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(54) **LIGHTING APPARATUS**

(57) The lighting apparatus (1) comprises at least a support body (2) and at least a lighting device (3a, 3b) associated with the support body (2), and comprises a plurality of said lighting devices (3a, 3b) of which:
- at least a first lighting device (3a) comprising at least a first emitting element (4a) able to emit light radiation and at least a first lighting appliance (5a) associated with the first emitting element (4a) and having a first inner surface (6a) substantially polygonal able to diffuse the light radiation; and
- at least a second lighting device (3b) comprising at least a second emitting element (4b) able to emit light radiation and at least a second lighting appliance (5b) associated with the second emitting element (4b) and having a second inner surface (6b) substantially smooth able to direct the light radiation.

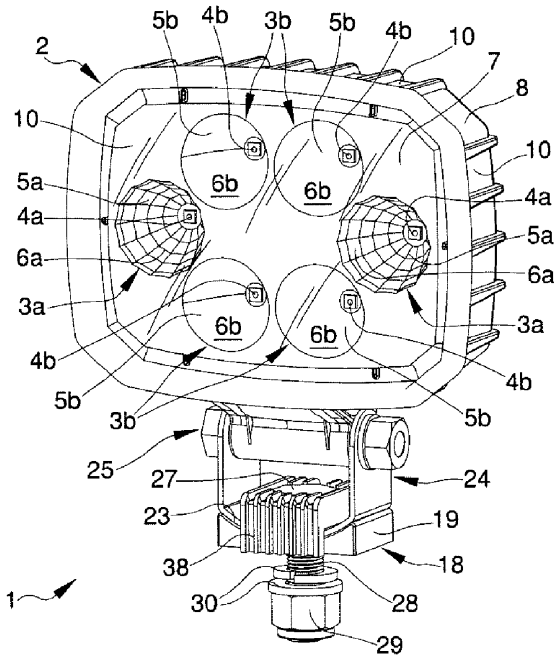

Fig. 1

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Description

[0001] The present invention relates to a lighting apparatus, particularly to a removable lighting apparatus.

[0002] Lighting apparatus are used, such as removable spotlights, to illuminate indoor and outdoor environments in special circumstances requiring temporary and/or exceptional illumination of areas which are not normally illuminated.

[0003] Known spotlights generally have a metal support body similar to a cap inside which one or more light sources and the electrical circuits thereof are placed. These spotlights have coupling devices which allow to be fixed in a removable manner to walls or means of transport to be used in several environments and for different purposes.

[0004] Several types of these apparatus exist which, besides distinguishing by shape and size, can accommodate various types of light sources.

[0005] In particular, spotlights are used which have one or more traditional light sources inside, such as incandescent lamps, gas discharge lamps and the like. The operation of these apparatus has been improved by making LED spotlights, much more efficient and long-lasting than traditional light sources.

[0006] The latter, in fact, have some drawbacks both as regards efficiency, given that by their nature they tend to opacify the glass covering them, both as regards their lifespan, since they last less than LEDs.

[0007] Even known LED fixtures have some drawbacks.

[0008] One drawback is related to the temperature these apparatus can reach during operation.

[0009] LEDs, in fact, are very sensitive to heat and excessive operating temperatures lead to a shortening of lifespan or to the destruction of the LED itself.

[0010] For this reason, in known LED spotlights the support body must be designed in such a way as to ensure a sufficient heat dissipation.

[0011] This is achieved by increasing the surface of the body in contact with air and hence with a larger and heavier body.

[0012] This drawback is worsened by the fact that the bodies of known spotlights are commonly made of a metal material, and therefore there would be a considerable increase in the weight of the spotlight with a consequent reduction in manageability and convenience, as well as an increase in the manufacturing cost.

[0013] Another drawback of known spotlights is related to the versatility and flexibility of use.

[0014] Known spotlights, in fact, are designed in such a way as to have one or more light sources of the same type and arranged to illuminate the environment according to a precise mode of use.

[0015] This way it is impossible to switch from one lighting mode to another using the same spotlight, but a different spotlight has to be used for each type of lighting one wish to make.

[0016] For example, as it often happens in night work in the fields, or as is the case of lighting of theater scenes and the like, if there is the need to switch from a diffuse lighting mode, wherein a large area is illuminated, to a punctual lighting mode, wherein a small area is lit, two spotlights have to be prepared.

[0017] The main aim of the present invention is to provide a lighting apparatus that allows to have different lighting modes and to switch from one mode to another in a simple and fast manner.

[0018] Another aim of the present invention is to provide an apparatus that allows effective heat dissipation ensuring illuminance suitable for the user's purposes. Another object of the present invention is to provide an apparatus which is easy to position and adjustable in a convenient and simple manner.

[0019] Another object of the present invention is to provide an apparatus that allows to overcome the mentioned drawbacks of the prior art within the ambit of a simple, rational, easy, effective to use and affordable solution.

[0020] The objects stated above are achieved by the present lighting apparatus having the characteristics of claim 1.

[0021] Other characteristics and advantages of the present invention will become better evident from the description of a preferred but not exclusive embodiment of a lighting apparatus, illustrated by way of an indicative, but non-limiting, example in the accompanying drawings in which:

Figure 1 is a front axonometric view of the apparatus according to the invention;
Figure 2 is a rear axonometric view of the apparatus according to the invention;
Figure 3 is an exploded view of the apparatus according to the invention.

[0022] With particular reference to such illustrations, reference number 1 globally indicates a lighting apparatus.

[0023] The lighting apparatus 1 has a support body 2 and at least a lighting device 3a, 3b associated with the support body 2.

[0024] The apparatus 1 has a plurality of lighting devices 3a, 3b, in particular, in the present embodiment, the number of lighting devices 3a, 3b is equal to six. Embodiments are not ruled out wherein the number of such devices is greater or lesser than 6.

[0025] A lighting device 3a, 3b consists of an emitting element 4a, 4b and a lighting appliance 5a, 5b.

[0026] The emitting element 4a, 4b is able to emit light radiation and is composed of, e.g., a LED light, but alternative embodiments are not ruled out.

[0027] The lighting appliance 5a, 5b is advantageously a casing able to define and direct the radiation emitted by the emitting element 4a, 4b.

[0028] In the present embodiment, the lighting appliance 5a, 5b is a casing the surface of which draws a

paraboloid at the apex of which is placed an emitting element 4a, 4b and the axis of symmetry of which comes out in a direction orthogonal to the plane on which the emitting elements 4a, 4b lie.

[0029] Embodiments cannot be ruled out wherein the lighting appliance 5a, 5b has alternative forms.

[0030] According to the invention at least a first lighting device 3a is composed of a first emitting element 4a and a first lighting appliance 5a.

[0031] The first lighting appliance 5a is associated with the first emitting element 4a and has a first inner polygonal surface 6a able to diffuse light radiation.

[0032] As illustrated in Figure 1, the first inner surface 6a is composed of a set of quadrangular polygons which are positioned side by side to each other.

[0033] In particular, the polygons are elements coated with a reflective material and are directed so as to deflect the incident radiation towards the other polygons which, in turn, further reflect the incident radiation by amplifying and diffusing the light radiation emitted by the LED.

[0034] The light beam exiting from the first lighting appliance 5a, therefore, is a beam of diffused light, suitable to illuminate large areas.

[0035] The apparatus 1 also has at least a second lighting device 3b comprising a second emitting element 4b able to emit light radiation and a second lighting appliance 5b.

[0036] The second lighting appliance 5b is also associated with the second emitting element 4b, but in this case has a second inner surface 6b substantially smooth and able to direct the light radiation produced by the LED.

[0037] In such an inner surface, the reflection phenomenon of the incident radiation is minimized and there is no significant amplification and diffusion of the light emitted by the LED.

[0038] The light beam exiting from the second lighting appliance 5b, therefore, is a well-defined light beam, suitable to illuminate circumscribed and limited areas in a substantially punctual manner.

[0039] As shown in Figure 1, two out of six lighting devices 3a, 3b present in the apparatus 1 are first lighting devices 3a and are arranged in a substantially peripheral position, so as to maximize the diffused light produced.

[0040] The other four devices are second lighting devices 3b and are arranged in a substantially central position, so as to obtain a well-defined single light beam which can be directed towards a point to illuminate.

[0041] In the present embodiment, the first and second lighting appliances 5a, 5b are made in a single body piece.

[0042] In particular, the single body piece has a substantially plate-shaped element 7 comprising convexities defining the lighting appliances 5a, 5b.

[0043] More particularly, convexities are the outer surfaces of the lighting appliances 5a, 5b and are extruded from the substantially plate-shaped element 7.

[0044] The substantially plate-shaped element 7 has a shape and dimensions such as to be accommodated inside the support body 2.

[0045] In particular, the support body 2 comprises a cap element 8 able to house the first and second lighting devices 3a, 3b and related electrical components.

[0046] The cap element 8 has a bottom wall 9 and a plurality of side walls 10 which, besides defining the perimeter edge of the support body 2, also define the depth of the cap element 8.

[0047] The cap element 8 is closed on top by a transparent element 11, conveniently glass, with the substantially plate-shaped element 7 inserted to measure inside said cap.

[0048] The transparent element 11 protects the internal parts of the apparatus 1 from external agents such as water, dust, etc..

[0049] Between the substantially plate-shaped element 7 and the bottom wall 9 is placed a printed circuit board 12 on which the emitting elements 4a, 4b are positioned.

[0050] As illustrated in Figure 3, the printed circuit board 12 is also insertable to measure in the cap element 8 and is fixed to the bottom wall 9 by means of connecting elements 13, e.g. star screws or the like.

[0051] The printed circuit board 12 also comprises a through opening 14 able to make the electrical connections necessary for the operation of LEDs pass through. To allow greater heat dissipation a thermo-conductive resin is applied between the support body 2 and the printed circuit board 12.

[0052] The cap element 8 also has an outer surface 9a with ribs 15, 16 able to reinforce the support body 2 and facilitate heat dissipation.

[0053] The ribs 15, 16, in fact, besides providing thicknesses that increase the resistance of the support body 2, increase the outer surface 9a in contact with air, promoting heat exchange between the support body 2 and the air itself. According to the invention, the ribs 15, 16 are divided into first ribs 15 and second ribs 16.

[0054] With reference to Figure 2, the first ribs 15 have a first stretch 15a substantially straight which extends on one of the side walls 10, a second stretch 15b substantially curved which extends on the bottom wall 9 and connected to the first stretch 15a, and a third stretch 15c substantially straight which extends on an adjacent side wall and connected to the second stretch 15b.

[0055] The second ribs 16 have a first stretch 16a substantially straight which extends on one of the side walls 10 and a second stretch 16b which extends on the bottom wall 9 and connected to the first stretch 16a.

[0056] The ribs 15, 16 so arranged promote circulation of air between the ribs themselves, thus increasing the ability of the support body 2 to dissipate heat. Still with reference to Figure 2, in correspondence of the outer surface 9a is placed an attachment medium 17 able to connect the apparatus to the electrical mains.

[0057] In the present embodiment, the attachment medium 17 is composed of a housing seat able to accommodate the end part of an electric cable. Embodiments

with different connections are not ruled out comprising, e.g., an integrated cable or other forms of connection.

[0058] The cap element 8 is made of plastic material able to disperse heat.

[0059] Advantageously, the cap element 8 is made of plastic which is obtained from a polymer composition such as to ensure structural resistance for the illuminance required and relative operating temperatures, as well as to ensure heat dissipation such as to keep the temperature within acceptable limits for LEDs operation.

[0060] The apparatus 1 comprises an attachment device 18 of the support body 2 to a bearing structure such as a fixed wall or the chassis of a means of transport, etc. In the present embodiment, the attachment device 18 comprises a base 19 stably associable with the bearing structure and articulation means 23, 24, 25 interposed between the base 19 and the support body 2.

[0061] The latter allow the support body 2 to rotate with respect to the bearing structure.

[0062] In particular, once defined a first direction 20 with respect to which the base 19 has to be secured, the articulation means 23, 24, 25 allow to rotate the support body 2 around a second and a third direction 21 and 22 mutually orthogonal to the first direction 20.

[0063] More particularly, the articulation means 23, 24, 25 comprise a first cylindrical surface 23, an intermediate element 24 and a hinging assembly 25.

[0064] The first cylindrical surface 23 is formed on the base 19.

[0065] The base 19 has a hole 26 able to make a fixing screw 27, 28, 29, 30 pass to measure.

[0066] In the present embodiment, the fixing screw 27, 28, 29, 30 is advantageously a traditional bolt having a prismatic hexagonal head 27, a threaded screw 28, a screwable nut 29 and washers 30 placed between the nut 29 and the base 19. The intermediate element 24 has a second cylindrical surface 33 substantially complementary to the first cylindrical surface 23 and sliding at least in part on it so as to make the support body rotate around the second direction 21.

[0067] In particular, the intermediate element 24 is "U"-shaped, with a central part 31 and two side parts 32.

[0068] The central part 31 is curved and allows a rotational sliding of the second cylindrical surface 33 on the first cylindrical surface 23.

[0069] Moreover, the central part 31 has a slot 34 able to make the fixing screw 27, 28, 29, 30 pass through.

[0070] The side parts 32 have two gaps 35 able to make a pin 29a, 30a, 36 pass through.

[0071] In the present embodiment, the pin 29a, 30a, 36 is composed of a bolt with smooth shank 36 and relative nut 29a and washer 30a.

[0072] The bolt is part of the hinging assembly 25 which is interposed between the support body 2 and the intermediate element 24.

[0073] In particular, the support body 2 has a cylindrical hollow extrusion 37 aligned with the gaps 35 along the third direction 22 and secured to the intermediate element 24 by means of the pin 29a, 30a, 36 inserted into the gaps 35 and in the hollow extrusion 37.

[0074] The hinging assembly 25 allows the support body 2 to rotate with respect to the third direction 22.

[0075] Embodiments are not ruled out wherein the articulation means 23, 24, 25 are made with different solutions allowing rotation in the three directions 20, 21, 22.

[0076] To lock the position of the support body 2, the attachment device 18 has a "C"-shaped fixing element 38 and has a prismatic housing seat 39.

[0077] This seat has a hexagonal outline and is able to be coupled to the head 27 of the bolt so as to prevent rotations around the first direction 20.

[0078] The fixing element 38 is able to embrace at least in part the intermediate element 24 and the base 19, so as to prevent rotations around the second direction 21.

[0079] The fixing screw 27, 28, 29, 30, besides having the prismatic head 27 insertable into the prismatic housing seat 39, is associable with the bearing structure.

[0080] In particular, by tightening the fixing screw 27, 28, 29, 30, the support body 2 is fixed together with the bearing structure.

[0081] The operation of the present invention is as follows.

[0082] The apparatus 1, fixed to a bearing structure by means of the attachment device 18, is directed towards the area or the point to be illuminated by adjusting the articulation means 23, 24, 25 and is connected to the electrical mains.

[0083] With the emitting elements 4a, 4b switched on, a light beam is generated by means of which the area or the selected point are illuminated.

[0084] In a first lighting mode the first lighting devices 3a are switched on, so the light radiation is amplified and diffused in such a way that the apparatus 1 illuminates an extended area.

[0085] In a second lighting mode the second lighting devices 3b are switched on, so the light radiation is concentrated in a well-defined beam in such a way that the apparatus 1 illuminates a precise point.

[0086] One or more mixed lighting modes cannot be ruled out wherein some or all first and second lighting devices 3a, 3b are switched on.

[0087] In any lighting mode there is an increase in the temperature of the apparatus 1 which is proportional to the illuminance exploited.

[0088] This increase in temperature is limited by the particular shape of the outer surface 9a wherein the ribs 15, 16 are arranged in such a way as to promote air circulation and heat dissipation.

[0089] It has in practice been found how the described invention achieves the intended objects and in particular the fact is underlined that the apparatus allows to obtain several lighting modes and to switch from one mode to another in a simple and fast manner thanks to the arrangement and conformation of the lighting devices.

[0090] The apparatus also ensures an effective heat dissipation due to the particular arrangement of the ribs.

[0091] Finally, the present invention allows to have an apparatus easy to position and adjustable in a practical and simple manner thanks to the special attachment device.

Claims

1. Lighting apparatus (1) comprising at least a support body (2) and at least a lighting device (3a, 3b) associated with said support body (2), **characterized by** the fact that it comprises a plurality of said lighting devices (3a, 3b) of which:

   - at least a first lighting device (3a) comprising at least a first emitting element (4a) able to emit light radiation and at least a first lighting appliance (5a) associated with said first emitting element (4a) and having a first inner surface (6a) substantially polygonal able to diffuse said light radiation; and
   - at least a second lighting device (3b) comprising at least a second emitting element (4b) able to emit light radiation and at least a second lighting appliance (5b) associated with said second emitting element (4b) and having a second inner surface (6b) substantially smooth able to direct said light radiation.

2. Apparatus (1) according to claim 1, **characterized by** the fact that it comprises a plurality of said first lighting devices (3a) arranged in a substantially peripheral position.

3. Apparatus (1) according to one or more of the preceding claims, **characterized by** the fact that it comprises a plurality of said second lighting devices (3b) arranged in a substantially central position.

4. Apparatus (1) according to one or more of the preceding claims, **characterized by** the fact that said first and second lighting appliances (5a, 5b) are made in a single body piece comprising a substantially plate-shaped element comprising convexities defining said lighting appliances (5a, 5b).

5. Apparatus (1) according to one or more of the preceding claims, **characterized by** the fact that said support body (2) comprises at least a cap element (8) able to house said first and second lighting devices (3a, 3b).

6. Apparatus (1) according to one or more of the preceding claims, **characterized by** the fact that said cap element (8) has a bottom wall (9) and a plurality of side walls (10).

7. Apparatus (1) according to one or more of the preceding claims, **characterized by** the fact that said cap element (8) comprises an outer surface (9a) having ribs (15, 16) able to reinforce said support body (2) and facilitate the dissipation of heat.

8. Apparatus (1) according to one or more of the preceding claims, **characterized by** the fact that said ribs (15, 16) comprise first ribs (15) having a first stretch (15a) substantially straight which extends on one of said side walls (10), a second stretch (15b) substantially curved which extends on said bottom wall (9) and connected to said first stretch (15a), and a third stretch (15c) substantially straight which extends on an adjacent side wall (10) and connected to said second stretch (15b).

9. Apparatus (1) according to one or more of the preceding claims, **characterized by** the fact that said ribs (15,16) comprise second ribs (16) having a first stretch (16a) substantially straight which extends on one of said side walls (10) and a second stretch (16b) which extends on said bottom wall (9) and connected to said first stretch (16a).

10. Apparatus (1) according to one or more of the preceding claims, **characterized by** the fact that said cap element (8) is made of plastic material able to disperse heat.

11. Apparatus (1) according to one or more of the preceding claims, **characterized by** the fact that it comprises an attachment device (18) of said support body (2) to a bearing structure.

12. Apparatus (1) according to claim 11, **characterized by** the fact that said attachment device (18) comprises:

    - a base (19) stably associable with said bearing structure; and
    - articulation means (23, 24, 25) interposed between said base (19) and said support body (2) and able to rotate said support body (2) with respect to said bearing structure.

13. Apparatus (1) according to claim 12, **characterized by** the fact that said articulation means (23, 24, 25) comprise:

    - a first cylindrical surface (23) formed on said base;
    - an intermediate element (24) having a second cylindrical surface (33) substantially complementary to said first cylindrical surface (23) and sliding at least in part on it; and
    - a hinging assembly (25) interposed between said support body (2) and said intermediate element (24).

14. Apparatus (1) according to claim 13, **characterized by** the fact that said attachment device (18) comprises:

- a "C"-shaped fixing element (38) having a prismatic housing seat (39) and able to embrace at least in part said intermediate element (24) and said base (19); and
- a fixing screw (27, 28, 29, 30) having a prismatic head (27) insertable into said prismatic housing seat (39) and associable with said bearing structure.

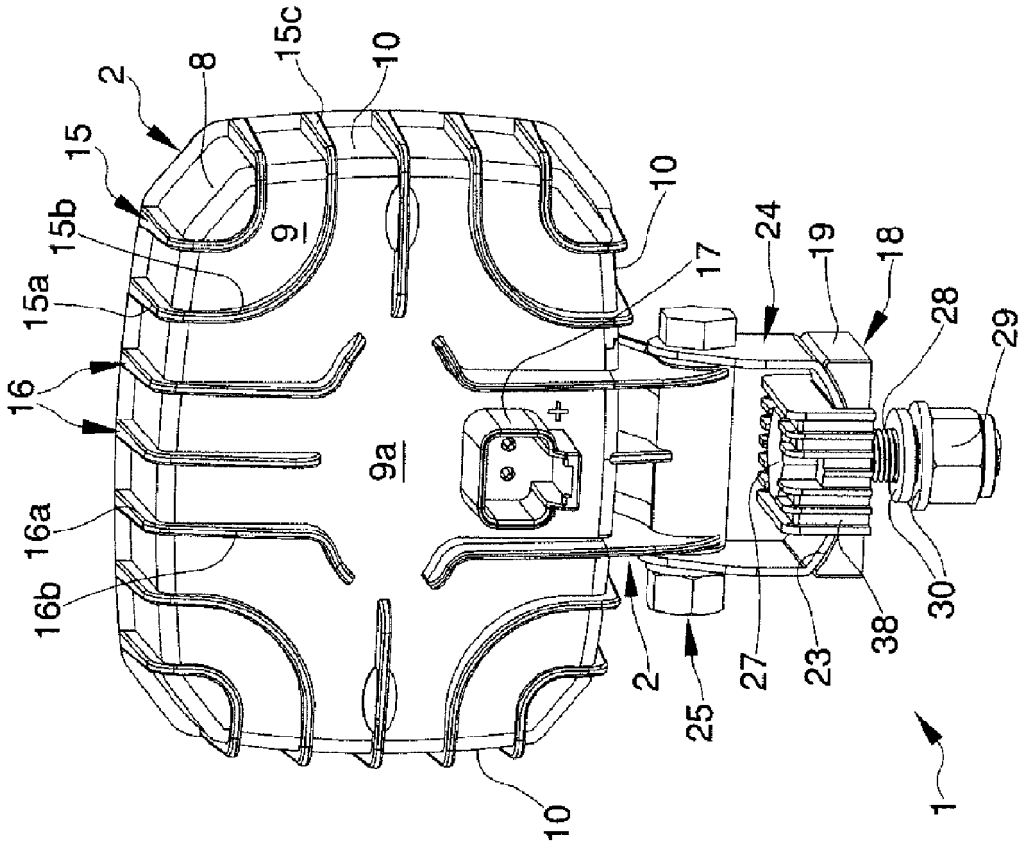
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Fig. 2

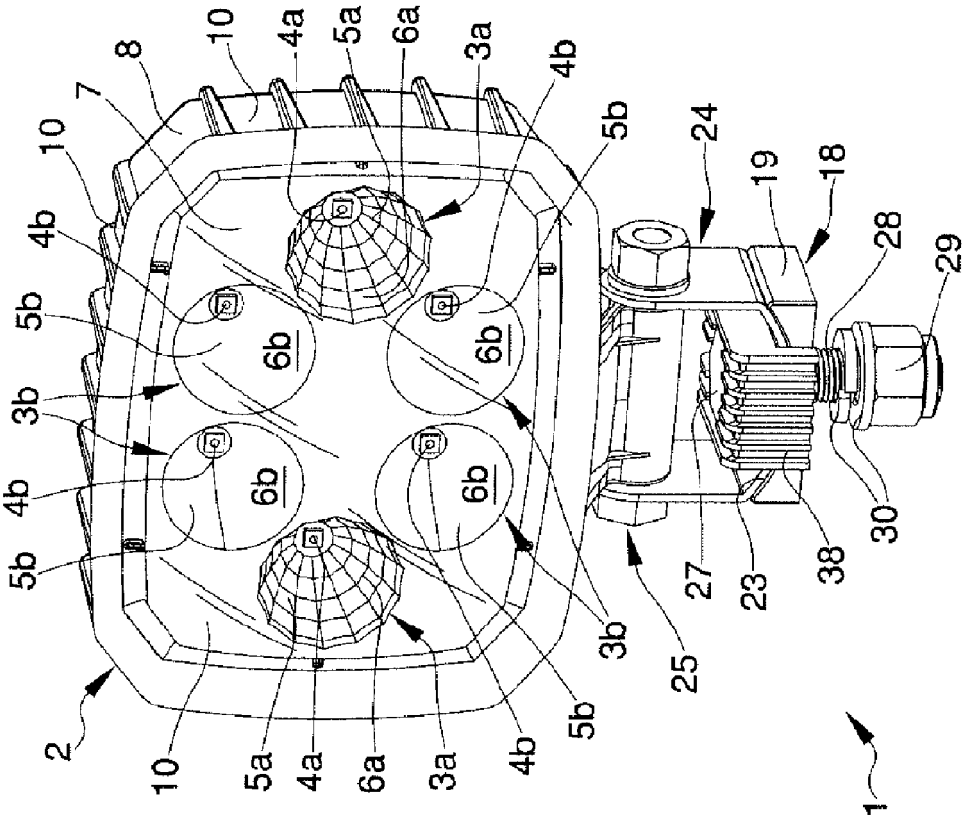
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Fig. 1

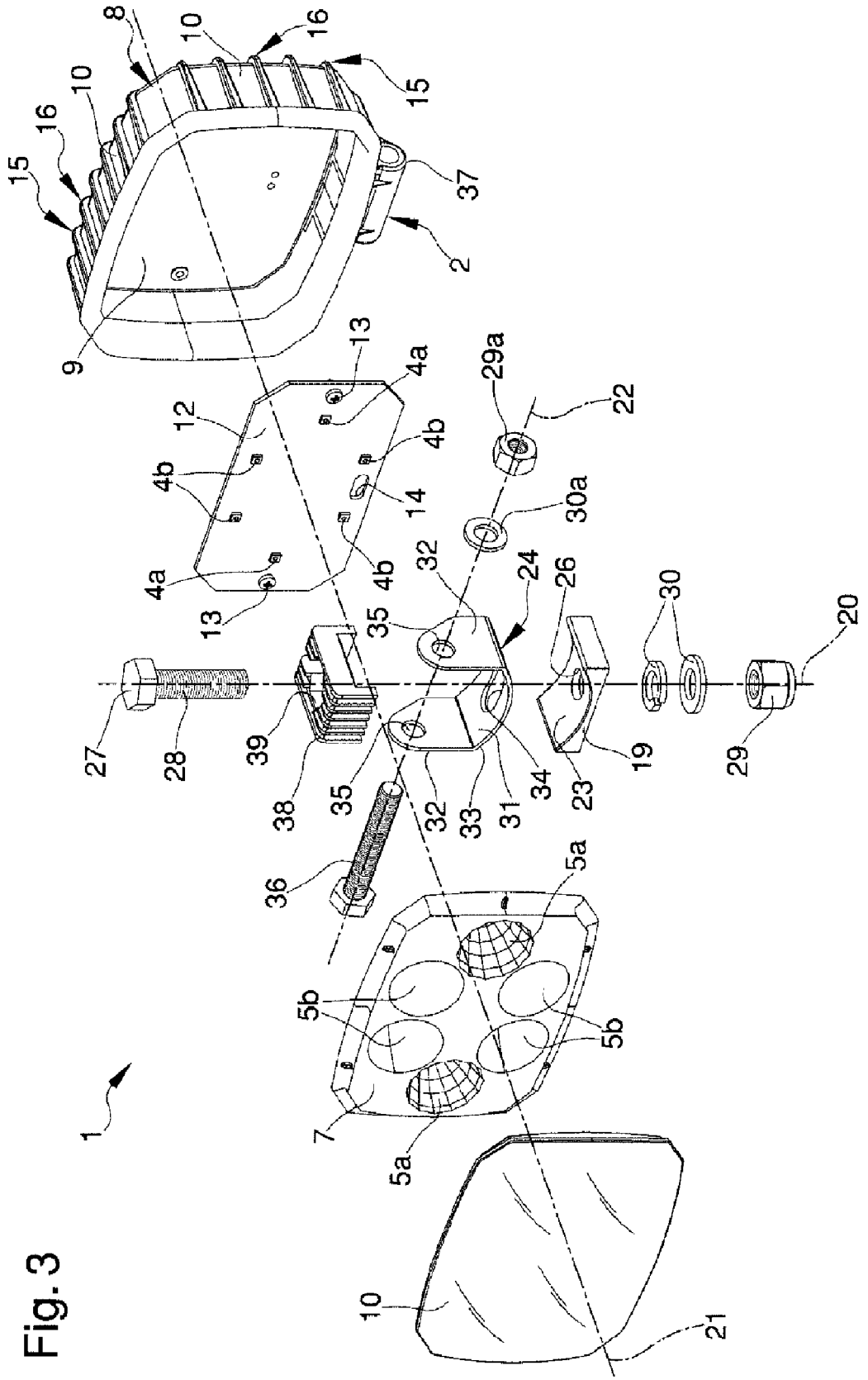
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Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 15 18 3240

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2013/215611 A1 (WONG KUM SOON [MY] ET AL) 22 August 2013 (2013-08-22) * paragraphs [0011], [0015], [0016], [0020] - [0024] * * figures 1-3 *	1-3,5-12	INV. F21V7/00 F21V29/00 F21V21/30 F21V21/28
X Y	EP 1 936 261 A2 (KYOCERA CORP [JP]) 25 June 2008 (2008-06-25) * paragraphs [0009], [0015], [0020] * * figures 1-3 *	1-4 11-13	
X	US 2009/189541 A1 (CRAWFORD JOHN D [US] ET AL) 30 July 2009 (2009-07-30) * paragraphs [0096], [0105] * * figure 13A.13C *	1-10	
Y	US 2011/079697 A1 (MUELLER SVEN [DE] ET AL) 7 April 2011 (2011-04-07) * paragraph [0038] * * figure 1 *	11-13	
A	WO 2011/131197 A1 (MARTIN PROFESSIONAL AS [DK]; VINTHER THOMAS [DK]; HANSEN CLAUS [DK]) 27 October 2011 (2011-10-27) * page 5, paragraph 2 * * page 6, paragraph 4 * * figures 2a-2c, 3a, 3b *	1	TECHNICAL FIELDS SEARCHED (IPC) F21V F21Y
A	WO 2011/125010 A1 (KONINKL PHILIPS ELECTRONICS NV [NL]; TORDINI GIORGIA [FR]) 13 October 2011 (2011-10-13) * page 25, paragraph 3 * * figures 4A, 4B *	1	
A	WO 2011/061120 A1 (OSRAM GMBH [DE]; ECKERT KLAUS [DE]; ENGL MORITZ [DE]) 26 May 2011 (2011-05-26) * page 9, line 29 - page 10, line 5 * * figures 1, 5 *	1	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	13 January 2016	Allen, Katie

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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13-01-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2013215611 A1	22-08-2013	CN 103292229 A	11-09-2013
		US 2013215611 A1	22-08-2013
EP 1936261 A2	25-06-2008	EP 1936261 A2	25-06-2008
		JP 4799393 B2	26-10-2011
		JP 2008153157 A	03-07-2008
		US 2008151544 A1	26-06-2008
US 2009189541 A1	30-07-2009	AU 2009206773 A1	30-07-2009
		EP 2236010 A1	06-10-2010
		US 2009189541 A1	30-07-2009
		US 2009189549 A1	30-07-2009
		US 2009189566 A1	30-07-2009
		US 2010259220 A1	14-10-2010
		US 2011115397 A1	19-05-2011
		WO 2009094118 A2	30-07-2009
		WO 2009094121 A1	30-07-2009
		WO 2009094381 A1	30-07-2009
US 2011079697 A1	07-04-2011	CN 102032424 A	27-04-2011
		DE 102009047971 A1	07-04-2011
		FR 2950951 A1	08-04-2011
		US 2011079697 A1	07-04-2011
WO 2011131197 A1	27-10-2011	CN 102844612 A	26-12-2012
		CN 102859269 A	02-01-2013
		CN 103791321 A	14-05-2014
		DK 177579 B1	28-10-2013
		EP 2561272 A1	27-02-2013
		EP 2561274 A1	27-02-2013
		JP 5467175 B2	09-04-2014
		JP 5587494 B2	10-09-2014
		JP 5756543 B2	29-07-2015
		JP 2013525960 A	20-06-2013
		JP 2013525961 A	20-06-2013
		JP 2014150069 A	21-08-2014
		RU 2012144005 A	27-05-2014
		RU 2012144006 A	27-05-2014
		US 2012091917 A1	19-04-2012
		US 2013038240 A1	14-02-2013
		US 2013093360 A1	18-04-2013
		WO 2011131197 A1	27-10-2011
		WO 2011131199 A1	27-10-2011
WO 2011125010 A1	13-10-2011	TW 201213730 A	01-04-2012
		WO 2011125010 A1	13-10-2011

EPO FORM P0459

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13-01-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2011061120 A1	26-05-2011	CN 102667322 A	12-09-2012
		DE 102009053957 A1	01-06-2011
		EP 2501991 A1	26-09-2012
		JP 2013511801 A	04-04-2013
		KR 20120095432 A	28-08-2012
		US 2012281418 A1	08-11-2012
		WO 2011061120 A1	26-05-2011

EPO FORM P0459

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