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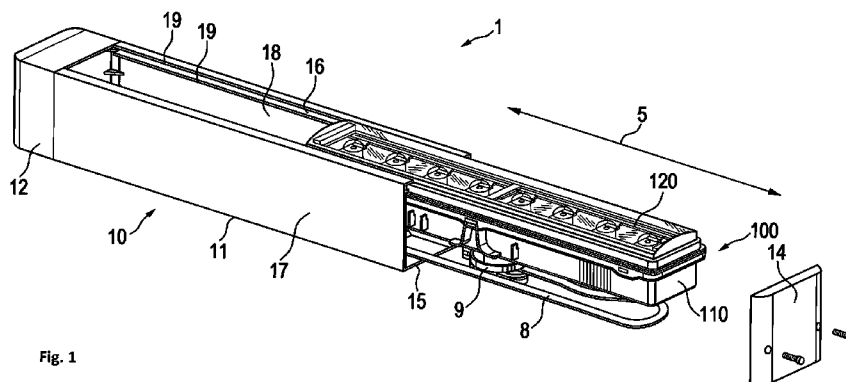


Fig. 1

(57) Abstract: A LED light (1) may be mounted in simple manner and provide however an efficient thermal management if the LED light comprises at least a housing (10) with a body (11) formed by a profile (11) with a rear panel (15) and two side walls (17, 18), wherein the profile (11) defines a preferential direction (5) of the housing (10). An encapsulated LED module (100) is inserted parallel to the preferential direction (5) into the housing (10).

LED Light

Field of the invention

The invention relates to a LED light with a housing. The housing has a body
5 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

10 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
15 LEDs. As increased operating temperature significantly reduces lifetime, cooling
is of high importance.

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
20 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.

Summary of the invention

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

5 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 permits to be mounted easily to wall or a ceiling. Further it is an object of the invention to permit an easy replacement of the LEDs in case of failure.

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

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
15 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.

The side walls of the body comprise preferably opposing ribs forming at least two sliding guides into which the LED-module is inserted parallel to the preferential
20 direction. This permits 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.

The LED-light housing preferably has at least one removable end cap limiting the movement of the LED module. This permits to close the housing by simply
25 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.

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.

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

Preferably the power-supply is thermally connected to the LED-light base by a preferably thermally conducting potting or sealant. This permits 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 may the cross section of the potting 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.

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

The LED-module is preferably 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 has the housing thus 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 permits 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.

- 5 The housing may have vents for permitting 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

- 10 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.

- 15 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.

- Figure 1 shows a LED light 1 with a housing 10 and a partially inserted LED
20 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 an 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.

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.

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).

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.

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
5 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).

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
10 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
15 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.

20 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
25 surrounded by a thread 135. This permits an easy assembly of the LED module 100

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 permits even better heat dissipation. Like in the example of Figures 2 to 4 is the compartment
5 not closed but open like a tub. The LED carrier 111 is thus not thermally shielded from the power supply 115.

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
10 potting isolates the circuitry.

List of reference numerals

	1	LED light
	5	preferential direction
	8	cable
5	9	connector
	10	housing
	11	body
	12	end cap
	14	end cap
10	15	rear panel
	16	sliding guides
	17	side wall
	18	side wall
	19	rib
15	100	LED module
	110	base
	111	LED carrier
	112	side wall of the base
	113	separation bar
20	114	base plate
	115	power-supply unit
	116	cable
	117	support structure
	118	protrusion
25	120	cover
	122	rim

- 124 groove of base
- 125 ribs of base forming groove 124
- 126 recess
- 130 connector assembly
- 5 131 mechanical part of connector assembly
- 133 pin holder
- 134 connection pin
- 135 thread
- 150 LEDs
- 10 151 lens and/or reflector

Claims**1. A LED light (1) comprising at least:**

- 5
- 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
 - an encapsulated LED module (100), the LED module (100) being inserted into the housing (10).

characterized in that

10 the side walls (17, 18) comprise opposing ribs (19) forming at least two sliding guides (16) into which the LED module (100) is inserted parallel to the preferential direction (5).

2. The LED light (1) of claim 1,

characterized in that

15 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).

3. The LED light (1) of one of the preceding claims

characterized in that

20 LED module (100) has a casing comprising a base (110) and a cover (120) wherein the base (110) supports a power-supply (115) unit and a LED carrier (115).

4. The LED-light (1) of the preceding claim characterized in that the base (110) two separation bars (113), in between of which is the power-supply unit (115) positioned.
- 5 5. The LED-light of one of claims 3 or 4 characterized in that the power-supply unit (115) is thermally connected to the base (11) by potting.
- 10 6. The LED-light of claims 5 characterized in that the potting comprises thermally conducting filler.
- 15 7. 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.
8. The LED light (1) of one the preceding claim characterized in that the connection compartment is sealed
- 20 9. The LED light (1) of one of the preceding claims characterized in that the housing has vents for permitting convection of air.

10. A LED module (100) for insertion into a housing of LED light, comprising at least a LED (150) and a power supply (115) in a casing, characterized in that the power supply (115) is thermally connected to the housing by a thermally conductive potting.
- 5

Fig. 2

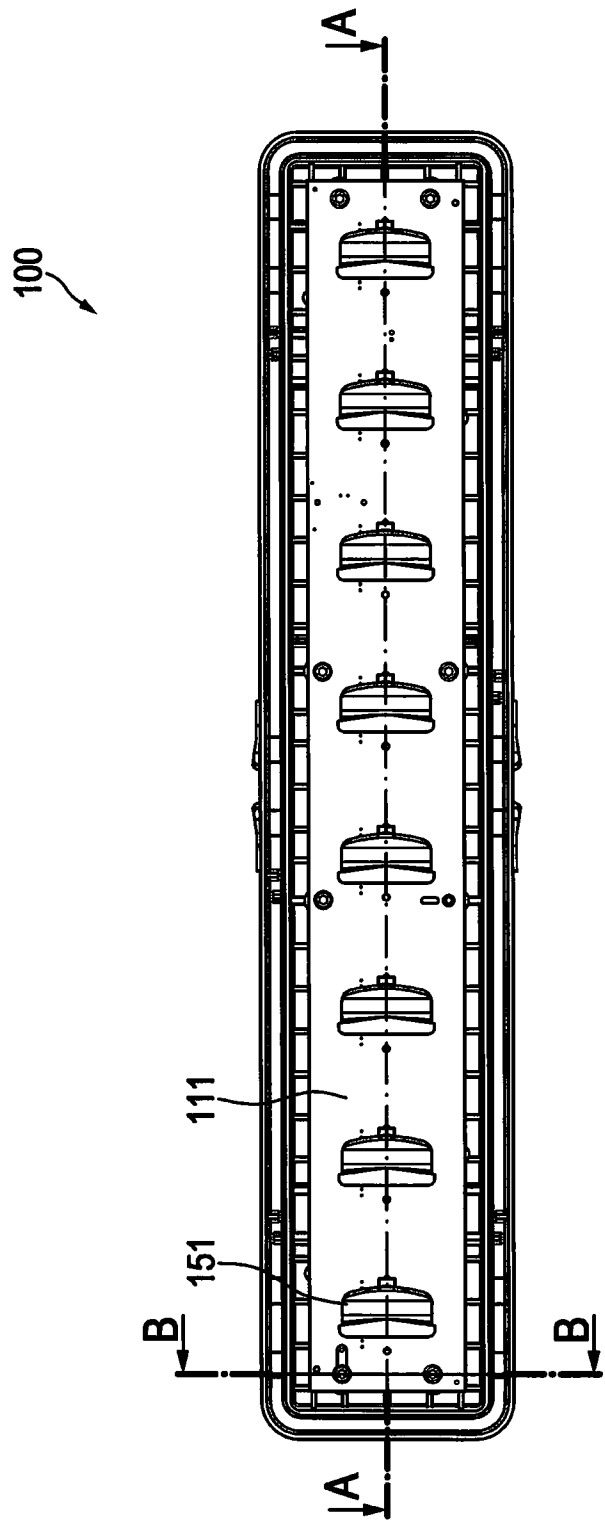


Fig. 3

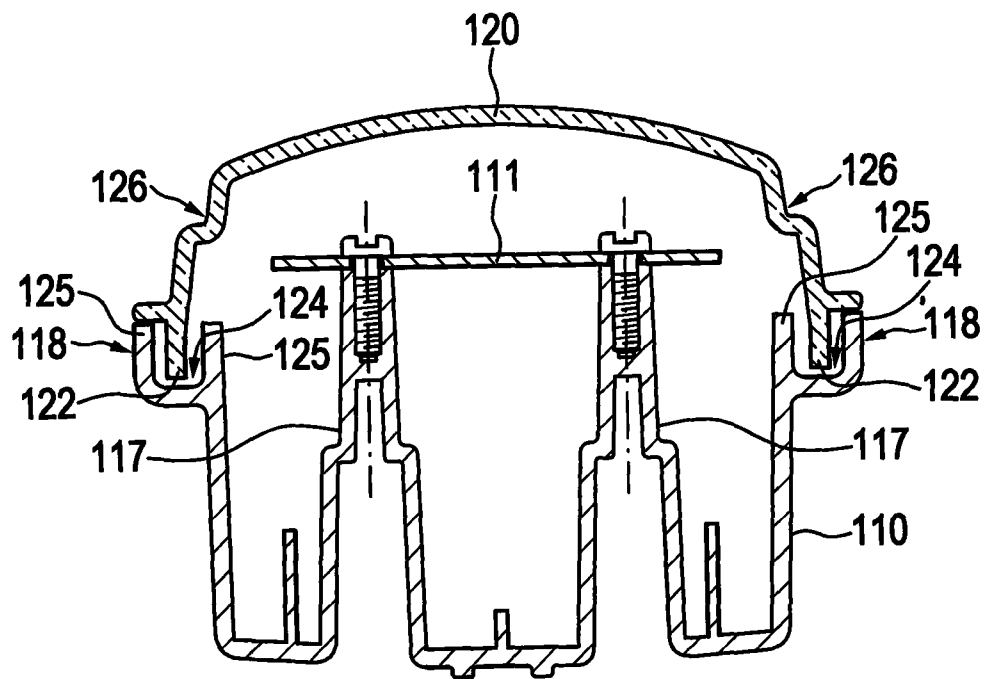


Fig. 4

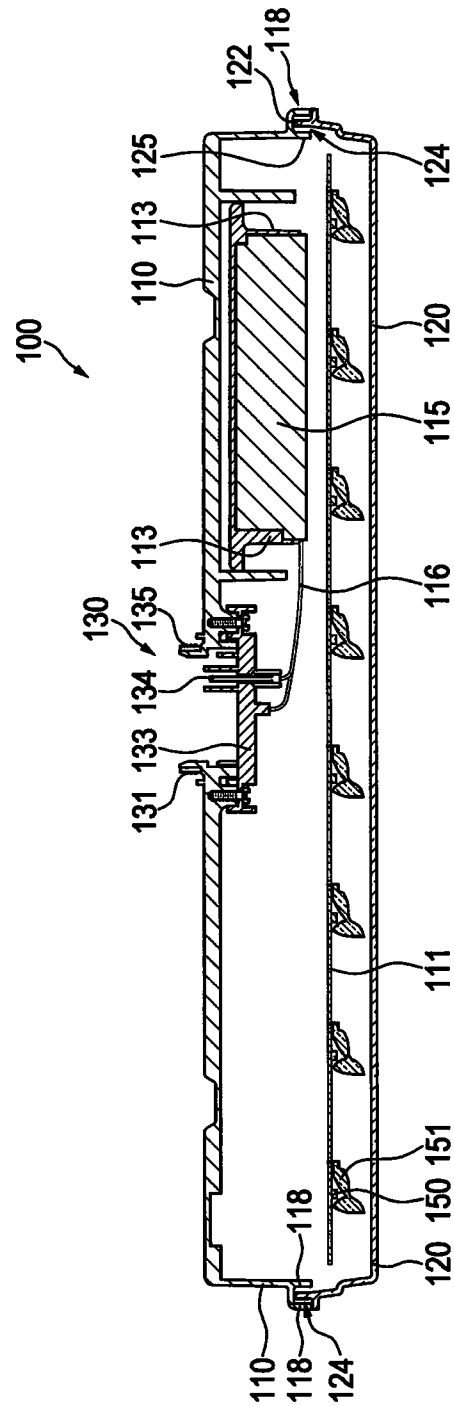


Fig. 5

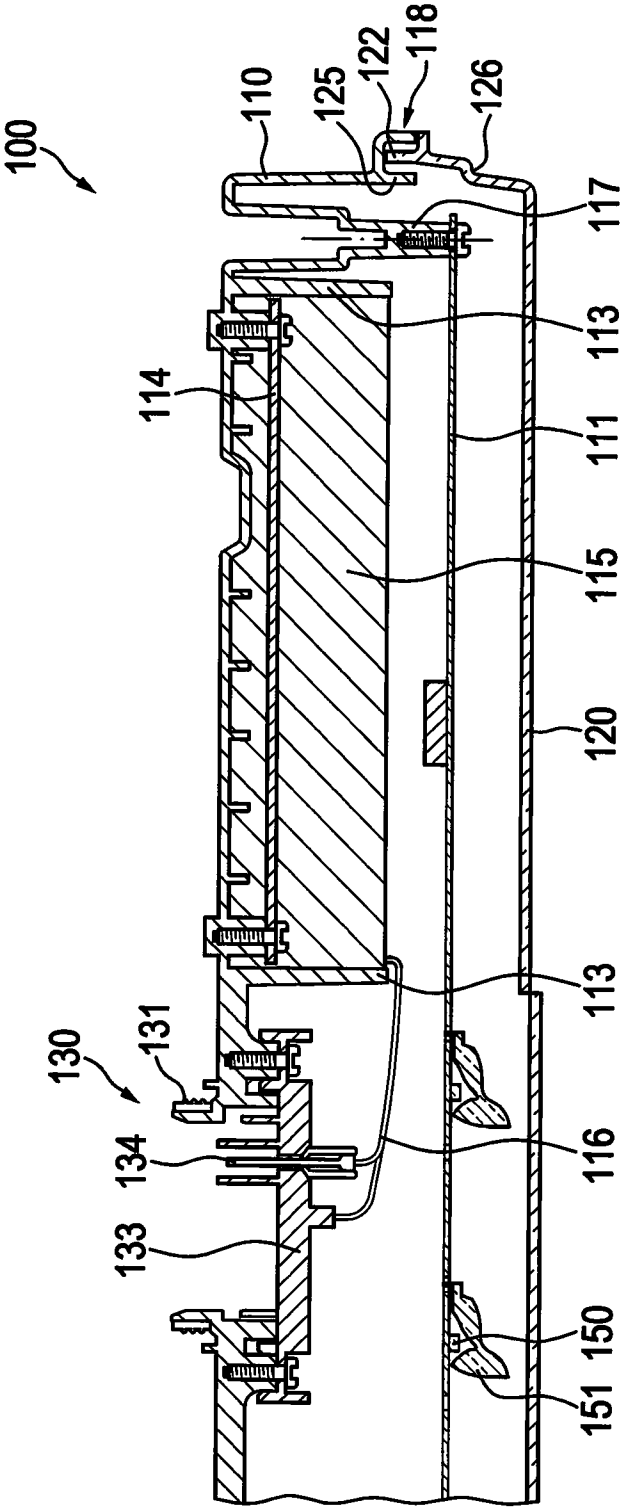
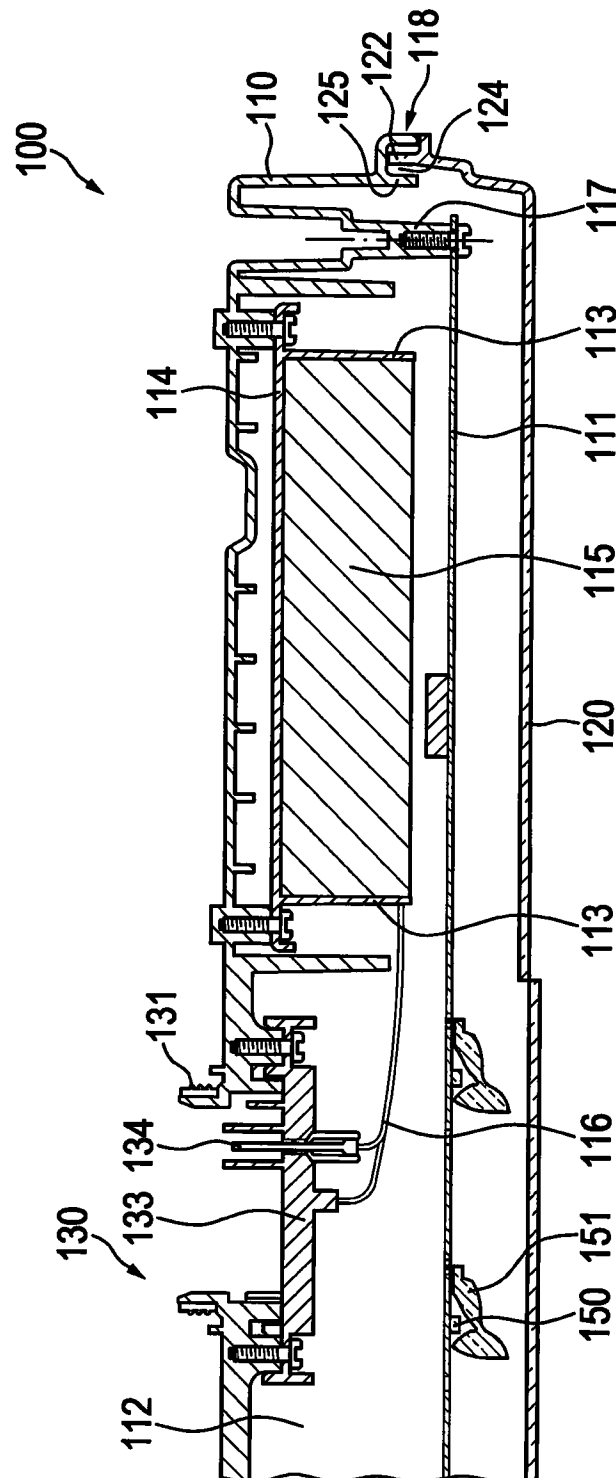


Fig. 6



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2012/070555

A. CLASSIFICATION OF SUBJECT MATTER

INV. F21V21/02 F21S4/00 F21V15/01 F21V15/015
ADD. F21Y101/02 F21Y103/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F21V F21S F21K F21Y

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 2 400 210 A2 (GE LIGHTING SOLUTIONS LLC [US]) 28 December 2011 (2011-12-28)	1,3
Y	paragraph [0026] - paragraph [0028] figures 1,2	2,4-10
Y	----- EP 2 327 930 A1 (ALLIANCE OPTOTEK CO LTD [TW]) 1 June 2011 (2011-06-01) paragraph [0008] - paragraph [0017] figures 1,4	2,7,8
Y	----- DE 20 2007 015497 U1 (AQUA SIGNAL AG [DE]) 13 March 2008 (2008-03-13) paragraph [0026] - paragraph [0035] figures 3,4	4-6,10
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Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

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INTERNATIONAL SEARCH REPORT

International application No
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	----- US 2007/274084 A1 (KAN PETER [CA] ET AL) 29 November 2007 (2007-11-29) cited in the application paragraph [0041] - paragraph [0046] figure 2 -----	1-4,7-9

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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