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(54) LIGHTING DEVICE WITH LED MODULES, PARTICULARLY FOR STREET LIGHTING

MODULARE LED-LEUCHTE FÜR STRASSENLATERNEN UND DERGLEICHEN

LUMINAIRE À DEL MODULAIRE POUR RÉVERBÈRES ET ANALOGUE

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Description

[0001] The present invention relates to a modular LED luminaire for street lights and the like.

[0002] As is known, there are several types of public lighting apparatus that include lighting apparatuses for vehicular roads.

[0003] Lighting apparatuses for vehicular roads include lighting bodies with an optical system that is specific for lighting streets with motorized traffic.

[0004] Apparatuses provided with LED devices, constituted by a plurality of LEDs arranged in parallel rows, each provided with its own optical system, are increasingly widespread.

[0005] In order to obtain the photometric curve required by the specific application, manufacturers normally modify the geometry of the lenses and the arrangement of each LED as a function of the type of road to be lit.

[0006] For example, the LEDs located close to the edge of the roadway, i.e. close to the support of the street light, diffuse the light downward and to the sides, while the LEDs that are progressively further away from the base diffuse the light forward, i.e., toward the center of the roadway, because the street lights are generally arranged on both sides of the roadway in interleaved positions.

[0007] LED modules constituted by a plurality of LEDs arranged in a row on an elongated plate are known. Those modules can be assembled in parallel rows in order to form a battery of LED modules.

[0008] However, each individual LED must be provided with a different lens, by shape and orientation, in order to obtain the desired photometric curve and according to the required luminous intensity.

[0009] The manufacture and installation of LED street lights is therefore onerous in terms of costs and time.

[0010] EP-2322849 discloses an LED lighting apparatus having a cover with one optical portion that adjusts the field of the LEDs.

[0011] WO2011/011734 discloses an LED lighting device provided with a light-shaping panel having a variety of optics.

[0012] A problem of the known LED lighting systems is to effectively and economically seal the electrical components, the LED and the optical systems from the environment.

[0013] The aim of the present invention is to provide a modular LED luminaire, for street lights and the like, that overcomes the drawbacks of the cited prior art.

[0014] Within the scope of this aim, an object of the invention is to provide an LED module for a street light that does not require any intervention for modification on the lenses of the individual LEDs in order to vary the luminous intensity of the street light and modify the photometric curve.

[0015] Another object of the invention is to provide a modular device that is constituted by a limited number of components.

[0016] Another object of the present 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.

[0017] This aim and other objects that will become better apparent hereinafter are achieved by a modular LED luminaire for street lights and the like, comprising an LED board having a plurality of LEDs arranged in rows; a transparent plate provided with a number of lenses that corresponds to the number of said LEDs; said plate being applied to said board wherein each LED corresponds to a respective lens; said luminaire is characterized in that each one of said lenses has a different profile in order to distribute the light emitted by the respective LED in a different manner.

[0018] 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 a modular LED luminaire, particularly for street lights and the like, according to the present invention;
Figure 2 is a partially exploded perspective view of the luminaire of the preceding figure;
Figure 3 is a perspective view of the transparent plate;
Figure 4 is a plan view of the transparent plate;
Figure 5 is a sectional view, taken along the plane V-V of Figure 4;
Figure 6 is a sectional view, taken along the plane VI-VI of Figure 4;
Figure 7 is a bottom view of the transparent plate;
Figure 8 is a sectional view, taken along the plane VIII-VIII of Figure 4;
Figure 9 is a perspective view of a lighting body for street lighting, provided with the luminaire according to the present invention;
Figure 10 is a bottom perspective view of the lighting body of the preceding figure, provided with five modular devices according to the present invention;
Figure 11 is a bottom perspective view of the lighting body, provided with three modular devices according to the present invention.

[0019] With reference to the cited figures, the modular LED luminaire according to the invention, generally designated by the reference numeral 1, comprises an LED board 2 on which a series of LEDs 3 is soldered.

[0020] In the example illustrated herein, the LED board 2 includes a total of sixteen LEDs 3 which are arranged in pairs longitudinally along the board 2.

[0021] The board 2 is associated with an aluminum heat sink 4.

[0022] According to the present invention, a transparent plate 5, provided with a number of lenses that corresponds to the number of LEDs 3 of the board 2, is applied

to the board so that each LED 3 or pair of LEDs 3 works in a respective lens.

[0023] Specifically, there are eight double lenses, designated by the reference numerals 61, 62, 63, 64, 65, 66, 67 and 68, each of which has a different profile in order to distribute the light emitted by the pair of LEDs in a different manner.

[0024] The transparent plate 5 has an internal edge 8 configured so as to provide the seal with the LED board 2.

[0025] The luminaire 1 also has a front member 9, constituted by a casing made of plastics, which has the function of pressing the transparent plate 5 against the LED board 2 when the assembly is mounted in the street light.

[0026] Specifically, the device 1 is designed to be mounted in a street light body 7, transversely to the roadway lit by the street light, which is arranged at the edge of the roadway, and therefore the double lenses 61-68 are designed to distribute the light forward. In other words, the front double lens 61 distributes the light forward, toward the center of the roadway, while the double lenses that are progressively further backward, up to the last rear lens 68, distribute the light in a manner that is more diffused downward.

[0027] As shown more clearly in Figures 7 and 8 and in the sectional views of Figures 5 and 6, each double lens 61-68 is shaped differently and accommodates a respective pair of LEDs 3 to allow a distribution of light that is suitable to cover a portion of road.

[0028] The street light body 7 can have a variable number of modules 1 so as to modify the luminous intensity of the street light according to the specific requirements, as a function of the height of the poles and of the mutual distance, without however modifying the photometric curve, differently from traditional systems in which the geometry of the lenses and the arrangement are modified as a function of the type of road to be lit.

[0029] The modular device according to the present invention is arranged longitudinally and provides a luminous emission that is directed forward, without the need to orient the modules.

[0030] In practice it has been found that the invention achieves the intended aim and objects providing a modular LED luminaire that allows to modify the luminous characteristics of a street light simply by modifying the number of luminaires mounted therein, without further interventions.

[0031] An advantage of the present invention resides in that it has a single plate, provided with multiple lenses, which provides the required optical performance and also constitutes a sealing element to protect the LEDs.

[0032] This application claims the priority of Italian Patent Application No. MI2011A002064, filed on November 14, 2011.

Claims

1. A modular LED street light, with a pole, arranged at the side of the roadway, comprising an LED board **(2)** having a plurality of LEDs **(3)** arranged in rows with a longitudinal axis; a transparent plate **(5)** provided with a number of lenses **(61, 62, 63, 64, 65, 66, 67, 68)** that corresponds to the number of said LEDs **(3);** said plate **(5)** being applied to said board **(2)** wherein each LED **(3)** corresponds to a respective lens **(61, 62, 63, 64, 65, 66, 67, 68);** each of said lenses **(61, 62, 63, 64, 65, 66, 67, 68)** having a different profile in order to distribute the light emitted by the respective LED **(3)** in a different manner; **characterized in that**, said longitudinal axis of said rows of LEDs (3) is, in use, arranged transversal **to the roadway lit by said street light; said lenses (61, 62, 63, 64, 65, 66, 67, 68) being configured to distribute the light forward, starting from** a front lens (61), located closest to the center of the roadway, which distributes the light forward, toward the center of the roadway, while the lenses (62, 63, 64, 65, 66, 67) that are progressively further back from the center of the roadway, up to the rear lens (68), distribute the light in a manner more diffused downward.

2. The street light according to claim 1, **characterized in that** said transparent plate has an internal edge configured so as to provide a seal with said LED board **(2)**.

3. The street light according to claim 1, **characterized in that** it comprises a front member **(9),** constituted by a plastic casing; said front member **(9)** pressing said transparent plate **(5)** on said LED board **(2)**,

4. The street light according to claim 1, **characterized in that** said LEDs (3) are arranged in pairs; each of said lenses **(61, 62, 63, 64, 65, 66, 67, 68)** being a double lens.

Patentansprüche

1. Eine modulare LED-Straßenleuchte mit einem Pfahl, angeordnet an der Seite der Straße, die eine LED-Leiterplatte (2) mit einer Vielzahl von LEDs (3) umfasst, angeordnet in Reihen mit einer Längsachse; eine transparente Platte (5), ausgestattet mit einer Anzahl von Linsen (61, 62, 63, 64, 65, 66, 67, 68), die der Anzahl der LEDs (3) entspricht; wobei die Platte (5) an der Leiterplatte (2) angebracht ist, wobei jede LED (3) einer dazugehörigen Linse (61, 62, 63, 64, 65, 66, 67, 68) entspricht; wobei jede der Linsen (61, 62, 63, 64, 65, 66, 67, 68) ein anderes Profil hat, um das von der jeweiligen LED (3) emittierte Licht auf andere Art zu verbreiten; **dadurch gekennzeichnet, dass** die Längsachse der Reihen von LEDs (3) im Gebrauch quer zu der Straße angeordnet ist, die von der Straßenleuchte beleuchtet wird; wobei die Linsen (61, 62, 63, 64, 65, 66, 67, 68)

konfiguriert sind, um das Licht nach vorne zu verbreiten, ausgehend von einer vorderen Linse (61), die der Straßenmitte am nächsten ist und das Licht nach vorne, zur Mitte der Straße, verbreitet, während die Linsen (62, 63, 64, 65, 66, 67), die zunehmend weiter nach hinten von der Straßenmitte entfernt sind, bis hin zur hinteren Linse (68), das Licht auf verstreutere Weise nach unten verbreiten.

2. Die Straßenleuchte gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die transparente Platte eine Innenkante hat, die ausgebildet ist, um eine Abdichtung mit der LED-Leiterplatte (2) bilden.

3. Die Straßenleuchte gemäß Anspruch 1, **dadurch gekennzeichnet, dass** sie ein vorderes Glied (9) umfasst, das aus einem Kunststoffgehäuse besteht; wobei das vordere Glied (9) die transparente Platte (5) auf die LED-Leiterplatte (2) presst.

4. Die Straßenleuchte gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die LEDs (3) in Paaren angeordnet sind; wobei jede der Linsen (61, 62, 63, 64, 65, 66, 67, 68) eine Doppellinse ist.

Revendications

1. Luminaire à LED modulaire, comportant un poteau, disposé sur le côté de la chaussée, comprenant un panneau à LED (2) doté d'une pluralité de LED (3) disposées en rangée avec un axe longitudinal; une plaque transparente (5) pourvue d'un certain nombre de lentilles (61, 62, 63, 64, 65, 66, 67, 68) qui correspondent au nombre de dites LED (3); ladite plaque (5) étant appliquée sur ledit panneau (2), chaque LED (3) correspondant à une lentille respective (61, 62, 63, 64, 65, 66, 67, 68); chacune desdites lentilles (61, 62, 63, 64, 65, 66, 67, 68) ayant un profil différent afin de répartir la lumière émise par la LED respective (3) de manière différente; **caractérisé en ce que** ledit axe longitudinal desdites rangées de LED (3) est, en cours d'utilisation, disposé transversalement à la chaussée éclairée par ledit luminaire ; lesdites lentilles (61, 62, 63, 64, 65, 66, 67, 68) étant configurées pour répartir la lumière vers l'avant en parlant d'une lentille frontale (61) située le plus près du centre de la chaussée et qui répartit la lumière vers l'avant vers le centre de la chaussée, alors que les lentilles (62, 63, 64, 65, 66, 67) qui sont progressivement plus reculées du centre de la chaussée, jusqu'à la lentille arrière (68), répartissent la lumière de manière plus diffusée vers le bas.

2. Luminaire selon la revendication 1, **caractérisé en ce que** ladite plaque transparente comporte un bord interne conçu pour créer un joint avec ledit panneau à LED (2).

3. Luminaire selon la revendication 1, **caractérisé en ce qu'**il comprend un élément frontal (9) constitué par un compartiment en plastique; ledit élément frontal (9) comprimant ladite plaque transparente (5) sur ledit panneau à LED (2).

4. Luminaire selon la revendication 1, **caractérisé en ce que** lesdites LED (3) sont disposées par paires; chacune desdites lentilles (61, 62, 63, 64, 65, 66, 67, 68) étant une double lentille.

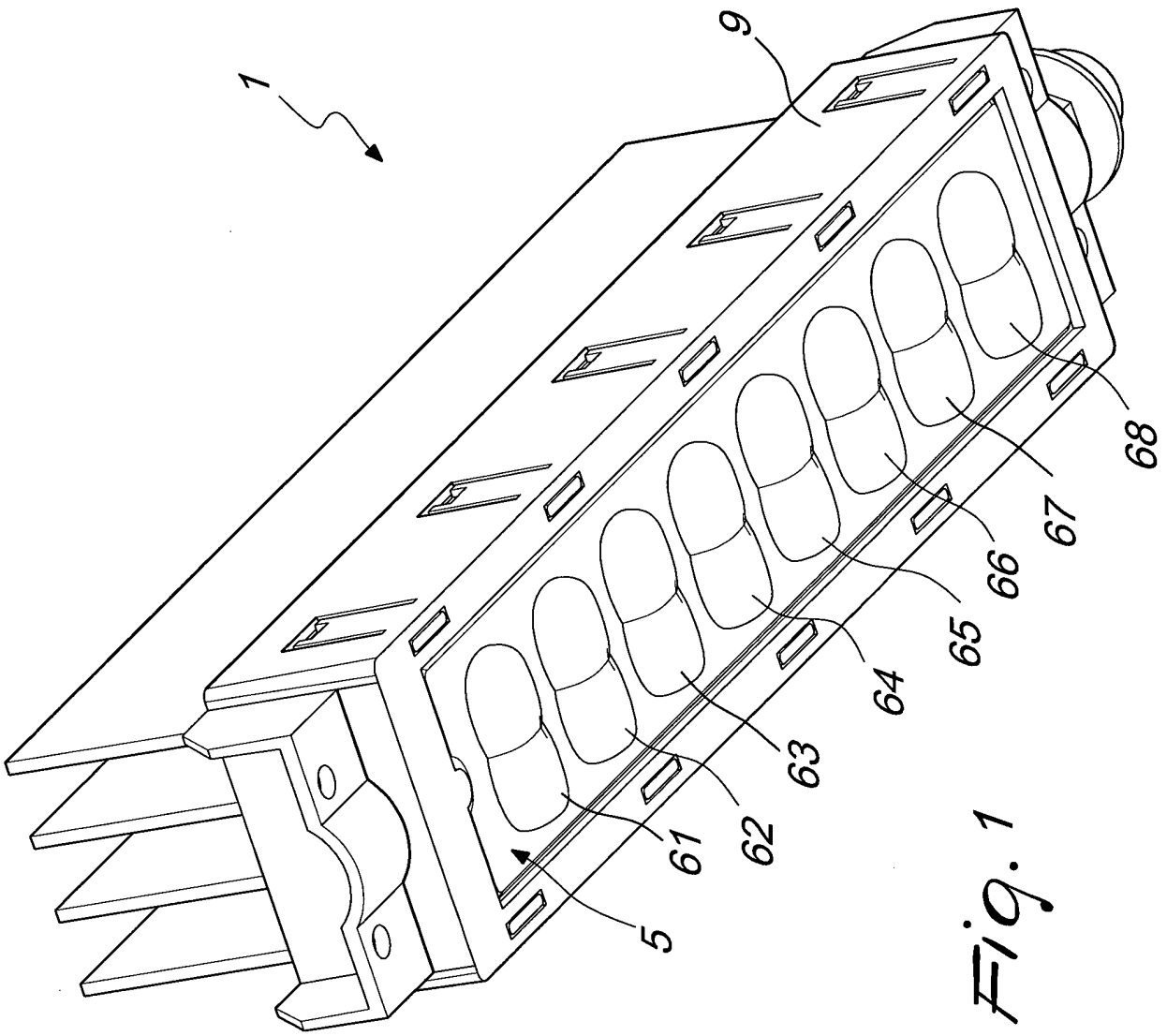


Fig. 1

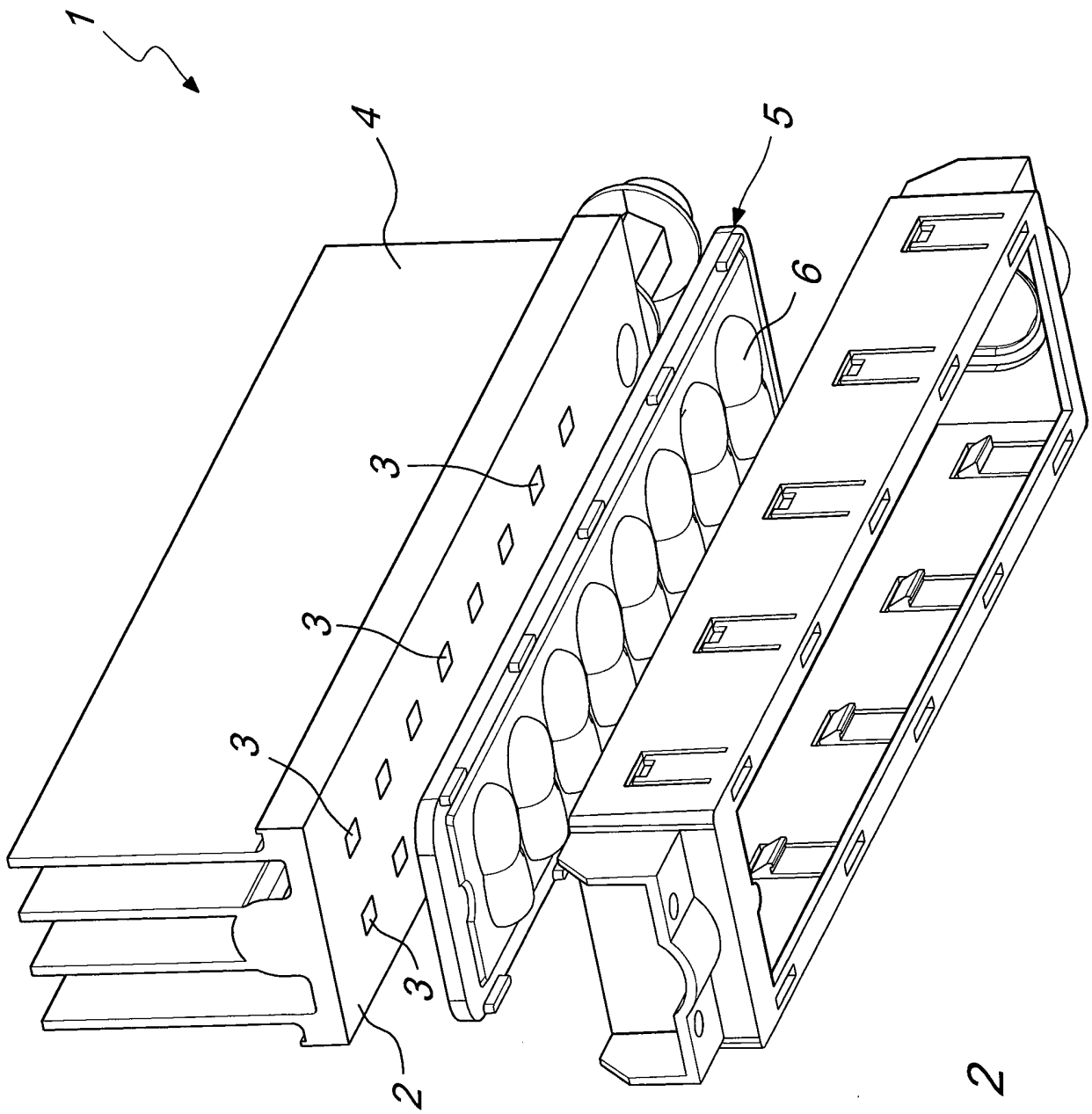


Fig. 2

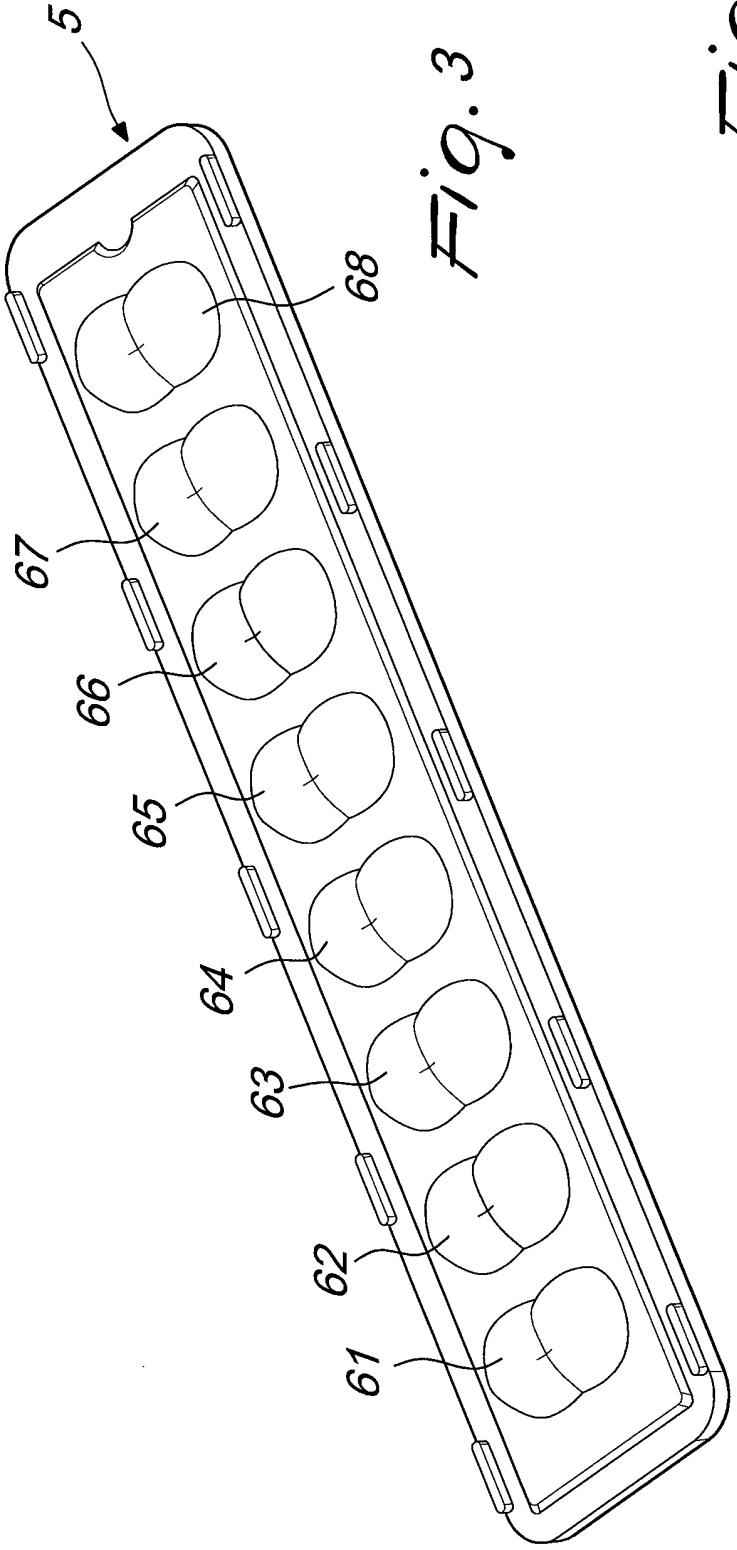

5
68
67
66
65
64
63
62
61

Fig. 3

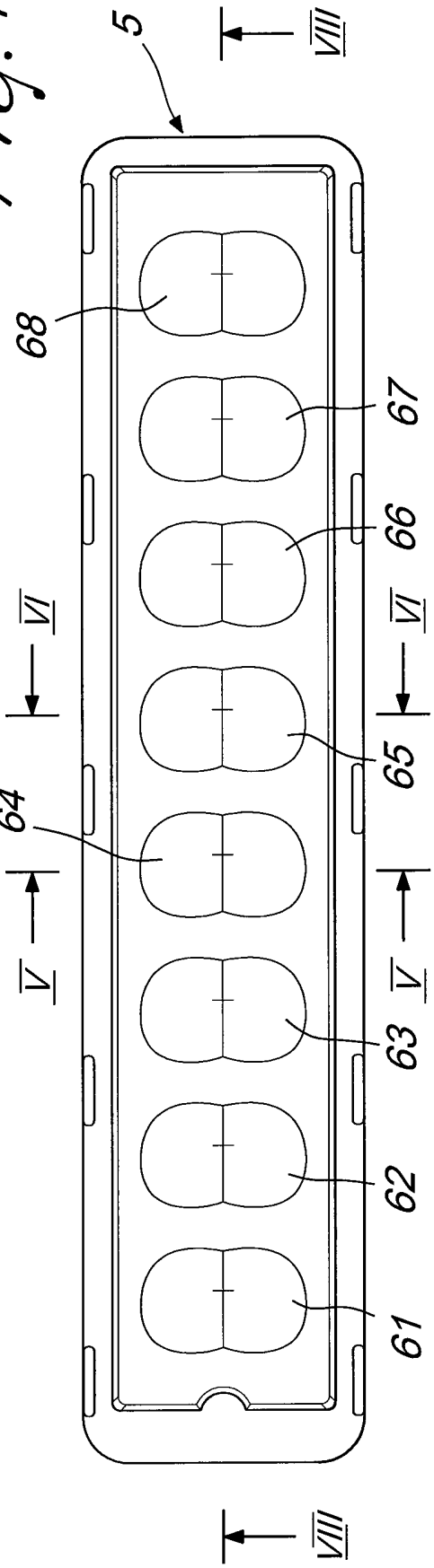

5
VIII
68
67
66
VII
VII
65
64
V
V
63
62
61
VIII

Fig. 4

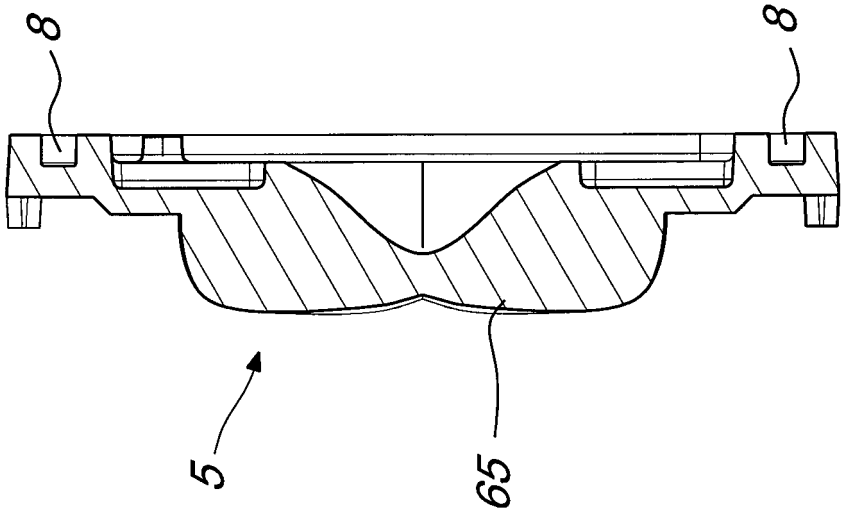


Fig. 6

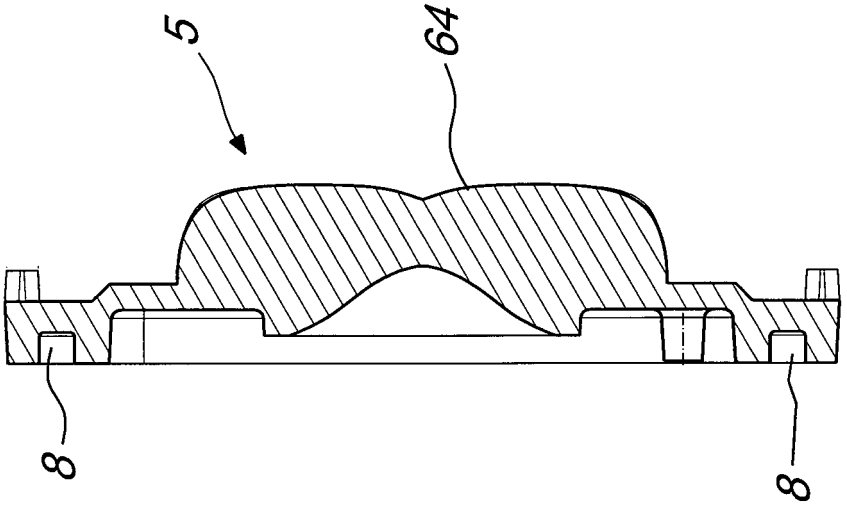


Fig. 5

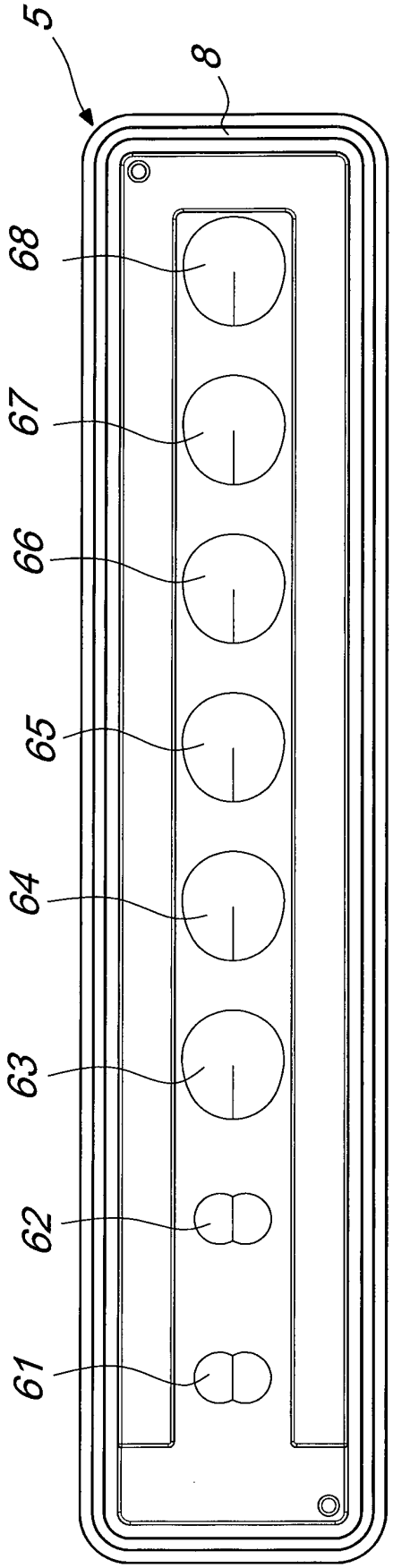


Fig. 7

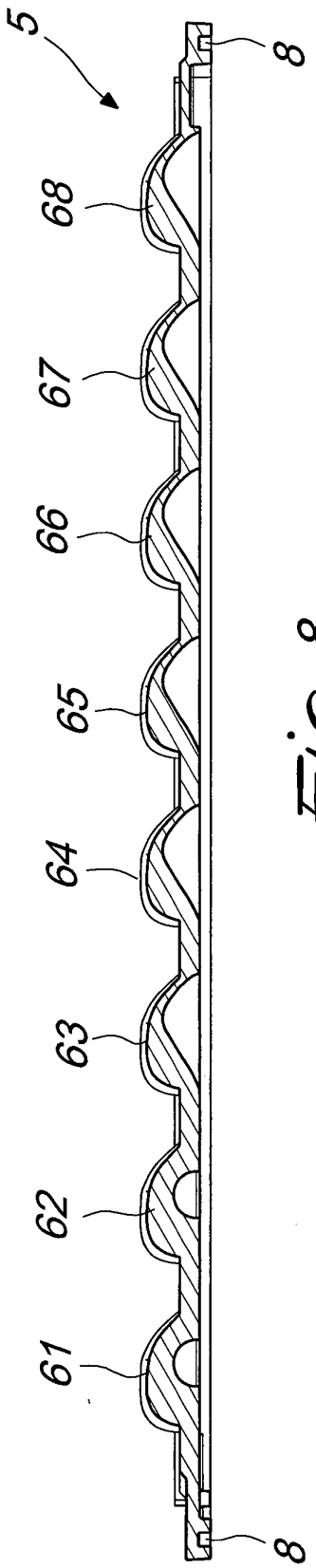


Fig. 8

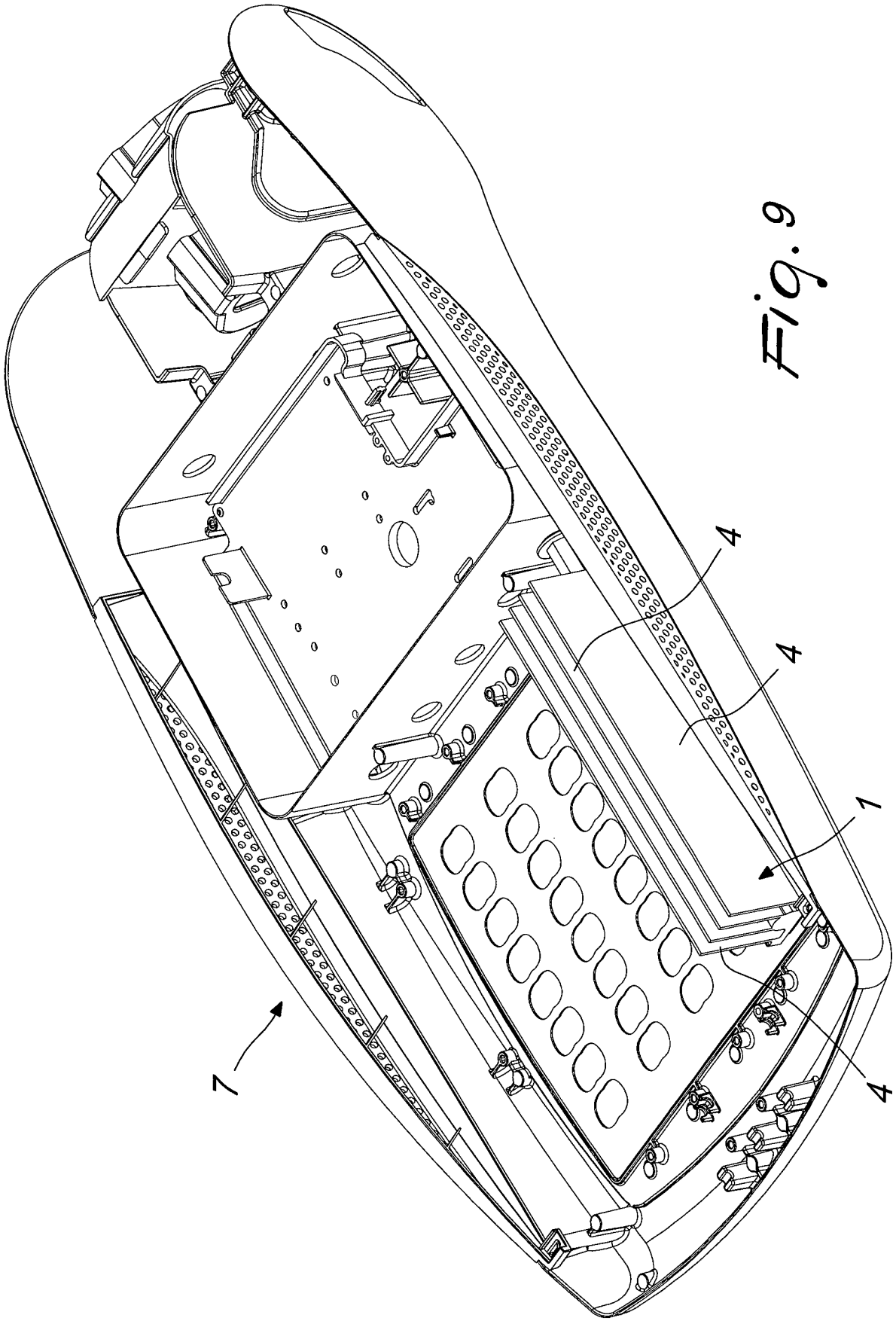


Fig. 9

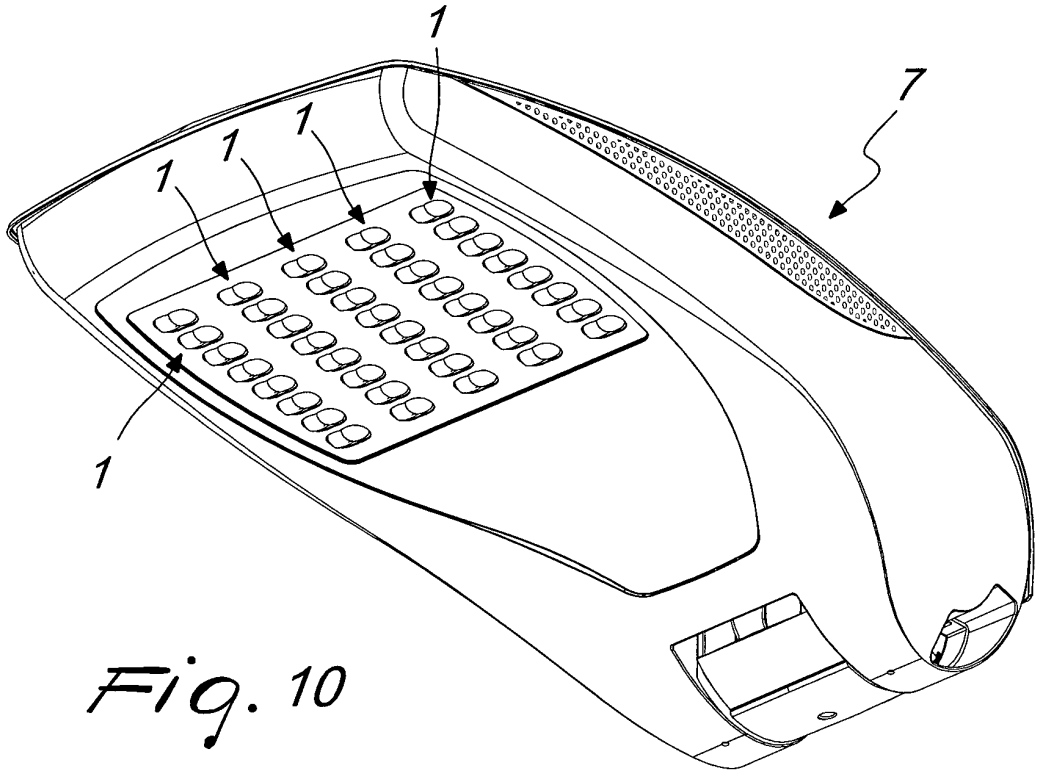


Fig. 10

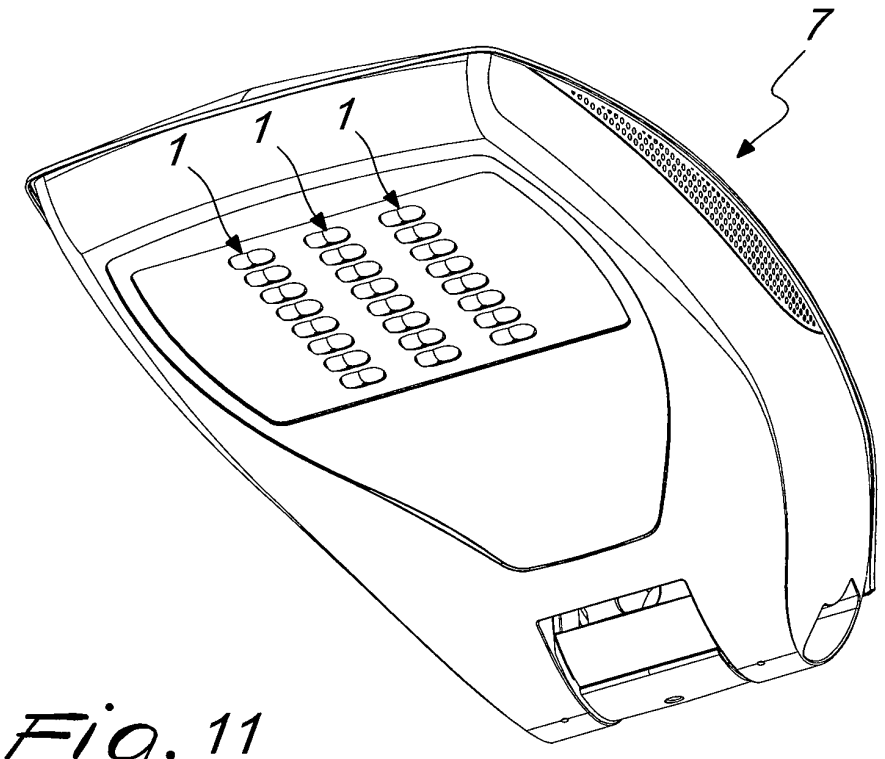


Fig. 11

REFERENCES CITED IN THE DESCRIPTION

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