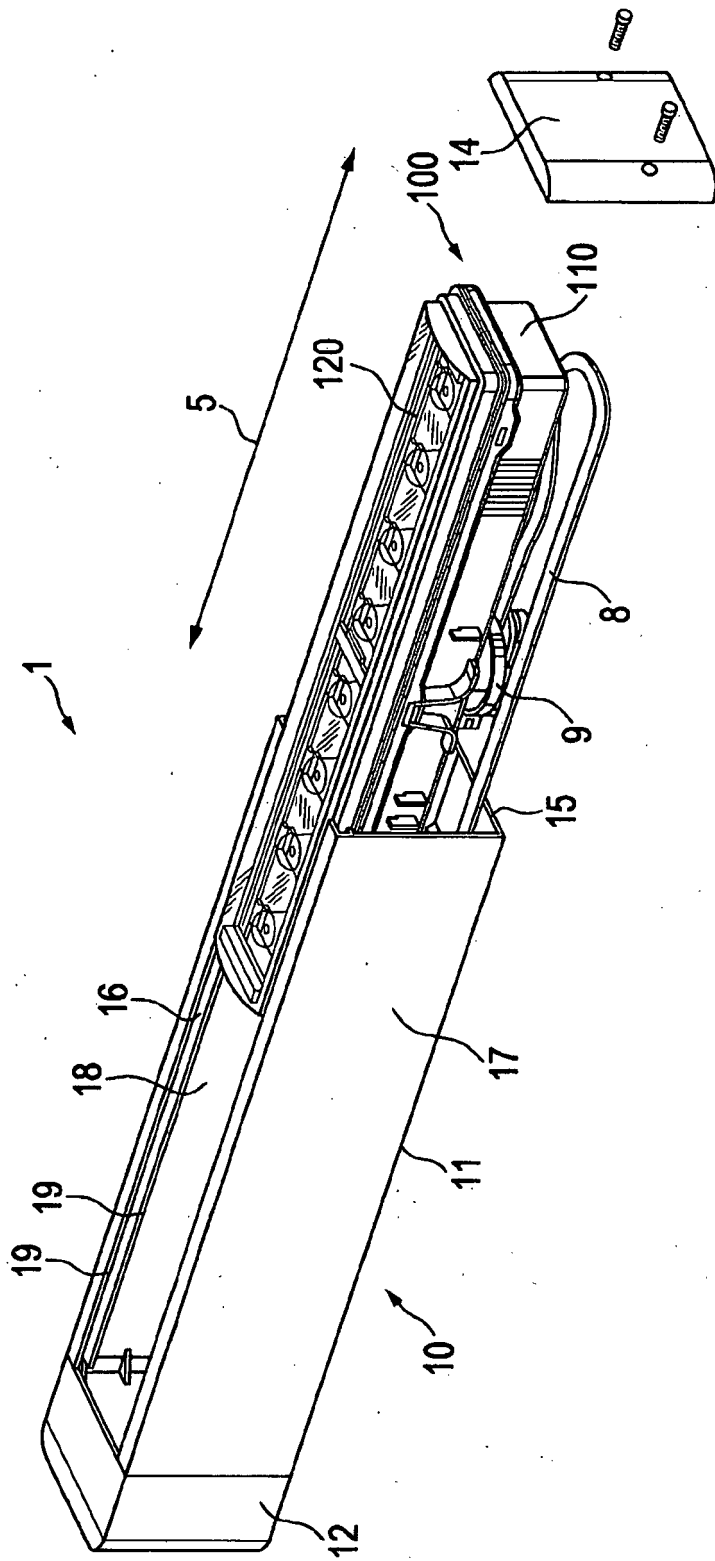


Fig. 2

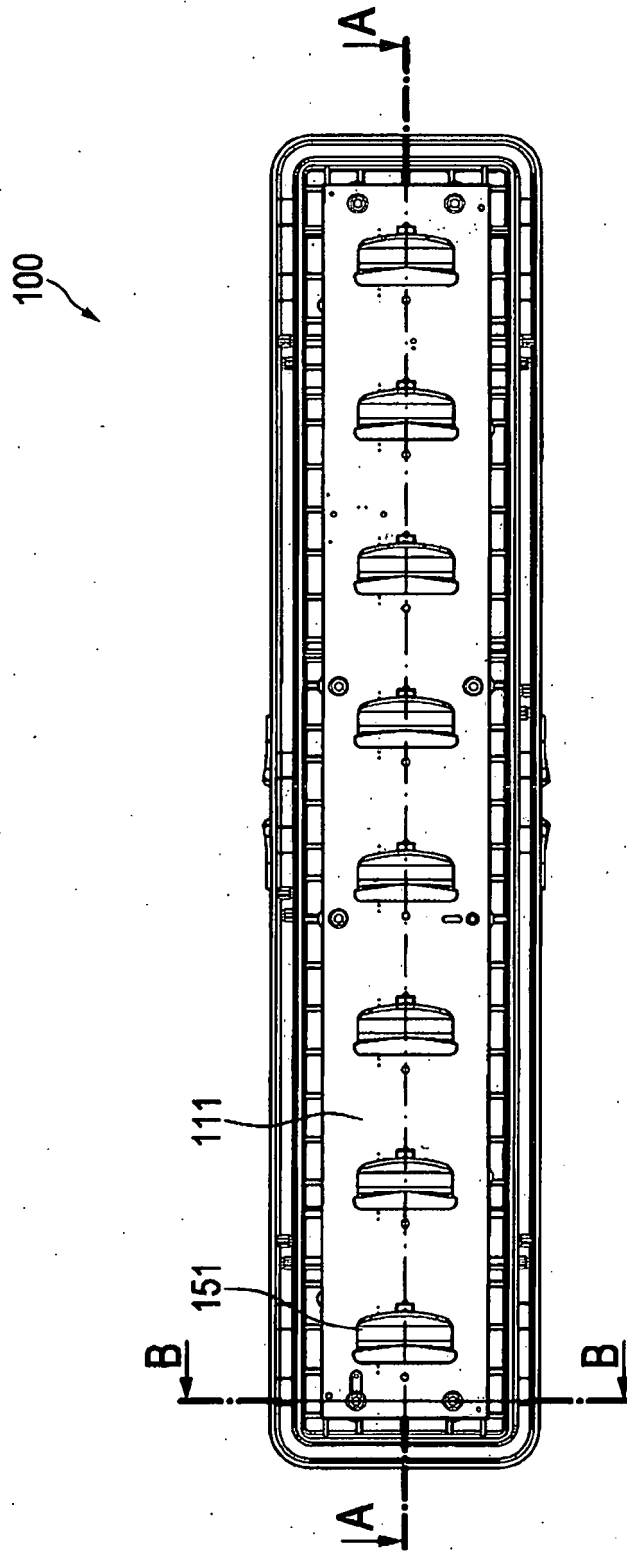


Fig. 3

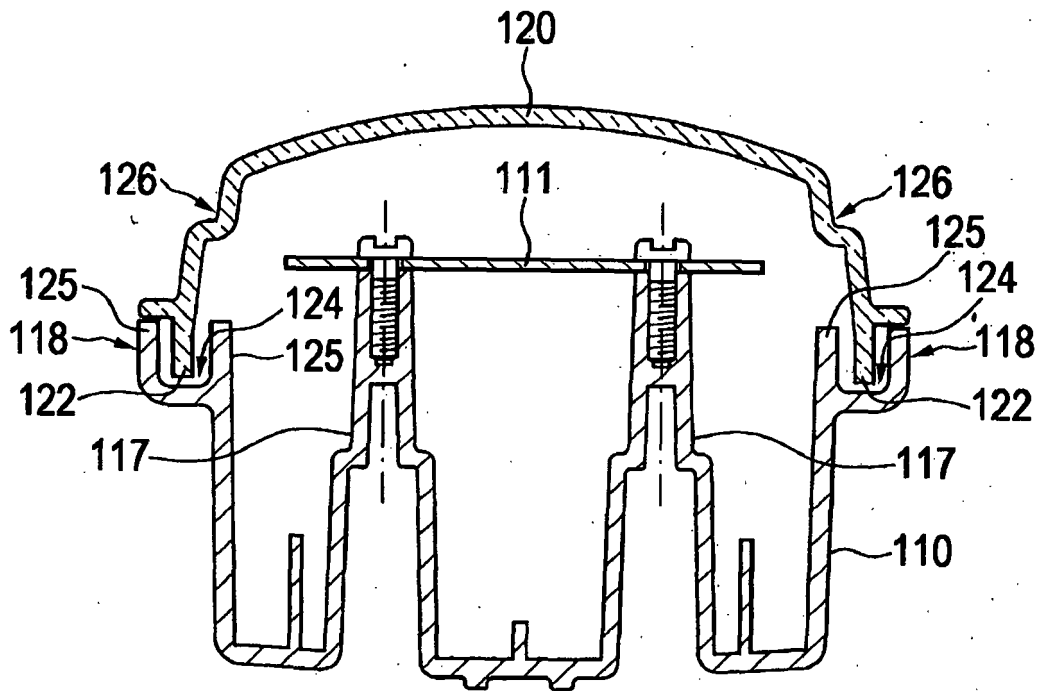


Fig. 4

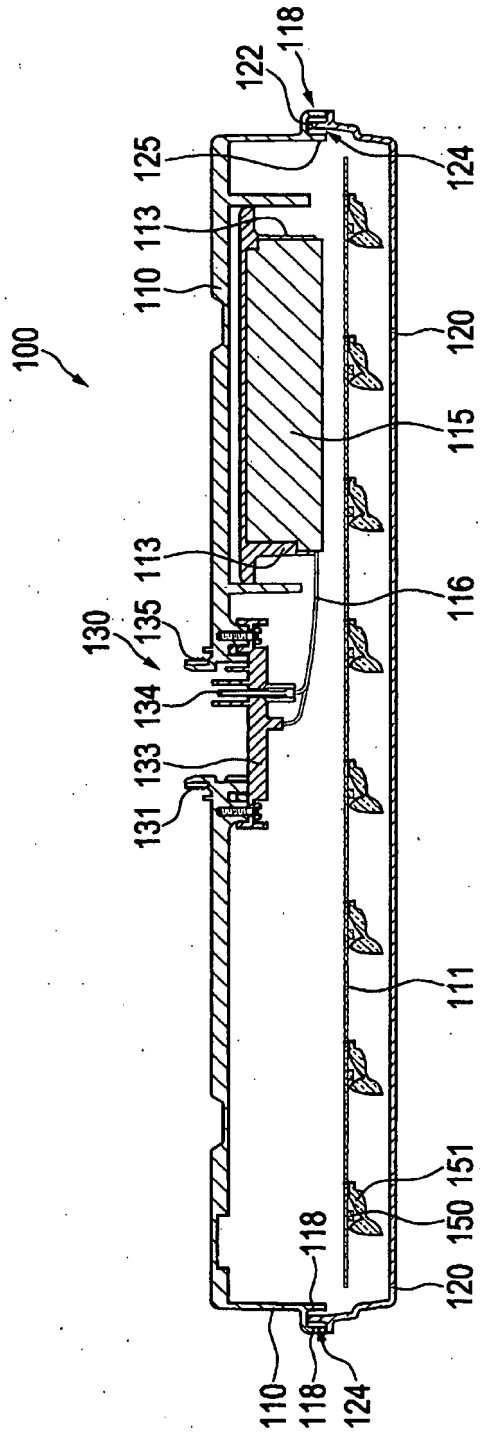


Fig. 5

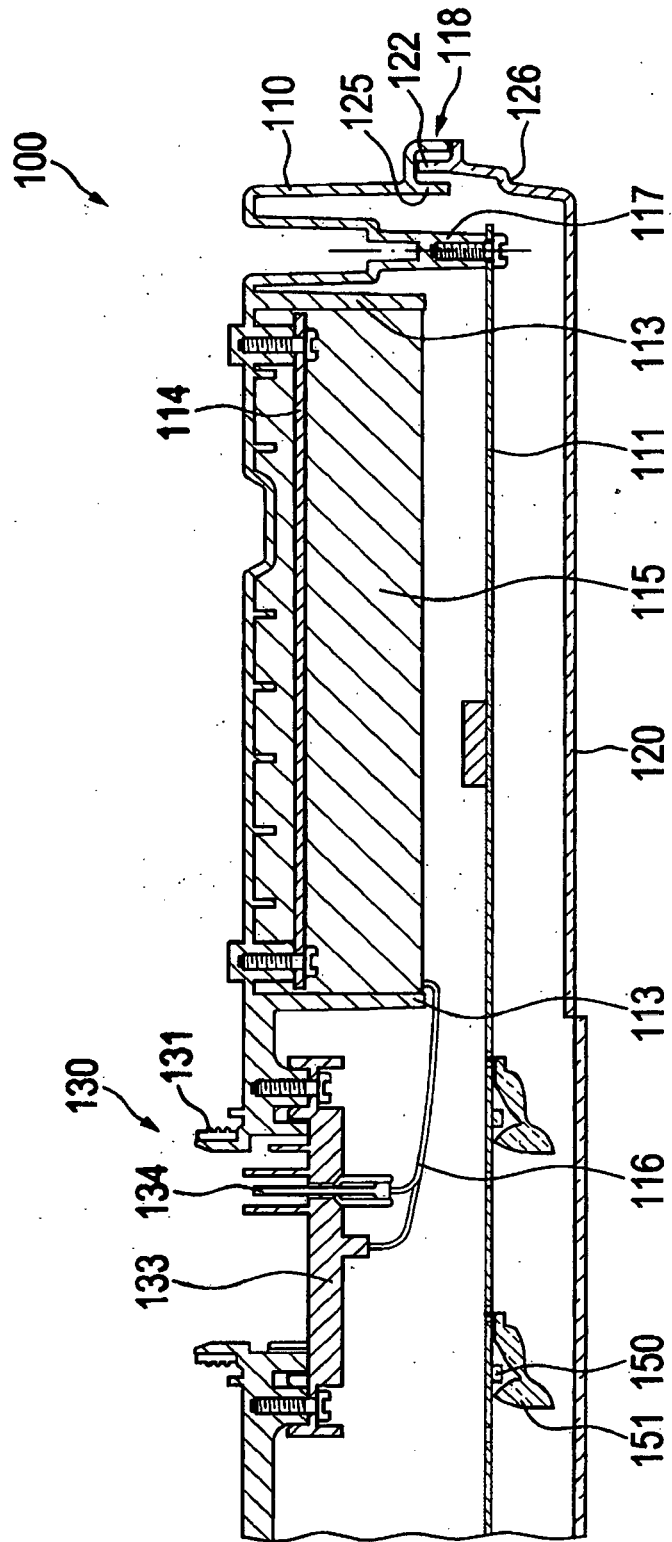
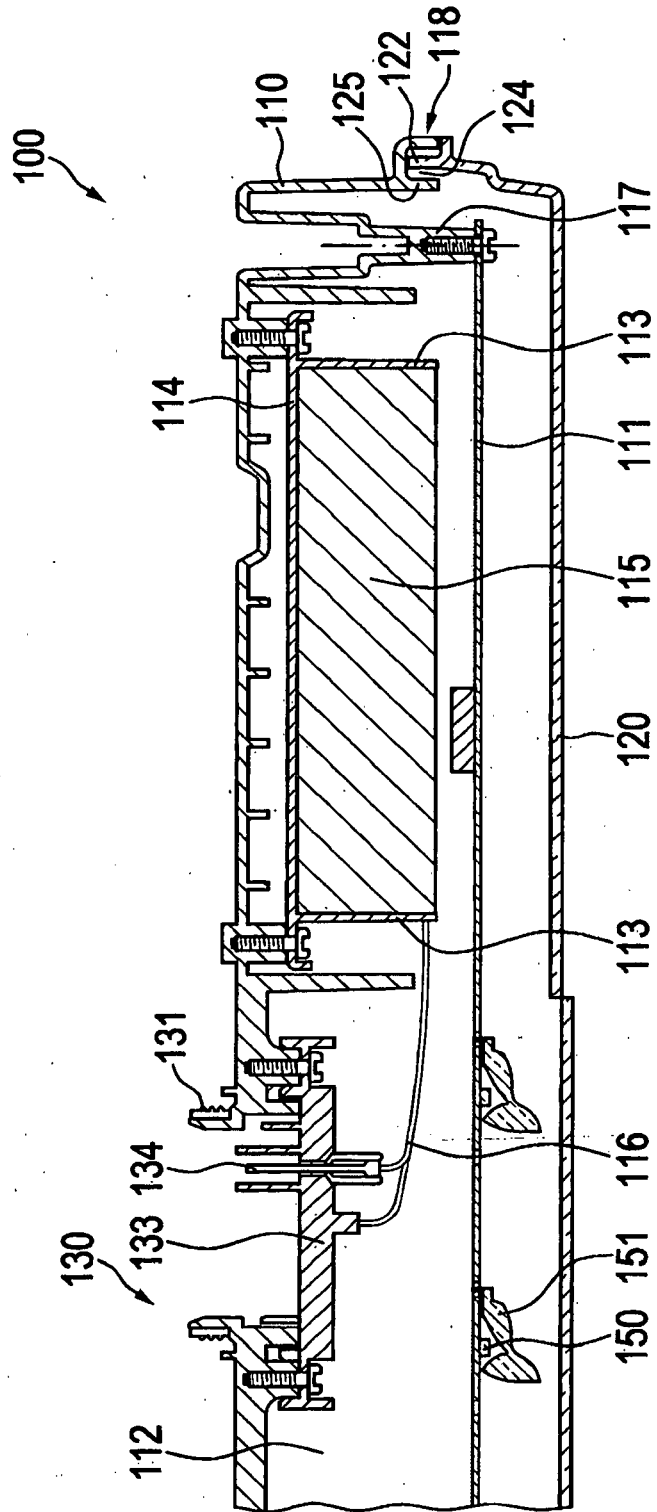


Fig. 6



REFERENCES CITED IN THE DESCRIPTION

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