

(19)



(11)

EP 2 908 050 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
19.08.2015 Bulletin 2015/34

(21) Application number: **14382051.2**

(22) Date of filing: **14.02.2014**

(51) Int Cl.:
F21V 31/00 (2006.01) **F21V 31/03** (2006.01)
F21S 2/00 (2006.01) **F21S 4/00** (2006.01)
F21V 5/04 (2006.01) **F21V 17/12** (2006.01)
F21Y 101/02 (2006.01) **F21Y 103/00** (2006.01)

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME

(71) Applicant: **Hoffmann, Friedemann**
08960 Sant Just Desvern Barcelona (ES)

(72) Inventor: **Hoffmann, Friedemann**
08960 Sant Just Desvern Barcelona (ES)

(74) Representative: **Gallego Jiménez, José Fernando**
Ingenias Creaciones, Signos e Invenciones
S.L.P.
Avda. Diagonal 421, 2
08008 Barcelona (ES)

(54) Lighting module

(57) Lighting module comprising: a row of LEDs that are connected to power supply means; a housing (1) having a flat bottom (11), side walls (12) and a front mouth (13); a printed circuit (3) arranged on the bottom (11) of the housing; a row of LEDs (4) connected to said printed circuit (3) and facing the front mouth (13) of the housing (1); a detachable cover (2) for sealing the front mouth

(13) of the housing, said cover (2) having a line of windows (21) facing respective LEDs (4); a line of lenses (5) of complex surface sealingly fixed to respective windows of the cover (2), wherein said lenses (5) of complex surface have a curvature that is calculated for guiding light from the LEDs (4) towards a certain direction.

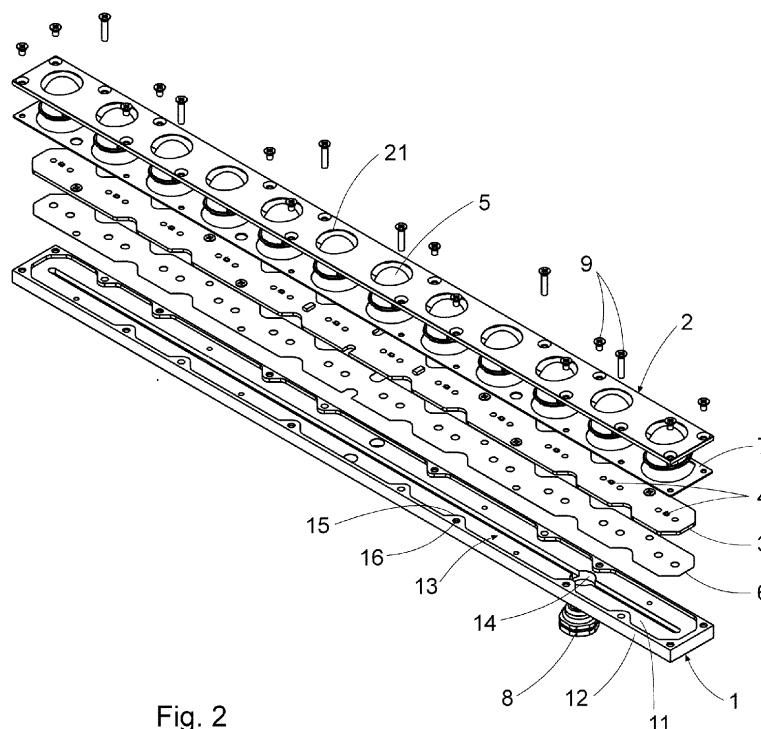


Fig. 2

EP 2 908 050 A1

Description

Object of the invention

[0001] The present invention refers to a lighting module, which comprises a row of LEDs connected to power supply means and presents constructive features aimed at recovering an important part of the lighting module in case of failure and to permit the incorporation of a variable number thereof in both indoor and outdoor lighting fixtures.

Application field

[0002] This lighting module is applicable in the field of manufacturing lighting fixtures and lighting elements in general.

State of the art

[0003] Currently, there are multiple lighting fixtures and lighting elements in the market using light emitting diodes (LEDs) because of the benefits they provide, both from the energy consumption and efficiency points of view.

[0004] In those lamps or lighting fixtures that incorporate one or more groups of LEDs to cover a given lighting area, these LEDs are placed on a curved surface, which is particularly difficult, frontally closing the lighting fixture by means of a transparent or translucent cover so that the light produced by the LEDs can exit to the outside towards a direction that is determined by the position in which said LEDs are installed on said curved surface of the lamp or lighting fixture.

[0005] A drawback of this type of lighting fixtures is the deterioration of the colour and performance of the LEDs when said LEDs are exposed to dirt and chemical contaminants, being frequent that lighting fixtures using LEDs are sealed, which prevents their subsequent repair in case of failure.

[0006] Another drawback of these lighting fixtures is that LEDs generate a bright light that can be uncomfortable and dazzle the observer if (s) he looks straight at them.

[0007] The applicant is not aware of prior art that satisfactorily resolves the issues posed. Therefore, the technical problem posed is the development of a lighting module that allows for solving the above-mentioned drawbacks.

Description of the invention

[0008] The lighting module object of this invention, comprising a row of LEDs connected to power supply means, presents some structural features particularly suited to provide adequate protection against external contamination to LEDs, thus avoiding their rapid deterioration and improving their performance. It also allows for the repair of the module by reusing a substantial part

of it in case of failure, what makes this lighting module especially suitable for being incorporated into lamps or lighting fixtures requiring a large number of LEDs.

[0009] Another objective of the present invention is to provide the lighting module with a flat configuration, thus avoiding the problems involved in installing the LEDs in a curved way.

[0010] Another objective of this lighting module is to provide it with a suitable sealing tightness to allow both its indoor and outdoor use, while allowing the opening of the module to repair it by replacing some of its elements.

[0011] To achieve the objectives proposed, this lighting module comprises a housing provided with a flat bottom, side walls and a front mouth; a printed circuit arranged on the bottom of the housing; a row of LEDs connected to said printed circuit and facing the front mouth of the housing; a removable cover for sealing the front mouth of the housing, the said cover having a line of windows opposing the respective LEDs of the row of LEDs; a line of lenses of complex surface sealingly fixed to the respective windows of the cover, said lenses of complex surface presenting a curvature that is calculated for guiding the light emitted by the LEDs towards a particular direction.

[0012] Between the printed circuit and the bottom of the housing, said module includes a thermal transfer sheet to facilitate the dissipation of the heat generated by the LEDs during operation, it being provided that said housing is made from a material having good heat transmission properties, such as aluminium.

[0013] Between the cover and the mouth of the housing, the module includes a seal which allows for sealing the housing, thus preventing the entry of dust or other contaminants to the housing that may affect the colour or the performance of the LEDs.

[0014] With the elements described above it is achieved that the LEDs are installed flat on the printed circuit housed inside the module and that the light emitted by the LEDs is guided by the respective lenses of complex surface towards the desired direction without having to install the LEDs in a curved way.

[0015] By removing the cover, the inside of the module can be accessed to replace the printed circuit carrying the LEDs in the event of a failure, while minimizing the cost of repair since both the housing and the cover carrying the lenses of complex surface can be reused, which enables the module to be repaired at a very low cost.

[0016] Another feature of this invention is that the housing and/or the cover comprises at least one through-hole into which a pressure regulating valve is mounted, which prevents entry of water into the housing and allows for the exit of air from the inside thereof.

[0017] The incorporation of this compensating valve allows for expelling air and any chemical contaminating to the outside when heating occurs inside the module, due to the heat dissipated by the LEDs during operation.

[0018] To allow for the installation of one or more modules on a supporting surface or a lighting fixture, the hous-

ing of the module has, at its periphery, solid portions with holes for receiving fixing screws for the attachment to said support or lighting fixture.

[0019] The electrical connection of the printed circuit to an external power supply will be performed by means of cables installed through the holes defined in the cover or in the housing and provided with respective seal gasket suitable to maintain the sealing tightness of the module.

[0020] To prevent the light emitted by the LEDs from dazzling any observers and be annoying, in one embodiment example the lenses of complex surface have, at least at one of their inner and outer surfaces, embossed patterns that are defined during the moulding conformation of said lenses, which perform a dispersion or fading of the light emitted by the LEDs, thus avoiding discomfort from glare.

Description of figures

[0021] In order to complement the description that is being carried out and with the purpose of facilitating the understanding of the characteristics of the invention, the present description is accompanied by a set of drawings wherein, by way of a non-limiting example, the following has been represented:

- Figure 1 shows a perspective view of one embodiment example of the lighting module according to the invention.
- Figure 2 shows an exploded perspective view of the lighting module of the previous figure.
- Figure 3 shows a detail in elevation view of the module cover sectioned along a vertical plane and in which the installation of the lenses through the windows of said cover can be seen.
- Figure 4 shows an elevation view of one of the lenses of complex surface having an embossed pattern on its outer surface and an enlarged detail thereof.

Preferred embodiment of the invention

[0022] As can be seen in the attached figures, the lighting module comprises a housing (1), in this case in aluminium, which has a flat bottom (11), side walls (12) and a front mouth (13) on which a cover (2) is removably fixed by means of screws (91).

[0023] Inside the housing (1) a printed circuit (3) is arranged, to which a row of LEDs (4) facing the mouth (13) of the housing are connected.

[0024] The cover (2) has a row of windows (21) in which lenses (5) of complex surface are fixed by gluing, as seen in the detail of Figure 3, so that in the fixing position of the cover said lenses (5) are opposite to respective LEDs (4).

[0025] The lenses (5) of complex surface have a curvature

that is calculated to guide the light emitted by the LEDs (4) towards a certain direction.

[0026] In this embodiment example it is envisaged that the printed circuit (3) can be resin coated inside the housing (1) to provide additional protection.

[0027] As can be seen in the exploded view of Figure 2, between the printed circuit (3) and the bottom (11) of the housing (1), a heat transfer sheet (6) is arranged in order to promote heat dissipation of the heat produced by the LEDs by means of the aluminium housing (1) itself.

[0028] Between the cover (2) and the mouth (13) of the housing (1) a sealing gasket (7) is arranged, which in this embodiment example takes the shape of a flat sheet with a plurality of holes in the areas facing the LEDs (4) and the respective lenses (5).

[0029] The housing (1) has at its bottom an opening (14) in which a pressure regulating valve (8) is mounted.

[0030] As can be seen in Figure 2, the housing has at its periphery solid portions (15) with holes (16) for the insertion of fixing screws (9).

[0031] In the embodiment example shown in Figure 3, the lenses (5) present at their periphery a flange (51) forming their mounting stop for the windows (21) of the cover (2) and forming surfaces that are intended to be fixed to said cover (2) by means of an adhesive.

[0032] In the example shown in Figure 4, the lenses (5) of complex surface present, on their outer surface, an embossed pattern (52) defined during the moulding of said lenses (5) on glass, and suitable for scattering or fading the light emitted by the LEDs, thus avoiding discomfort from glare.

[0033] Once the nature of the invention as well as an example of preferred embodiment have been sufficiently described, it is stated for all pertinent purposes that the materials, form, size and arrangement of the elements described are susceptible to changes, provided these do not involve an alteration of the essential characteristics of the invention that are claimed subsequently.

Claims

1. - Lighting module comprising a row of LEDs that are connected to power supply means; **characterized in that** it comprises: a housing (1) having a flat bottom (11) side walls (12) and a front mouth (13); a printed circuit (3) arranged on the bottom (11) of the housing; a row of LEDs (4) connected to said printed circuit (3) and facing the front mouth (13) of the housing (1); a detachable cover (2) for sealing the front mouth (13) of the housing, said cover (2) having a line of windows (21) facing respective LEDs (4); and a line of lenses (5) of complex surface sealingly fixed to the respective windows of the cover (2), wherein said lenses (5) of complex surface have a curvature that is calculated for guiding light from the LEDs (4) towards a certain direction.

2. -. Module according to claim 1 **characterized in that** it comprises a heat transfer sheet (6) between the printed circuit (3) and the bottom (11) of the housing.
3. -. Module according to claim 1 **characterized in that** it comprises a sealing gasket (7) between the cover (2) and the mouth (13) of the housing (1). 5
4. -. Module according to claim 1 **characterized in that** the housing (1) and/or the cover (2) comprises at least one hole (14) in which a pressure regulating valve (8) that prevents the entry of water into the housing (1) is installed and allows for the air to escape from the inside thereof. 10
5. -. Module according to claim 1 **characterized in that** the housing has at its periphery solid portions (15) with holes (16) for the insertion of fixing screws (9). 15
6. -. Module according to claim 1 **characterized in that** the lenses (5) of complex surface present on its outer surface an embossed pattern (52). 20

25

30

35

40

45

50

55

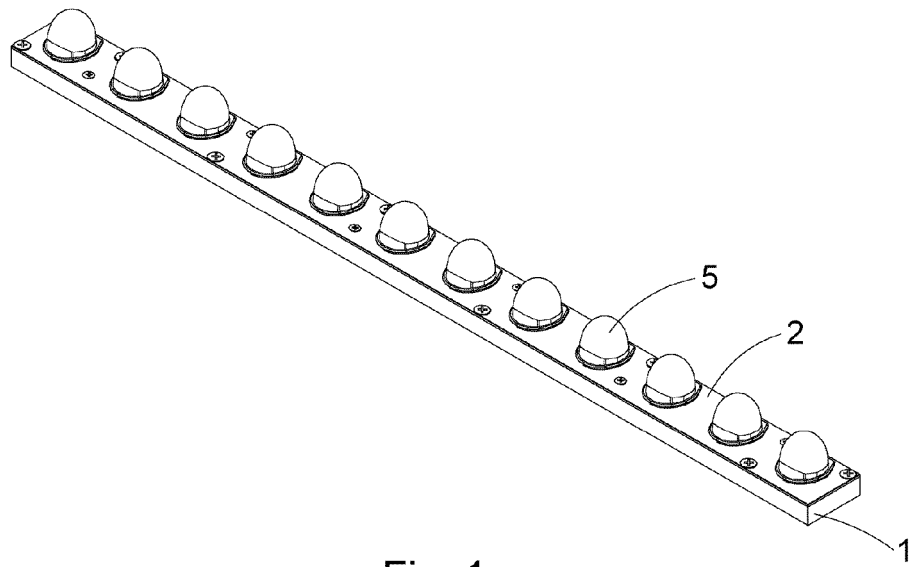


Fig. 1

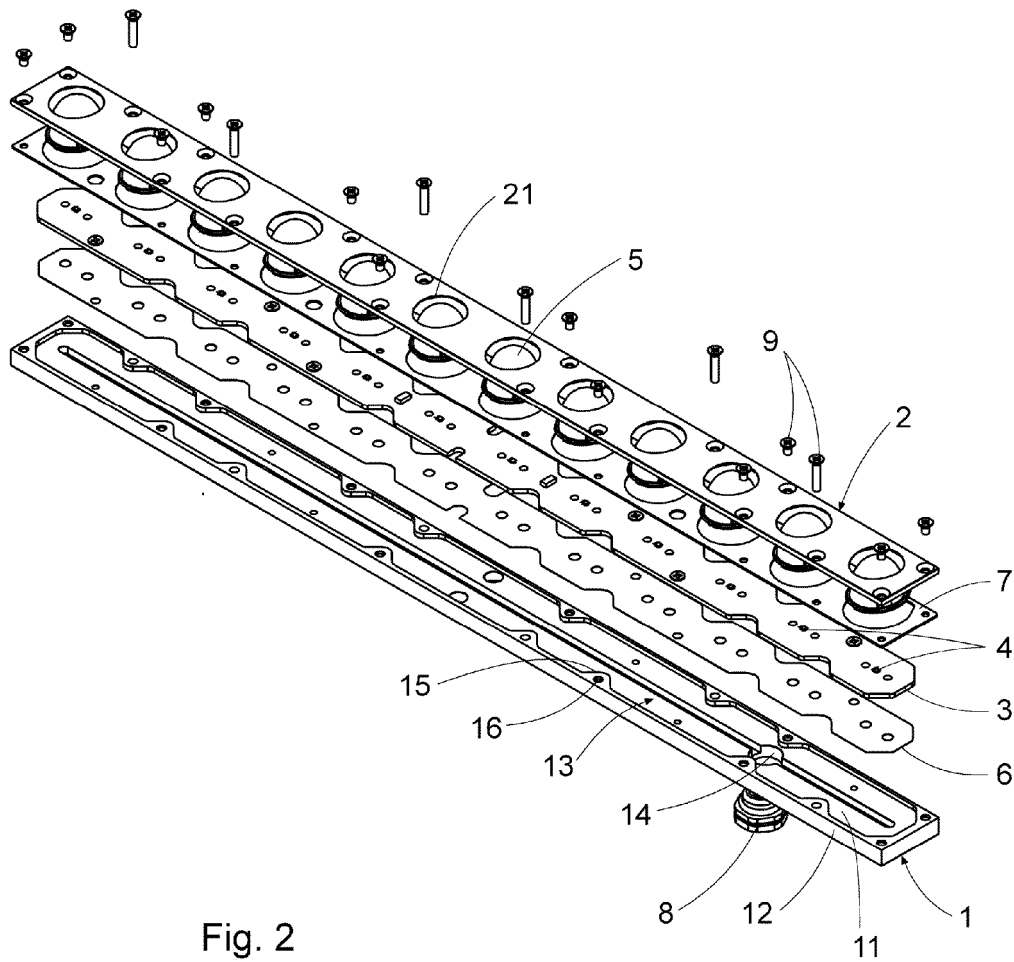


Fig. 2

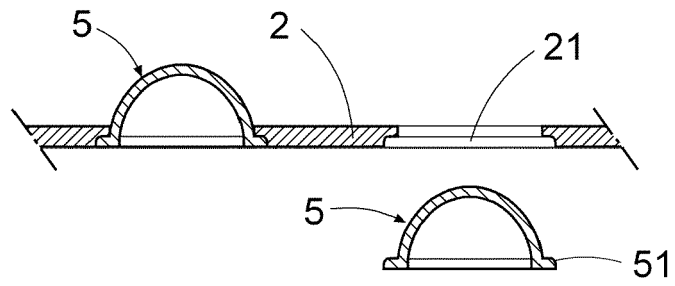


Fig. 3

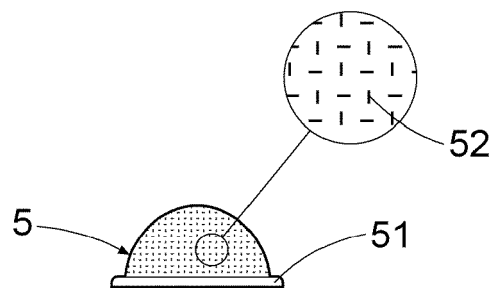


Fig. 4



EUROPEAN SEARCH REPORT

 Application Number
EP 14 38 2051

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	CN 201 382 340 Y (TIANAI HAIWEI ELECTRO MECHANICAL CO LTD) 13 January 2010 (2010-01-13) * the whole document *	1-6	INV. F21V31/00 F21V31/03 F21S2/00 F21S4/00 F21V5/04 F21V17/12
Y	US 2013/194799 A1 (WU HSIANG-CHEN [TW] ET AL) 1 August 2013 (2013-08-01) * paragraph [0029]; figures 1-2 *	1,3,6	
Y	DE 20 2010 004871 U1 (LIGHTDESIGN SOLUTIONS GMBH [DE]) 29 July 2010 (2010-07-29) * paragraph [0033]; figures *	2	ADD. F21Y101/02 F21Y103/00
Y	CN 201 246 634 Y (TIANAI HAIWEI ELECTRO MECHANICAL [CN]) 27 May 2009 (2009-05-27) * the whole document *	1,3,5	
Y	CN 102 221 141 B (XIAMEN GREENER OPTO SEMICONDUCTORS INC XIAMEN GREENER OPTOELECTRONICS) 17 July 2013 (2013-07-17) * abstract; figures *	1,3,5	TECHNICAL FIELDS SEARCHED (IPC)
Y	CN 201 462 503 U (HUAIZHONG CHEN) 12 May 2010 (2010-05-12) * the whole document *	1,3,5	F21V F21S F21Y
Y	CN 203 024 119 U (GUANGDONG TONGFANG LIGHTING CO LTD) 26 June 2013 (2013-06-26) * abstract; figures *	4	
Y	CN 201 651 911 U (ZHEJIANG JIELAI LIGHTING CO LTD) 24 November 2010 (2010-11-24) * the whole document *	4	
A	US 2011/103051 A1 (WILCOX KURT S [US] ET AL) 5 May 2011 (2011-05-05) * abstract; figures *	1,3,5	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 14 August 2014	Examiner Berthommé, Emmanuel
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			

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 14 38 2051

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

14-08-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CN 201382340 Y	13-01-2010	NONE	
US 2013194799 A1	01-08-2013	TW 201333371 A US 2013194799 A1	16-08-2013 01-08-2013
DE 202010004871 U1	29-07-2010	NONE	
CN 201246634 Y	27-05-2009	NONE	
CN 102221141 B	17-07-2013	NONE	
CN 201462503 U	12-05-2010	NONE	
CN 203024119 U	26-06-2013	NONE	
CN 201651911 U	24-11-2010	NONE	
US 2011103051 A1	05-05-2011	AU 2010313751 A1 CA 2779266 A1 CN 102869918 A EP 2494266 A1 JP 2013509686 A KR 20120116917 A US 2011103051 A1 WO 2011053349 A1	31-05-2012 05-05-2011 09-01-2013 05-09-2012 14-03-2013 23-10-2012 05-05-2011 05-05-2011

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82