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(54) **Wall-washing-effect LED lighting device**

(57) A wall-washing-effect LED lighting device (1) is substantially defined by a supporting bar (2) elongated longitudinally along an axis (A) and having a longitudinal channel (11) housing a plurality of LEDs (3) and having a light-emitting opening (20); the channel (11) is bounded by a distal lateral wall (17) located, in use, further from the wall to be illuminated, and by a proximal lateral wall (18) located, in use, closer to the wall to be illuminated; the LEDs (3) are fitted to the distal lateral wall (17), alongside the light-emitting opening (20); and the channel (11) also houses a reflector (4) positioned in front of and asymmetrically with respect to the LEDs (3).

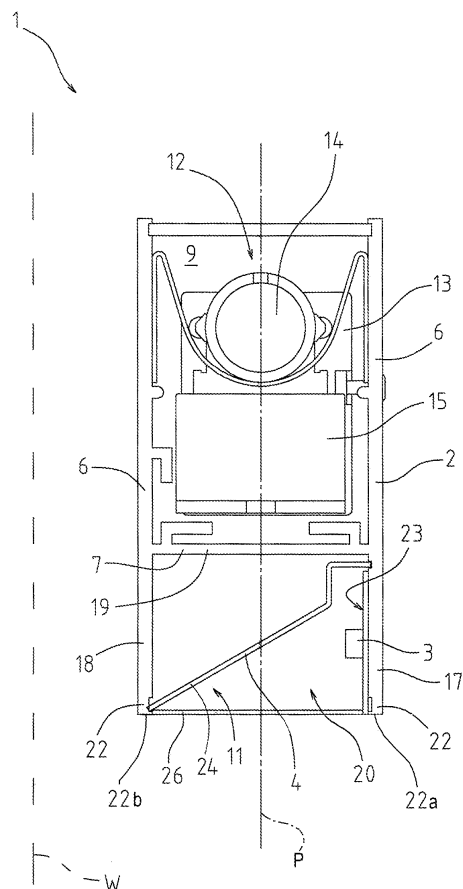


Fig. 3

Description

[0001] The present invention relates to a wall-washing-effect LED lighting device.

[0002] Various lighting systems are known designed to give a so-called wall-washing effect, i.e. to substantially evenly illuminate a vertical surface (normally a room wall or a building façade).

[0003] Known systems, however, are not altogether satisfactory, especially in terms of easy manufacture, efficiency, and versatility.

[0004] It is an object of the present invention to provide a wall-washing-effect LED lighting device which, compared with known solutions, is at least equally, if not more, efficient, straightforward, and versatile.

[0005] According to the present invention, there is provided a wall-washing-effect LED lighting device as defined basically in the accompanying Claim 1, and in more detail in the dependent Claims.

[0006] The device according to the invention is easy to manufacture and install, fully efficient, and highly versatile, in that it can be made to compact size, can be installed in various configurations (e.g. recessed in a ceiling or floor, or even wall-mounted), and can be equipped with various types of additional light sources. The device is specially designed to conceal the LEDs from direct view, at least in normal observation conditions, and so eliminates the annoying glare effect typical of strong spot light sources, such as LEDs.

[0007] A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a schematic, overall view in perspective of a lighting device in accordance with the invention;

Figure 2 shows a schematic longitudinal section of the Figure 1 device;

Figure 3 shows a schematic cross section of the Figure 1 device.

[0008] With reference to the attached drawings, a wall-washing-effect LED lighting device 1 comprises a supporting bar 2 elongated longitudinally along an axis A; and a plurality of LEDs 3 fitted to bar 2 and associated with a reflector 4.

[0009] Device 1 is designed to be installed preferably (though not necessarily) close to a wall W (shown schematically in Figure 3) to be illuminated substantially evenly (wall-washing effect), e.g. an interior or exterior building wall, is recessed, for example, in a floor or ceiling adjacent to wall W, and is substantially parallel to wall W.

[0010] Bar 2 is defined, for example (though not necessarily), by a metal, e.g. aluminium, section.

[0011] In the non-limiting example shown, bar 2 has an H-shaped cross section, and comprises two substantially parallel flanges 6 parallel to axis A; and a central partition 7 substantially perpendicular to flanges 6 and

also parallel to axis A.

[0012] Bar 2 comprises two opposite longitudinal compartments 8, 9 bounded laterally by flanges 6 and separated by partition 7. Compartments 8, 9 define respective opposite, parallel, substantially U-shaped longitudinal channels 11, 12, and more specifically : a main longitudinal channel 11 housing LEDs 3 and reflector 4; and an auxiliary longitudinal channel 12 housing components 13 for powering and controlling LEDs 3, and/or additional light sources 14 (e.g. one or more fluorescent sources) and relative power and/or control components 15.

[0013] Channel 11 is bounded by two opposite lateral walls 17, 18 defined by respective portions of flanges 6, and by a back wall 19 defined by partition 7, and has a light-emitting opening 20 opposite back wall 19 (i.e. partition 7) and bounded by respective end edges 22 of flanges 6. More specifically, opening 20 is bounded by a first longitudinal edge 22a on the same side of channel 11 as LEDs 3 (i.e. LEDs 3 and edge 22a are located on the same side of channel 11, i.e. the same side of a longitudinal centre plane P of channel 11); and by a second longitudinal edge 22b opposite first edge 22a (i.e. LEDs 3 and edge 22b are located on opposite sides of channel 11, i.e. on opposite sides of the longitudinal centre plane P of channel 11).

[0014] More specifically, lateral walls 17 and 18 comprise a distal lateral wall 17 and a proximal lateral wall 18, which in use, i.e. when device 1 is installed, are located further from and closer to wall W respectively; and light-emitting opening 20 is located, in use, at the top or bottom of bar 2.

[0015] Inside channel 11, LEDs 3 are fitted to an inner surface 23 of lateral wall 17, alongside light-emitting opening 20. As stated, when device 1 is installed, lateral wall 17 is located further from wall W, which means surface 23 is positioned facing wall W.

[0016] LEDs 3 are spaced apart, parallel to axis A, on surface 23 of lateral wall 17, and project inwards of channel 11, towards the opposite lateral wall 18. Surface 23, to which LEDs 3 are fitted, is substantially perpendicular to light-emitting opening 20, and LEDs 3 project perpendicularly from surface 23 towards lateral wall 18 and reflector 4, which is also housed in channel 11, is interposed between lateral walls 17 and 18, and is positioned facing LEDs 3.

[0017] Reflector 4 is asymmetrical with respect to LEDs 3. More specifically, reflector 4 is designed and located to reflect the light from LEDs 3 through light-emitting opening 20 with a light distribution which is asymmetrical with respect to a centre plane P of light-emitting opening 20 (i.e. a plane through axis A, substantially perpendicular to opening 20, and dividing opening 20 longitudinally in half), and which extends horizontally beyond a vertical plane parallel to centre plane P and through (containing) the longitudinal edge 22b opposite LEDs 3.

[0018] More specifically, reflector 4 is designed to reflect the light from LEDs 3 with a light distribution that is offset laterally towards the side of bar 2 opposite the lat-

eral wall 17 fitted with LEDs 3, i.e. towards the wall to be illuminated.

[0019] In other words, reflector 4 is designed to reflect at least part of the light from LEDs 3 through opening 20 and obliquely beyond the longitudinal edge 22b opposite LEDs 3, i.e. obliquely beyond the proximal lateral wall 18 of channel 11 (closer to wall W) opposite the distal lateral wall 17 (further from wall W) fitted with LEDs 3.

[0020] In the non-limiting embodiment shown, for example, reflector 4 is a substantially plane reflector sloping with respect to lateral wall 17 fitted with LEDs 3, and is therefore positioned on a slant inside channel 11. A reflector 4 of different design may, however, be used, such as a parabolic or generically curved or complex-surface reflector.

[0021] More specifically, reflector 4 extends obliquely from lateral wall 17 fitted with LEDs 3, to the opposite lateral wall 18, and from the bottom of channel 11 (i.e. a position close to back wall 19) to light-emitting opening 20, and preferably comprises a single reflecting, e.g. metal, sheet 24 housed in channel 11 and facing all of LEDs 3.

[0022] Device 1 also comprises an optional diffuser screen 26 (only shown in Figure 3) located substantially in front of reflector 4 and/or closing light-emitting opening 20 between edges 22, to diffuse the light reflected by reflector 4. Accordingly, diffuser screen 26 is made of material which diffuses light passing through it.

[0023] In actual use, device 1 is installed alongside and substantially parallel to wall W to be illuminated, e.g. recessed in a floor or ceiling, or mounted to the actual wall to be illuminated.

[0024] The light emitted by LEDs 3 is reflected by reflector 4 onto wall W with the desired, i.e. wall-washing, distribution; and user glare is prevented by LEDs 3 being concealed inside channel 11, out of direct view, at least in normal observation conditions.

[0025] Optional diffuser 26 serves to further improve the overall lighting effect of device 1, and more specifically to eliminate the light-shade boundary line projected onto wall W.

[0026] The design and compactness of device 1 enable it to be installed in various configurations (e.g. recessed in a ceiling or wall, or wall-mounted); and additional light sources housed in auxiliary channel 12 provide for additional lighting effects, thus enhancing the versatility of device 1.

[0027] Clearly, changes may be made to the device as described and illustrated herein without, however, departing from the scope defined in the accompanying Claims.

Claims

1. A wall-washing-effect LED lighting device (1) comprising a supporting bar (2) elongated longitudinally along an axis (A) and having a longitudinal channel (11) extending along the axis (A) and having a light-

emitting opening (20); a plurality of LEDs (3) housed inside the channel (11) and fitted to an inner surface (23) of a distal lateral wall (17) of the channel (11), alongside the light-emitting opening (20); and a reflector (4) housed inside the channel (11), opposite and asymmetrically with respect to the LEDs (3); the light-emitting opening (20) being bounded by a first longitudinal edge (22a) on the same side of the channel (11) as the LEDs (3), and by a second longitudinal edge (22b) opposite the first longitudinal edge (22a); the device being **characterized in that** :

- in use, the LEDs (3), and the inner surface (23) to which the LEDs (3) are fitted, face a wall (W) to be illuminated with a wall-washing effect; and
- the reflector (4) is designed to reflect at least part of the light from the LEDs (3) through the light-emitting opening (20) and obliquely beyond the second longitudinal edge (22b) opposite the LEDs (3), i.e. obliquely beyond a proximal lateral wall (18) of the channel (11), opposite the distal lateral wall (17) fitted with the LEDs (3).

2. A device as claimed in Claim 1, wherein the reflector (4) is designed to reflect the light from the LEDs (3) through the light-emitting opening (20) with a light distribution which is asymmetrical with respect to a centre plane (P) of the light-emitting opening (20), and which extends horizontally beyond a vertical plane parallel to the centre plane (P) and through the second longitudinal edge (22b) opposite the LEDs (3).
3. A device as claimed in Claim 1 or 2, wherein the reflector (4) is designed to reflect the light from the LEDs (3) with a light distribution which is offset laterally towards the side of the bar (2) opposite the distal lateral wall (17) fitted with the LEDs (3).
4. A device as claimed in one of the foregoing Claims, wherein the reflector (4) is a substantially plane reflector sloping with respect to the distal lateral wall (17) fitted with the LEDs, or is a parabolic reflector, or a generically curved reflector, or a complex-surface reflector.
5. A device as claimed in one of the foregoing Claims, wherein the LEDs (3) are spaced apart parallel to the axis (A); and the reflector (4) comprises a single reflecting sheet (24) housed in the channel (11) and facing all the LEDs (3).
6. A device as claimed in one of the foregoing Claims, wherein the distal lateral wall (17) fitted with the LEDs (3) is substantially perpendicular to the light-emitting opening (20), and the LEDs (3) project perpendicularly from the distal lateral wall (17) towards the reflector (4).

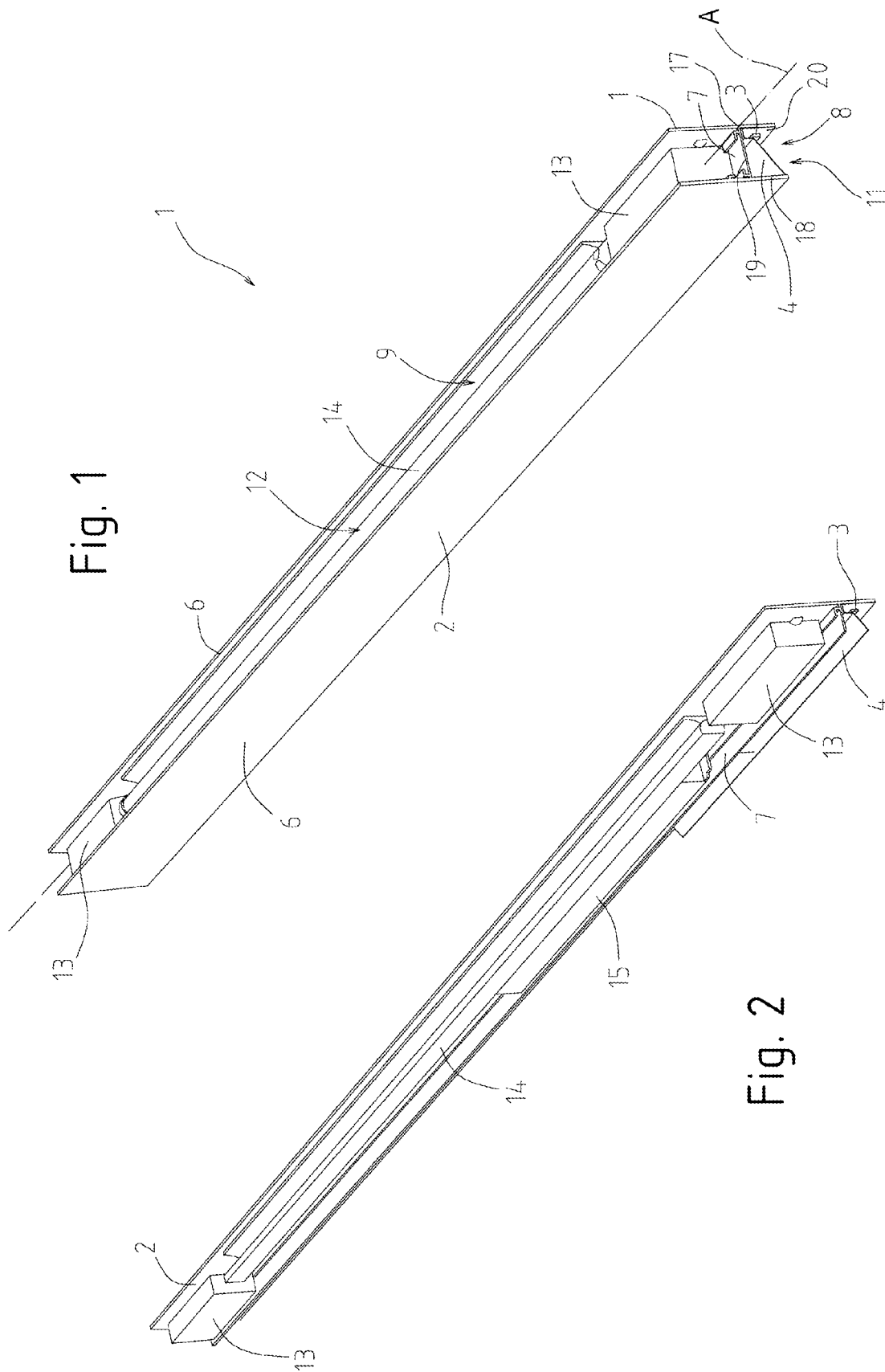
7. A device as claimed in one of the foregoing Claims,
wherein the channel (11) is substantially U-shaped.
8. A device as claimed in one of the foregoing Claims,
wherein the bar (2) has a substantially H-shaped
cross section. 5
9. A device as claimed in one of the foregoing Claims,
wherein the bar (2) has two opposite longitudinal
compartments (8, 9) separated by a partition (7); the
two compartments (8, 9) respectively defining said
channel (11) housing the LEDs (3) and the reflector
(4), and an auxiliary channel (12) housing compo- 10
nents (13) for powering and/or controlling the LEDs
(3), and/or additional light sources (14). 15
10. A device as claimed in one of the foregoing Claims,
wherein the channel (11) comprises two facing lat-
eral walls (17, 18), and more specifically a distal lat-
eral wall (17) located, in use, further away from the
wall (W) to be illuminated, and a proximal lateral wall 20
(18) located, in use, closer to the wall (W) to be illu-
minated; and the LEDs (3) are fitted to the distal lat-
eral wall (17). 25
11. A device as claimed in one of the foregoing Claims,
wherein the reflector (4) extends obliquely from the
distal lateral wall (17), fitted with the LEDs (3), to an
opposite proximal lateral wall (18), and from the bot-
tom of the channel (11) to the light-emitting opening 30
(20). 30
12. A device as claimed in one of the foregoing Claims,
and also comprising a diffuser screen (26) in front of
the reflector (4). 35

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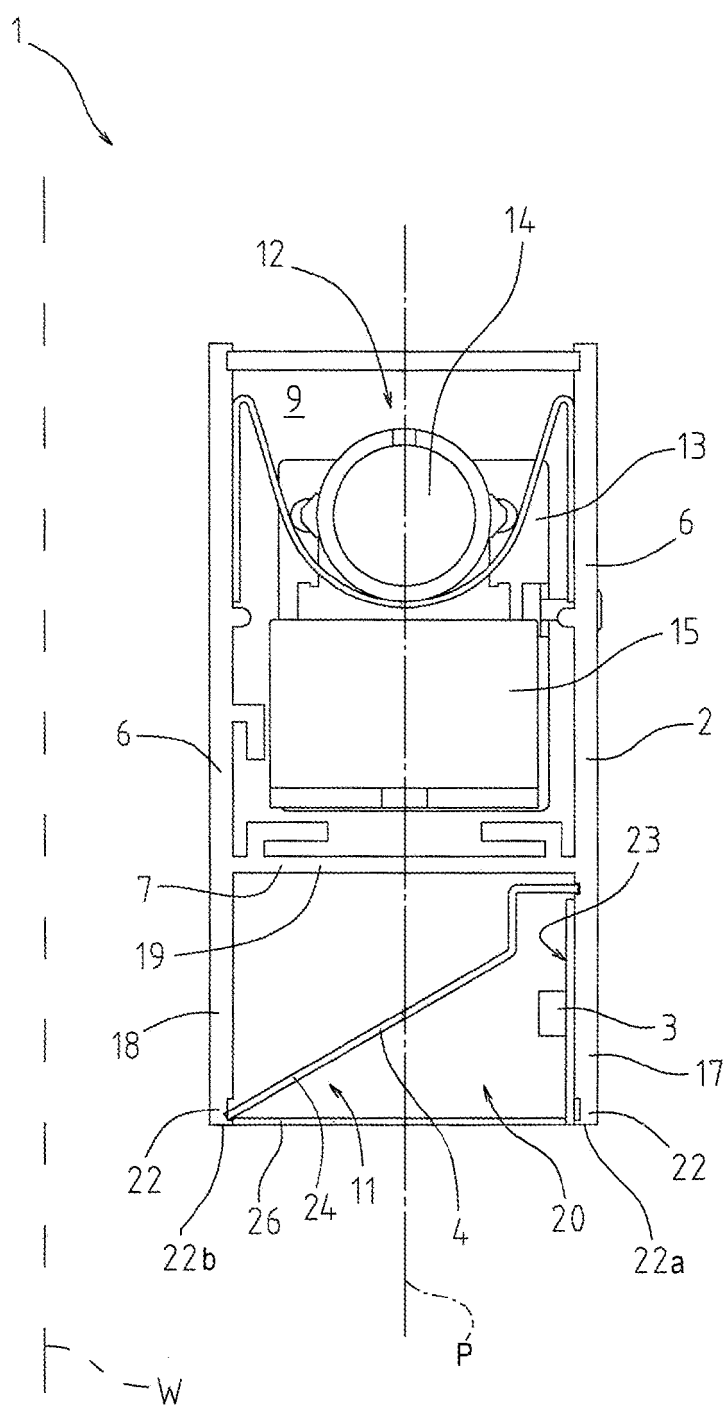


Fig. 3



EUROPEAN SEARCH REPORT

Application Number
EP 10 16 0629

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2006/126114 A1 (KONINKL PHILIPS ELECTRONICS NV [NL]; VALSTER ADRIAAN [NL]; NUYENS PETR) 30 November 2006 (2006-11-30) * page 6, line 3 - page 9, line 13 * * figures 1-3 *	1-5,7,11	INV. F21S8/00 F21V7/00 F21V23/00
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 15 July 2010	Examiner Cosnard, Denis
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			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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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
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