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(54) Lighting device, particularly for outdoor use

(57) A lighting device, particularly for outdoor use, including a casing (2,3) for one or more LED units (4); each LED unit (4) includes an LED board, on which LEDs arranged in a row are mounted; a heat sink connected to the LENDS is isolated from the casing made of metallic material of the lighting device by a support base (10) made of plastics. The lighting device has a higher resistance to overvoltages, than traditional lighting devices, and does not require the protection of an SPD surge voltage arrester.

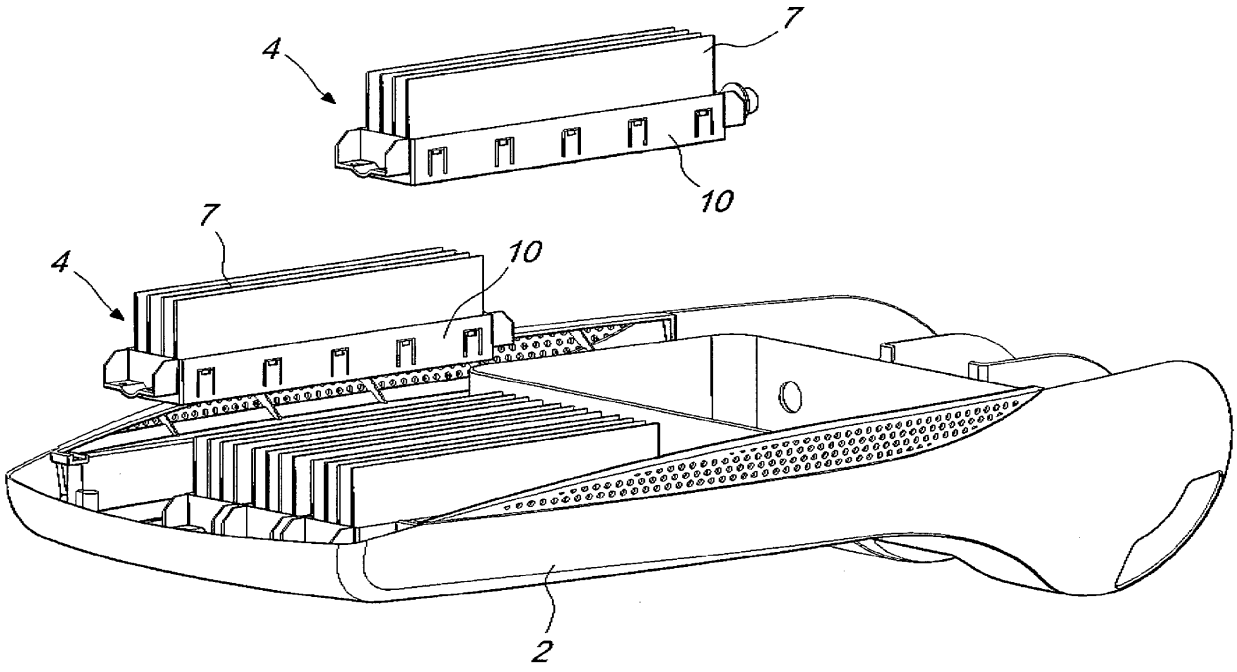

Fig. 2

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Description

[0001] The present invention relates to a lighting device for outdoor use.

[0002] Various lighting devices for outdoor use are known: devices intended for lighting roads with low or high traffic, devices for lighting public spaces, spot lighting devices for areas of particular value, projectors, etc.

[0003] Growing attention to energy efficiency makes it increasingly common to replace ordinary lighting devices, provided with discharge lamps, with lighting devices provided with LEDs, which allow to reduce the power consumed for an equal supplied lighting level.

[0004] This becomes particularly important in the case of devices intended for street or public lighting designed to remain lit for long periods of the night and, in certain conditions, of the day.

[0005] Those LED lighting devices have a unit constituted by a PCB (Printed Circuit Board) designed to supply the LEDs with the correct power.

[0006] The light generated by the LEDs is then directed by optical lenses as a function of the level and type of lighting desired.

[0007] Conventional LED devices include metal heat sinks arranged in contact with the LEDs and designed to dissipate the heat generated during the operation of the LEDs.

[0008] Those heat sinks are connected to the PCB by means of metallic fasteners that act by pressing the lenses mechanically against the heat sinks.

[0009] The assembly is then connected to the metal base of the lighting device by means of plates and connections of the metallic type.

[0010] US5785418 discloses an electrically driven LED lamp assembly having a thermally insulating material disposed over the heat sink, for sandwiching the heat sink against the conductive plating, to limit heat transfer into the heat sink from the outside. The assembly comprises a housing that supports a flange, extending radially from the heat sink, with the interposition of a thermally insulating gasket. There is no provision for electrically insulating the LED unit from the housing.

[0011] US2010/277917 discloses an LED light system comprising LEDs mounted on a PCB and an insulating member arranged between the PCB and the heat sink.

[0012] Such electronic assembly is particularly sensitive to an overvoltage due to events such as, for example, atmospheric discharges, grid switching, etc.

[0013] Those phenomena in fact lead to an unnatural increase in the supply voltage both among the various supply conductors of the device, so-called differential-mode overvoltage, and between any one of the conductors and the ground of the device, normally known as common-mode overvoltage.

[0014] Since the LED PCB is connected to the casing by means of metallic elements and therefore connected electrically to the casing, the overvoltage is applied between the supply conductors of the unit and the casing thereof and can exceed the maximum voltage value that can be withstood by the LEDs.

[0015] This situation often causes damage to the PCB, which therefore must be replaced, with all the associated problems, such as lack of continuity of service, traffic inconvenience, replacement costs, etc.

[0016] Also, in order to ensure an adequate lighting of the area, the lighting devices are often located on poles at a considerable height from the ground.

[0017] The system most commonly used to protect the lighting devices is to arrange surge protection devices (SPDs) on panels arranged at the base of the pole and/or inside said devices.

[0018] Generally, the surge protector devices have an impedance that can vary according to the voltage to which they are subjected, shifting from constituting a very high value impedance to a very low value impedance, as the voltage increases above a certain threshold value.

[0019] The SPDs are an economic burden and, in order to operate correctly, require an adapted ground connection by means of which the device dissipates the discharge.

[0020] Installing such a connection is a particular problem if the lighting system meets class II insulation criteria, because in such situation the electrical system standard does not allow to connect the metallic parts to the ground, in order to avoid introducing potential dangers in the system.

[0021] In this context, it is therefore necessary to provide an adapted conductor that connects the SPD, optionally arranged within the lighting device, and a ground connection point, which is normally provided by means of an adapted buried stake (discharger) provided for this purpose.

[0022] The aim of the present invention is to provide a lighting device, particularly for outdoor use, that overcomes the drawbacks of the cited prior art.

[0023] Within the scope of this aim, an object of the invention is to provide a lighting device that has a high resistance to overvoltages.

[0024] A particular object of the present invention is to provide a lighting device, particularly for outdoor lighting, that is self-protected against atmospheric discharges.

[0025] Another object of the invention is to provide a lighting device that does not need to be provided with an SPD and with the corresponding ground connection.

[0026] A further object of the invention is to provide a device which, by virtue of its particular constructive characteristics, is capable of giving the greatest assurances of reliability and safety in use.

[0027] This aim and other objects that will become better apparent hereinafter are achieved by a lighting device, particularly for outdoor use, comprising a casing for one or more LED units, each LED unit being constituted by a board provided with one or more LEDs; said device being **characterized in that** said LED unit is associated with said casing with the interposition of an insulator member; said insulator member electrically isolating said

casing and said LED unit from each other.

[0028] The modular LED lighting device, according to the present invention, includes an LED board on which LEDs arranged in a row are mounted; a heat sink, connected to the LED, is isolated from the case made of metallic material of the lighting device by means of a support made of plastic material.

[0029] The lighting device according to the present invention is **characterized in that** it has a higher resistance to overvoltages than traditional lighting devices.

[0030] The lighting device according to the present invention is **characterized in that** it does not require the protection of an SPD.

[0031] Further characteristics and advantages will become better apparent from the description of preferred but not exclusive embodiments of the invention, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a perspective view of an LED lighting device;
Figure 2 is a partially exploded perspective view of the device without the upper shell;
Figure 3 is an exploded perspective view of the LED unit and support base;
Figure 4 is a perspective view of the LED unit assembled to the support base;
Figure 5 is a perspective view of the lighting device shown with the upper shell separated from the lower shell;
Figure 6 is a perspective view of an LED lighting device having an alternative shape.

[0032] With reference to the cited figures, the lighting device, particularly for outdoor use, according to the invention, generally designated by the reference numeral 1, has a casing constituted by a lower shell 2 and by a cover 3.

[0033] The LED lighting device may have various shapes in relation to the required functional and design characteristics.

[0034] A non-limiting example of a possible alternative embodiment is shown in Figure 6, which shows a lighting device 100 having a disk-shaped casing.

[0035] With particular reference to Figure 2, the casing accommodates one or more LED units, each designated by the reference numeral 4, which are generally arranged in the lower shell 2 of the lighting device 1.

[0036] Each LED unit 4 has an LED board 5 on which LEDs 6 are mounted.

[0037] In the example illustrated herein, the an LED board 5 includes sixteen LEDs 6 arranged in pairs, longitudinally along the board 5.

[0038] The LED board 5 is associated with a heat sink 7 made of metallic material.

[0039] A transparent lens plate 18, provided with a number of lenses 8 that corresponds to the number of LEDs 6 of the board 5, is applied to the board so that each LED 6, or pair of LEDs 6, works in a respective lens.

[0040] The construction of the LED unit 4 described above is merely an example and the person skilled in the art clearly understands that the LED unit can be provided in different manners.

[0041] According to the present invention, the LED unit 4 is associated with the casing of the lighting device 1 by means of a support base 10, made of insulating material, so that the lower shell 2 and the LED unit 4, and particularly the metallic heat sink 7, are mutually electrically insulated.

[0042] The support base 10 of the present invention comprises side panels 11 and 12 joined to a front member 13 and to a rear member 14, and a bottom frame member 15.

[0043] The side panels 11 and 12 are provided with fastener members 16 which elastically engage the LED unit 4.

[0044] The support base 10 locks the lens plate 18 into its position.

[0045] According to a further embodiment of the present invention, not shown in the figures, instead of the support base 10 there is a layer of insulating material that is arranged directly on the surface of the lower shell 2, and there are fasteners made of insulating material.

[0046] In practice it has been found that the invention achieves the intended aim and objects, providing an LED lighting device that has a higher resistance to the overvoltages to which it can be subjected.

[0047] The lighting device according to the present invention differs from traditional devices in that it does not need to be protected against overvoltages by means of an SPD surge voltage arrester.

[0048] The materials used, as well as the dimensions, may be any according to the requirements and the state of the art.

[0049] This application claims the priority of Italian Patent Application No. MI2012A000458, filed on March 23, 2012 the subject matter of which is incorporated herein by reference.

Claims

1. A lighting device, particularly for outdoor use, comprising a casing (2, 3) for one or more LED units (4), each LED unit (4) being constituted by a board (5) provided with one or more LEDs (6); said device being **characterized in that** said LED unit (4) is associated with said casing (2,3) with the interposition of an insulator member (10); said insulator member (10) electrically isolating said casing (2,3) and said LED unit (4) from each other.

2. The device according to claim 1, **characterized in that** said LED unit (4) comprises a metal heat sink; said insulator member (10) electrically insulating said casing (2,3) from said LED unit (4) and said

metal heat sink.

3. The device according to claim 2, **characterized in that** said insulator member comprises a support base (1a), made of insulating material, said support base (10) being associated with said LED unit (4) and electrically insulating said LED unit (4) from said casing (2, 3).

4. The device according to claim 3, **characterized in that** said support base (10) comprises side panels (11, 12) joined to a front member (13) and to a rear member (14), and a bottom frame member (15).

5. The device according to claim 3, **characterized in that** said side panels (11, 12) are provided with fastener members (16) which elastically engage said LED unit (4); said support base (10) locking said lens plate (18) into position.

6. The device according to claim 1, **characterized in that** said insulator member (10) comprises a layer of insulating material and fasteners made of insulating material; said layer of insulating material being arranged directly on an inner surface of said casing (2).

7. The device according to claim 1, **characterized in that** said LED unit (4) comprises an LED board (5) and one or more LEDs (6) mounted on said board (5); a heat sink (7), made of metallic material, and lens means (8) for each of said LEDs (6).

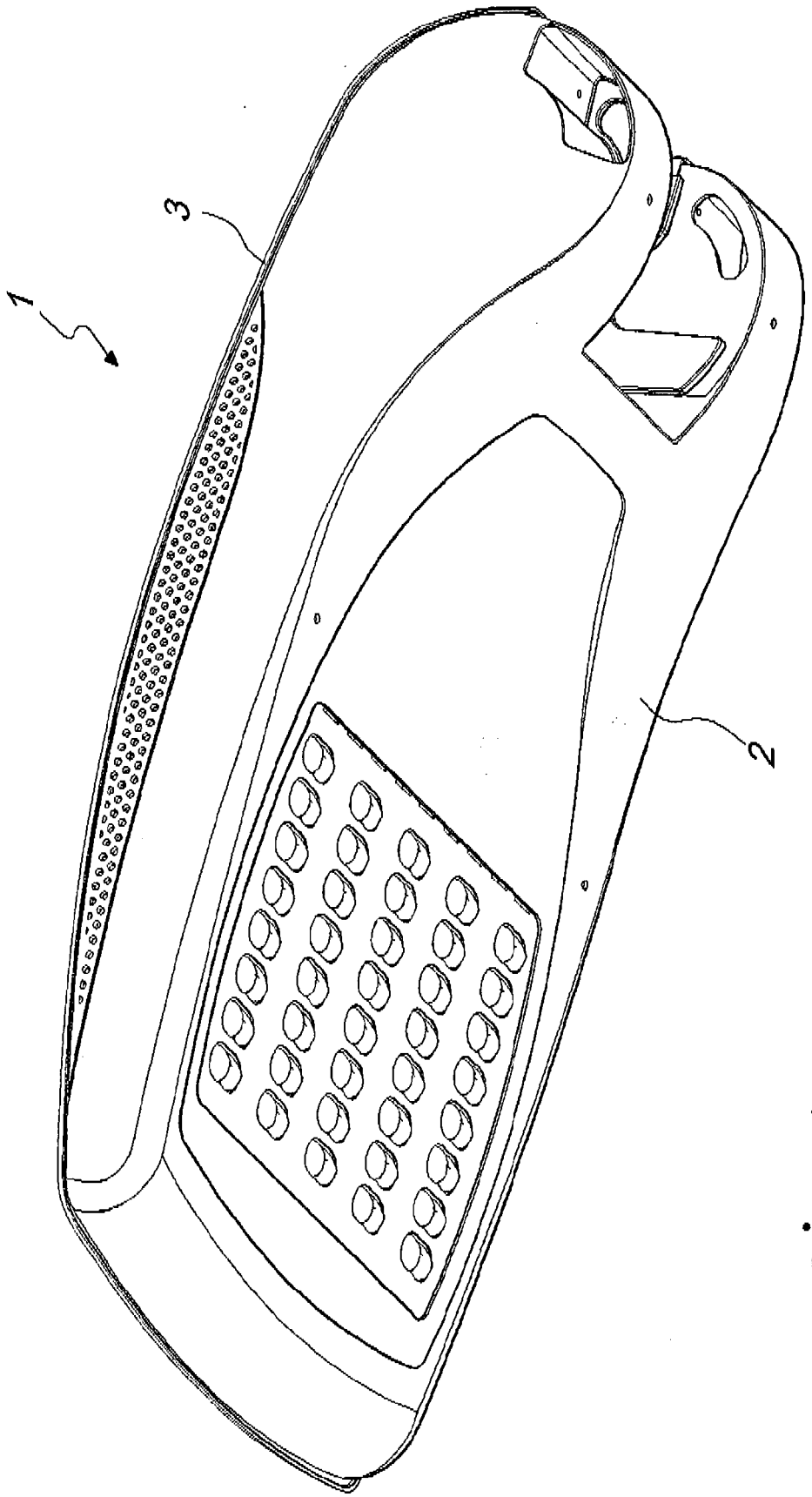

Fig. 1

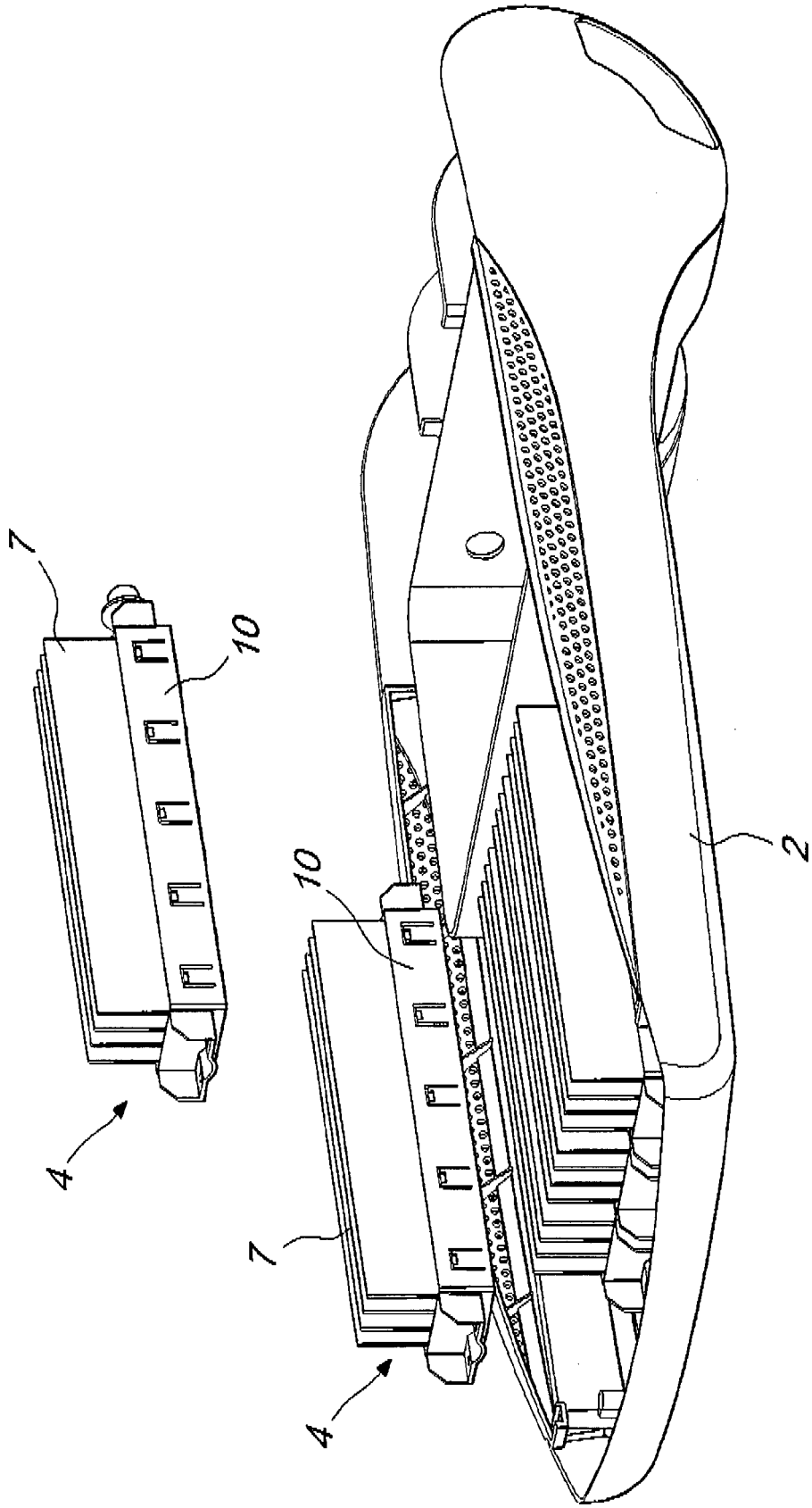

Fig. 2

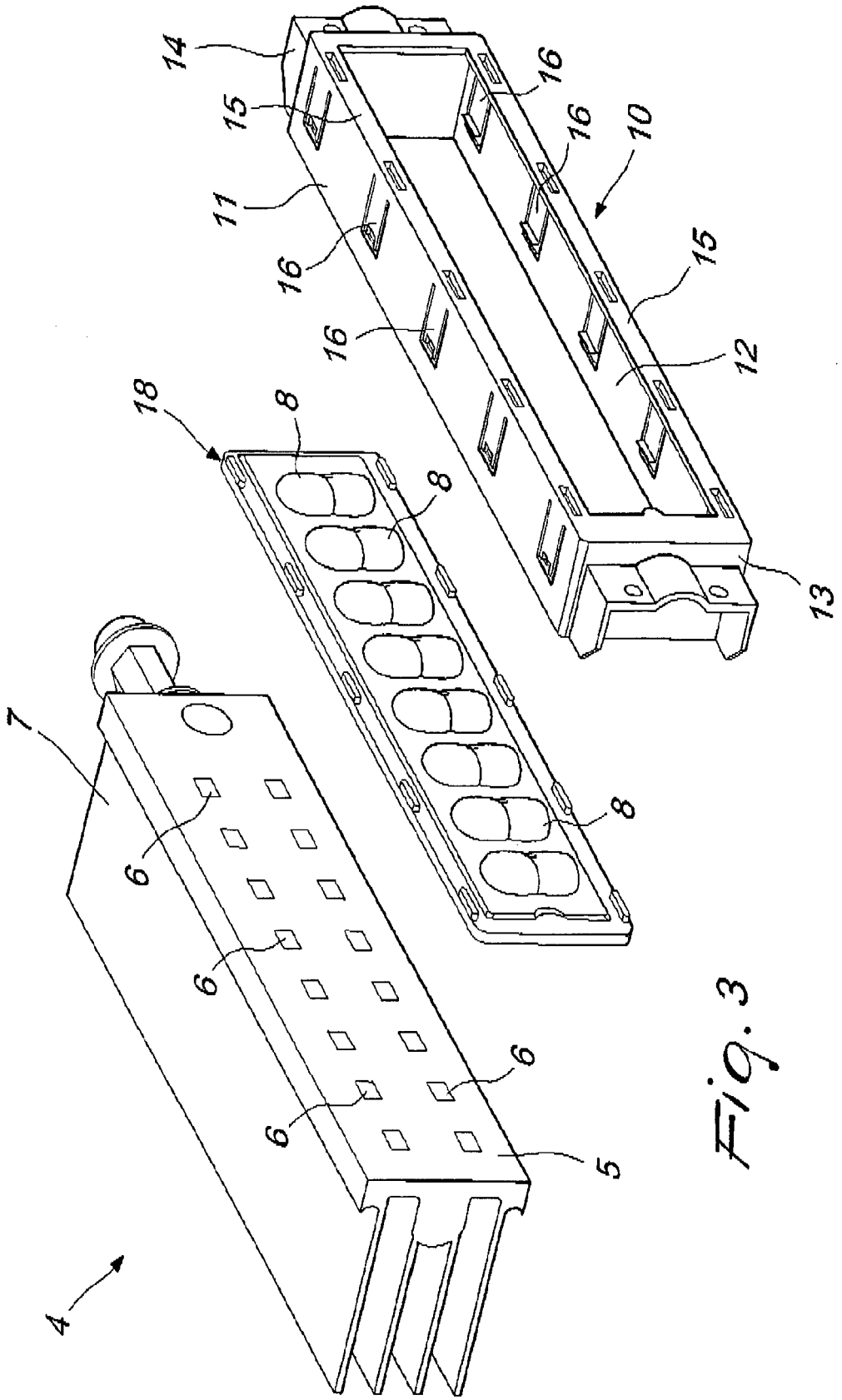

Fig. 3

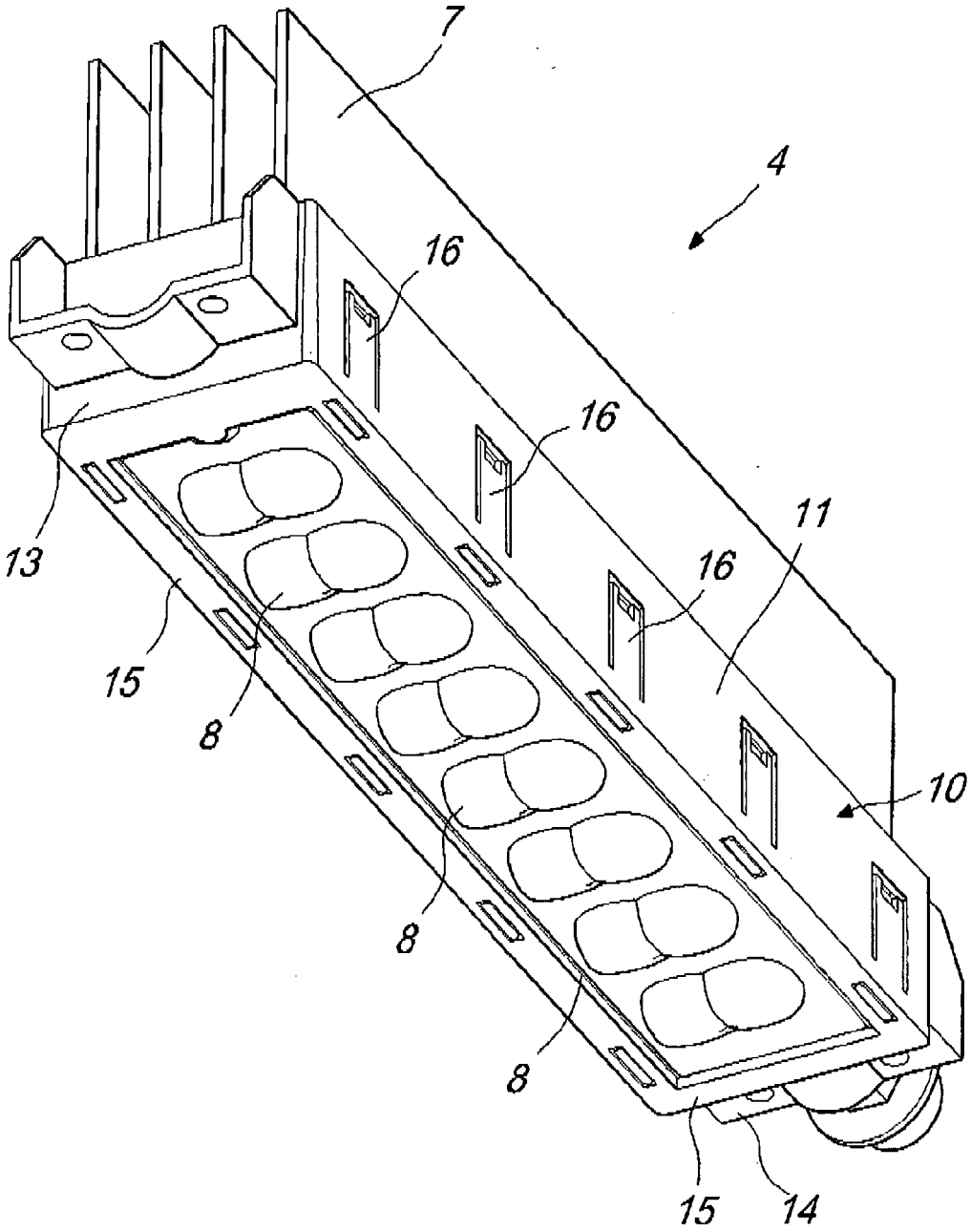

Fig. 4

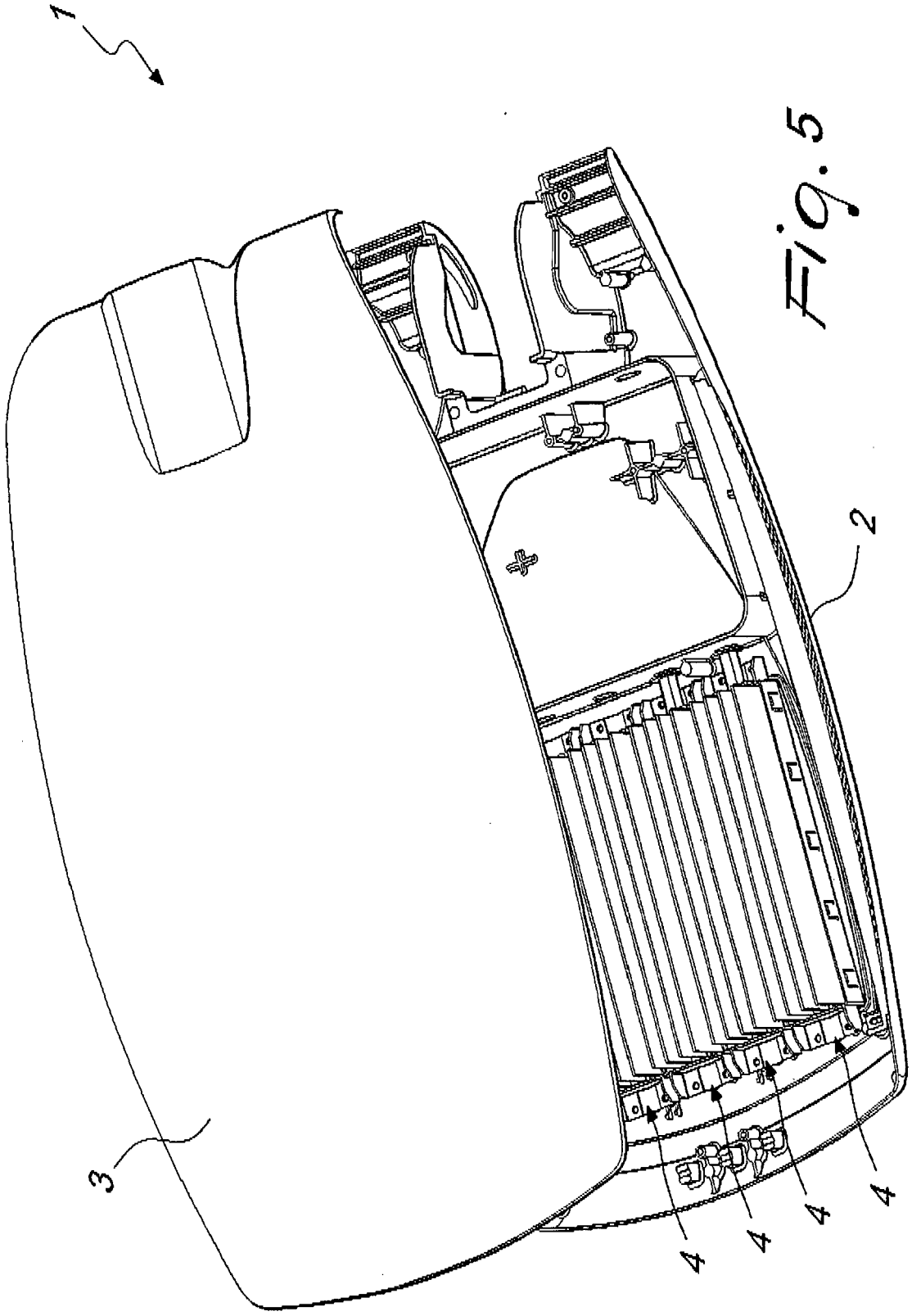

Fig. 5

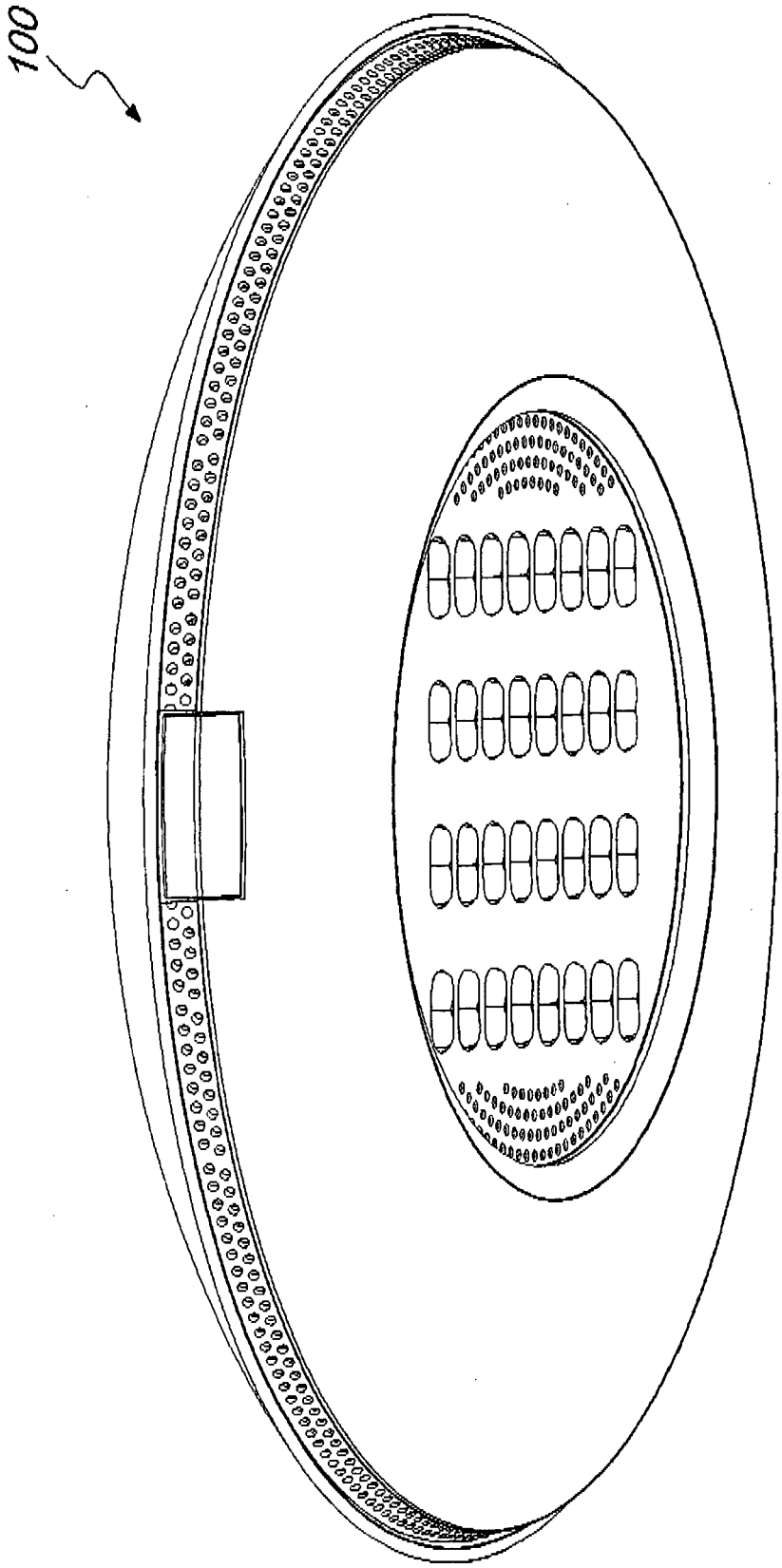

Fig. 6

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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