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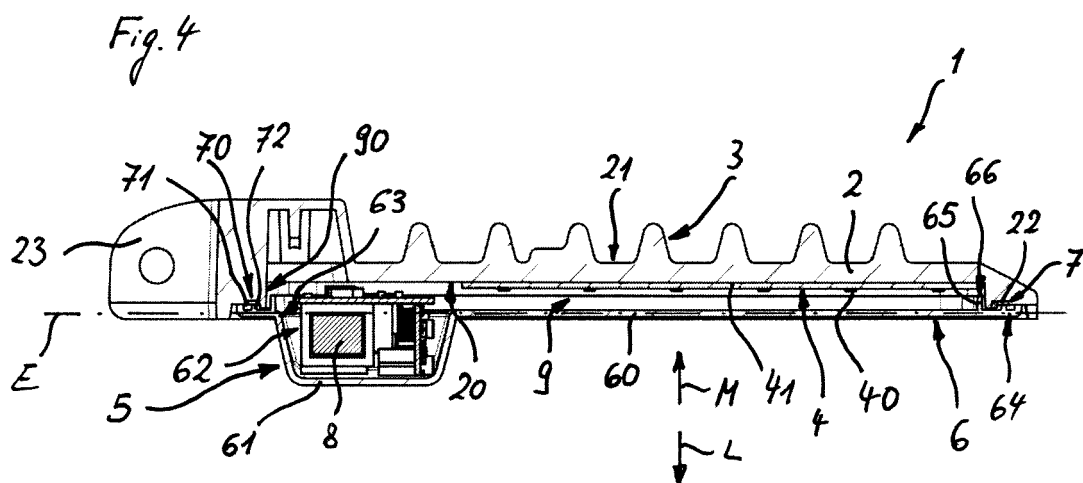
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(54) **LUMINAIRE COVER UNIT**

(57) The present invention refers to a luminaire cover unit (5) for a flat luminaire (1) comprising an integral luminaire cover (6) having a flat light transmission section (60) to allow light to pass through, which light transmission section (60) only extends substantially within a plane (E), and a receiving section (61) which is bulged away from the plane (E) to form a receiving space (62) delimited

by the receiving section (61) with an opening (63) within the plane (E) to access the receiving space (62). The luminaire cover unit (5) further comprises a lighting electronic (8) being at least partially received within the receiving space (62). The present invention further refers to a flat luminaire (1) equipped with the said luminaire cover unit (5).

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Description

[0001] The present invention relates to a luminaire cover unit for a flat luminaire as well as a flat luminaire equipped with said luminaire cover unit.

[0002] Flat luminaires as described herein above are generally known in the prior art. These flat luminaires are often used as streetlights. For said purpose, these luminaires are usually equipped with LEDs as light source and are often designed to allow for high luminous fluxes. Such type of luminaires often have a housing made of heat conductive materials, like metals (e.g. aluminium alloy) which can also act as a heat-sink to conduct the heat from the light sources and exchange it with the ambient.

[0003] The continuous increase of the efficiency of the LEDs allows the increase of the light generated by the LEMs (Light Emitting Modules). Hence, corresponding converters are required. Furthermore, the LEDs are getting even more stable at higher temperatures which could allow a reduction of the size of the heat sink or the housing. On the other hand, the housing contains also other electronic devices, like a driver, that usually are very sensitive with the temperature. For this reason, the dimension of the housing and its cooling effect is constrained by the temperature of these electronic devices.

[0004] It is thus an object of the present invention to provide a flat luminaire and corresponding components thereof, which allow for a flat layout of the luminaire itself while still allowing the lighting electronic to be least thermally affected by the heat generated during operation of the luminaire.

[0005] This object is achieved by the subject-matter of the independent claims. The dependent claims study further the central idea of the present invention.

[0006] According to a first aspect, the present invention relates to a luminaire cover unit for a flat luminaire. The luminaire cover unit comprises an integral luminaire cover. In the light of the present invention, "integral" preferably means a one-piece layout, e.g. made by casting or injection moulding or 3D printing. The luminaire cover comprises a flat light transmission section to allow light to pass through, which light transmission section only extends substantially within a plane, so that the light transmission section preferably has a substantially flat layout. The luminaire cover further comprises a receiving section which is bulged away from the plane to form a receiving space delimited by the receiving section and with an opening within the plane (i.e. which extends substantially within the plane) to access the receiving space. The luminaire cover unit further comprises a lighting electronic (e.g. for operating the luminaire equipped with the luminaire cover) being at least partially received within the receiving space.

[0007] By placing the lighting electronic into a defined space of the luminaire cover, these features can, on the one hand, be easily handled altogether. On the other hand, the lighting electronic can be positioned at a region

of a luminaire being least affected by heat generated during operation of the luminaire. This comes about since the heat goes naturally upward while the luminaire cover is usually situated on the lowest part of a corresponding luminaire, which is usually the coolest part of the luminaire. The luminaire cover itself thus offers a suitable place to host the lighting electronic in order to guarantee a sufficient cooling thereof on the one hand, and to allow much higher temperatures, if desired, on other parts of a luminaire equipped with said luminaire cover unit, like a luminaire housing/body and/or a corresponding heat-sink. The luminaire cover unit according to the present invention thus allows the lighting electronic being thermally disconnected from other parts of a luminaire being equipped with said luminaire cover unit, like a heat-sink or the housing, so that the lighting electronic can be located in a more convenient, i.e. cooler, place with respect to known luminaires of the prior art from a thermal point of view. This is exemplarily illustrated by the heat map of Figure 6. The receiving section is preferably bulged away in a direction of an intended main light emission direction of the light transmission section.

[0008] The receiving section can be positioned next to the light transmission section within or with respect to the plane. Alternatively, the receiving section can also be at least partially surrounded by the light transmission section within or with respect to the plane. In other words, the receiving section can be positioned at any suitable place of the luminaire cover with respect to the flat light transmission section. By being placed next to each other, the luminaire cover can be designed in a most compact manner.

[0009] The light transmission section may comprise optical elements or structures to optically influence light passing the light transmission section. Such optical elements or structures can be a diffusing structure, lenses and the like. These optical elements can be integrally formed with the light transmission section and/or separately provided in a (e.g. permanently) fixed or detachable manner. The light transmission section can thus be provided in any desired manner dependent on the required light emission properties.

[0010] The luminaire cover may further comprise a (e.g. integral) rim section at least partially and preferably completely surrounding the light transmission section and, more preferably, also the receiving space. The rim section preferably extends within the plane. With such a rim section, the luminaire cover can be mechanically stabilized. Also, a defined attachment area can be provided.

[0011] The rim section may comprise a sealing, preferably at a side of the plane opposite to the receiving section and preferably opposite to a (e.g. outer) light emission side of the light transmission section. The sealing can preferably circumferentially extend about or along the entire luminaire cover. In a preferred embodiment, the rim section comprises a circumferential groove being preferably open towards a side of the plane opposite to the receiving section and thus preferably opposite to the

(e.g. outer) light emission side of the light transmission section. The sealing can thus preferably be positioned within said groove. The sealing can be a ring gasket or a sealing material applied into the groove, e.g. applicable in a liquid form which then solidifies.

[0012] The rim section may comprise an attachment structure, like a snap structure or a lock structure or a mounting flange, to attach the luminaire cover to a luminaire body, like a luminaire housing. As the luminaire cover is integrally provided, separate attachment structures can be avoided.

[0013] The luminaire cover and preferably at least the light transmission section can be made of a translucent material, preferably a transparent material. The light transmission property can thus be easily provided.

[0014] The lighting electronic may comprise a converter, a driver and/or any other known lighting electronics. As these types of electronic devices are very sensitive with the temperature, they are placed at a position being less affected by the temperature, i.e. in the receiving space of the receiving section, which results in a higher lifetime of these lighting electronics.

[0015] The lighting electronic can be fixedly attached to the receiving section, preferably detachably or permanently attached. This allows for an easier handling of the luminaire cover unit and allows a defined prepositioning of the lighting electronic with respect to the luminaire cover, if required.

[0016] The lighting electronic can at least partially be potted with a pottant in the receiving space. The lighting electronic can thus be easily secured and preferably also protected within the luminaire cover. In a preferred embodiment, the pottant can be opaque, so that the lighting electronic can be easily hidden in the receiving section thus increasing the aesthetics of the luminaire cover unit.

[0017] The receiving section can be opaque, e.g. by being coated with an opaque (e.g. black) coating or even by the lighting electronic being potted with an opaque pottant in the receiving space to increase the aesthetics of the luminaire cover and thus of a luminaire being equipped with said luminaire cover unit.

[0018] According to a further aspect, the present invention is also directed to a flat luminaire comprising a flat luminaire body (like a luminaire housing) with a flat side, a light source being provided at the flat side, and a luminaire cover unit according to the present invention. The luminaire cover unit is attached to the luminaire body such that the light transmission section covers the light source so that light of light source can emit through the light transmission section. The light source is operably connected to the lighting electronic. The lighting electronic is thus thermally disconnected from other parts of the luminaire, so that the flat luminaire can be designed in a comparably flat and compact manner without thermally affecting the lighting electronic.

[0019] The light source can be an LED, an LED-module or an LED-board. Also, other light sources are possible, while LEDs allow for a minimal size with comparably high

luminous fluxes.

[0020] The luminaire body may comprise a cooling structure preferably at a side opposite to the flat side. Hence, the cooling structure is positioned distant from the receiving section and thus the lighting electronic positioned therein. This allows for a reduction of the size of the cooling structure which allows for higher luminous fluxes generated by the luminaire, as the light sources (preferably LEDs) are getting even more stable at higher temperatures. Also, a reduction in size results in a reduction of used material for the flat luminaire body. Moreover, the smaller the flat luminaire, the less prone the flat luminaire is against wind power.

[0021] The luminaire body can be made of a material having a high thermal conductivity, like aluminium or an aluminium alloy. This allows for a most efficient heat transfer, while particularly aluminium also allows for a comparably lightweight luminaire body.

[0022] The luminaire cover and the luminaire body may delimit a lighting space for receiving the light source and the lighting electronic. The lighting space is preferably sealingly enclosed by the luminaire cover and the luminaire body, e.g. with aid of the sealing provided in or at the rim section. Hence, the flat luminaire is easily and securely provided for outdoor purposes.

[0023] Further aspects and advantages of the present invention are now defined with respect to the drawings of the enclosed Figures.

Figure 1 shows a perspective bottom view of a flat luminaire according to the present invention having a luminaire cover unit according to the present invention,

Figure 2 shows a top view of the flat luminaire according to Figure 1,

Figure 3 shows a front view of the flat luminaire according to Figure 1,

Figure 4 shows a cross-sectional side view of the flat luminaire according to Figure 1,

Figure 5 shows a perspective view of the luminaire cover of the luminaire cover unit of Figure 1, and

Figure 6 shows a heat map of the luminaire of Figure 4.

[0024] The Figures all show a flat luminaire 1 according to the present invention. As can be seen, said luminaire 1 has a generally flat layout, which means that the luminaire 1 generally extends within a plane.

[0025] The flat luminaire 1 here comprises a flat luminaire body 2 with a flat side 20. The luminaire body 2 can be made of a material having a high thermal conductivity, like aluminium or aluminium alloy. The luminaire body 2

can comprise a cooling structure 3 at a side 21 opposite to the flat side 20, i.e. at a rear side 21 of the luminaire 1. The cooling structure 3 is preferably integrally formed with the luminaire body 2.

[0026] A light source 4 is provided at the flat side 20 and is preferably in thermal contact with the luminaire body 2 via the flat side 20. The light source 4 can be an LED, an LED-module or an LED-board as shown in Figure 4. The LED-board here comprises a plurality of LEDs 40 being provided on a circuit board 41. The rear side of the circuit board 41 here is in flat contact with the flat side 20 of the luminaire body 2.

[0027] The flat luminaire 1 further comprises a luminaire cover unit 5, which itself forms part of the present invention and as such is described in the following.

[0028] The luminaire cover unit 5 according to the present invention is designed to be used for a flat luminaire 1 according to the present invention. The luminaire cover unit 5 comprises an integral luminaire cover 6. The luminaire cover 6 comprises a flat light transmission section 60 to allow light to pass through (preferably in a defined main light emission direction L), which light transmission section 60 only extends substantially within a plane E, as can be clearly seen in Figures 1, 4 and 5. The light transmission section 60 may comprise optical elements or structures to optically influence light passing the light transmission section 60 (e.g. in the main light emission direction L), like lenses, diffusing structures or elements or the like.

[0029] The luminaire cover 6 further comprises a receiving section 61 which is bulged away from the plane E to form a receiving space 62 delimited by the receiving section 61 with an opening 63 extending substantially within the plane E to access the receiving space 62. This can be seen, for instance, in Figures 4 and 5.

[0030] As can be seen in Figures 1, 4 and 5, the receiving section 61 can be positioned next to the light transmission section 60 within or with respect to the plane E, i.e. being laterally offset within the plane E. The receiving section 61 may also be at least partially surrounded by the light transmission section 61 within or with respect to the plane E.

[0031] As can be clearly seen in Figures 4 and 5, the luminaire cover 6 may comprise a rim section 64 at least partially surrounding the light transmission section 60 and, preferably, as also shown in Figures 1, 4 and 5, also the receiving space 62. The rim section 64 here preferably extends within the plane E thus allowing for a most compact layout of the luminaire cover 6.

[0032] The rim section 64 may comprise a sealing 7, preferably at a side of the plane E opposite to the receiving section 61. The sealing 7 preferably circumferentially extends about or along the entire luminaire cover 6.

[0033] The rim section 64 may also comprise a sealing section 70 preferably at a side of the plane E opposite to the receiving section 61 and also preferably circumferentially extending about or along the entire luminaire cover 6. The sealing section 70 can be a circumferential

groove 71 for receiving the sealing 7. Alternatively or additionally, the sealing section 70 can also be a circumferential protrusion 72 to get into sealing engagement with a corresponding sealing 7 provided on the luminaire body 2; here, for instance, circumferentially extending about the flat side 20 or light source 4 such that the sealing 7 is positioned opposite to the circumferentially extending sealing section 70, these features thus facing each other to get into functional sealing engagement when the luminaire 1 is equipped with the luminaire cover unit 5. Then, the sealing 7 can be provided in a circumferential groove 22 of the luminaire body 2 at a side facing the luminaire cover 6 when being attached to the luminaire body 2. The sealing 7 can preferably be a ring gasket or a sealing material applied into the groove 71 and/or 22, e.g. applicable in a liquid form which then solidifies.

[0034] The rim section 64 may comprise an attachment structure, like a snap structure or a lock structure or a mounting flange, to attach the luminaire cover 6 or the luminaire cover unit 5 to the luminaire body 2 in a permanent or, preferably, in a detachable manner.

[0035] The rim section 64 may further comprise a positioning section 65 to allow for interaction with a corresponding element 24 (e.g. of the luminaire body 2) for defined positioning or alignment of the luminaire cover unit 5, e.g., with respect to the luminaire body 2. This positioning section 65 can be a circumferentially extending or circumferentially (e.g. evenly) distributed protrusion section protruding at a side of the plane E opposite to the receiving section 61. The positioning section 65 may engage in a groove or recess 90 of the luminaire body 2, e.g. forming or surrounding the flat side 20, to thus position or align the luminaire cover unit 5 with respect to the luminaire body 2, e.g. in a direction parallel to the plane E. Further, a distal tip section 66 of the positioning section 65 may be designed such that it comes into contact with the light source 4 (e.g. here in a mounting direction M), to push the light source 4 towards and onto the flat side 20 (here in the mounting direction M) to allow for a secure flat contact between light source 4 and luminaire body 2 thus allowing for an efficient heat transfer.

[0036] The luminaire cover unit 5 further comprises a lighting electronic 8 being at least partially received within the receiving space 62, as can be clearly seen in Figure 4. The lighting electronic 8 is thus securely supported in and by the luminaire cover 6 and thus thermally disconnected from other parts of the flat luminaire 1, e.g. the luminaire body 2. The lighting electronic 8 may comprise a converter, a driver and/or any other type of lighting electronic.

[0037] The lighting electronic 8 can be fixedly attached to the receiving section 61, preferably detachably (e.g. by screw connection or clip connection) or permanently attached (e.g. by glue connection). The lighting electronic 8 can at least partially be potted with a pottant in the receiving space 62.

[0038] The receiving section 61 can be opaque to thus hide the lighting electronic 8 received therein. In a pre-

ferred embodiment, the receiving section 61 can be coated with an opaque coating, e.g. a black coating. It is also possible that the pottant itself is opaque and thus making the receiving section 61 appear opaque by the pottant provided therein.

[0039] The luminaire cover 6, preferably at least the light transmission section 60, can be made of a translucent material and preferably a transparent material.

[0040] The luminaire cover unit 5 can be attached to the luminaire body 2 such that the light transmission section 60 covers the light source 4 so that light of the light source 4 can emit through the light transmission section 60; here preferably in a defined main light emission direction L as can be seen, for instance, in Figure 4. For mounting, the luminaire cover unit 5 is attached to the luminaire body 2 in a mounting direction M which here is, exemplarily according to the shown embodiment, in parallel with the defined light emission direction L and orthogonal to the plane E.

[0041] In a preferred embodiment, the luminaire cover 6 and the luminaire body 2 (e.g. by its recess 90) delimit a lighting space 9 for receiving the light source 4 and the lighting electronic 8. Preferably, the luminaire cover 6 and the luminaire body 2 preferably sealingly enclosing the lighting space 9.

[0042] The light source 4 is operably connected to the lighting electronic 8.

[0043] The flat luminaire body 2 can further comprise an attachment section 23 for attaching the flat luminaire 1 to a support structure, like a pole for a streetlight.

[0044] The present invention is not limited to the embodiment described herein above as long as being covered by the appended claims.

Claims

1. Luminaire cover unit (5) for a flat luminaire (1) comprising:

an integral luminaire cover (6) having:

- a flat light transmission section (60) to allow light to pass through, which light transmission section (60) only extends substantially within a plane (E), and
- a receiving section (61) which is bulged away from the plane (E) to form a receiving space (62) delimited by the receiving section (61) with an opening (63) within the plane (E) to access the receiving space (62), and

a lighting electronic (8) being at least partially received within the receiving space (62).

2. Luminaire cover unit (5) according to claim 1, wherein the receiving section (61) is positioned next to the

light transmission section (60) within or with respect to the plane (E), or the receiving section (61) is at least partially surrounded by the light transmission section (60) within or with respect to the plane (E).

3. Luminaire cover unit (5) according to claim any one of the preceding claims, wherein the light transmission section (60) comprises optical elements or structures to optically influence light passing the light transmission section (60).

4. Luminaire cover unit (5) according to any one of the preceding claims, wherein the luminaire cover (6) comprising a rim section (64) at least partially surrounding the light transmission section (60) and, preferably, also the receiving space (62), wherein the rim section (64) preferably extends within the plane (E).

5. Luminaire cover unit (5) according to claim 4, wherein the rim section (64) comprises a sealing (7), preferably at a side of the plane (E) opposite to the receiving section (61), the sealing (7) preferably circumferentially extends about or along the entire luminaire cover (6).

6. Luminaire cover unit (5) according to claim 4 or 5, wherein the rim section (64) comprises an attachment structure, like a snap structure or a lock structure or a mounting flange, to attach the luminaire cover (6) to a luminaire body (2) of the luminaire (1).

7. Luminaire cover unit (5) according to claim any one of the preceding claims, wherein the luminaire cover (6), preferably at least the light transmission section (60), is made of a translucent material, preferably a transparent material.

8. Luminaire cover unit (5) according to claim any one of the preceding claims, wherein the lighting electronic (8) comprises a converter or a driver.

9. Luminaire cover unit (5) according to claim any one of the preceding claims, wherein the lighting electronic (8) is fixedly attached to the receiving section (61), preferably detachably or permanently attached.

10. Luminaire cover unit (5) according to claim any one of the preceding claims, wherein the lighting electronic (8) is at least partially potted with a pottant in the receiving space (62), wherein the pottant preferably is opaque.

11. Luminaire cover unit (5) according to claim any one of the preceding claims, wherein the receiving section (61) is opaque, preferably coated with an opaque coating.

12. Flat luminaire (1), comprising:

a flat luminaire body (2) with a flat side (20),
 a light source (4) being provided at the flat side
 (20), 5
 a luminaire cover unit (5) according to any one
 of the preceding claims, the luminaire cover unit
 (5) being attached to the luminaire body (2) such
 that the light transmission section (60) covers
 the light source (4) so that light of the light source
 (4) can emit through the light transmission sec- 10
 tion (60), wherein the light source (4) is operably
 connected to the lighting electronic (8).

13. Flat luminaire (1) according to claim 12, wherein the 15
 light source (4) is an LED (40), an LED-module or
 an LED-board.

14. Flat luminaire (1) according to claim 12 or 13, where- 20
 in the luminaire body (2) comprises a cooling struc-
 ture (3) preferably at a side (21) opposite to the flat
 side (20), and/or the luminaire body (2) is made of a
 material having a high thermal conductivity, like alu-
 minum or an aluminum alloy.

15. Flat luminaire (1) according to any one of claims 12 25
 to 14, wherein the luminaire cover (6) and the lumi-
 naire body (2) delimit a lighting space (9) for receiving
 the light source (4) and the lighting electronic (8),
 preferably sealingly enclosing the lighting space (9). 30

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Fig. 3

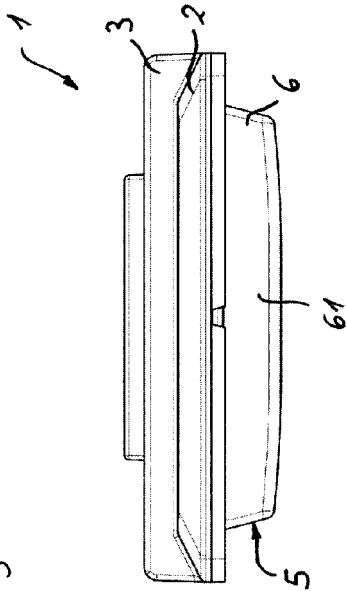


Fig. 4

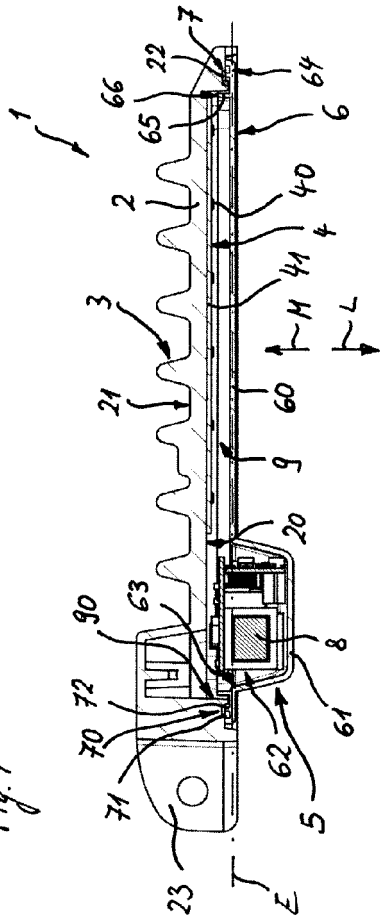


Fig. 2

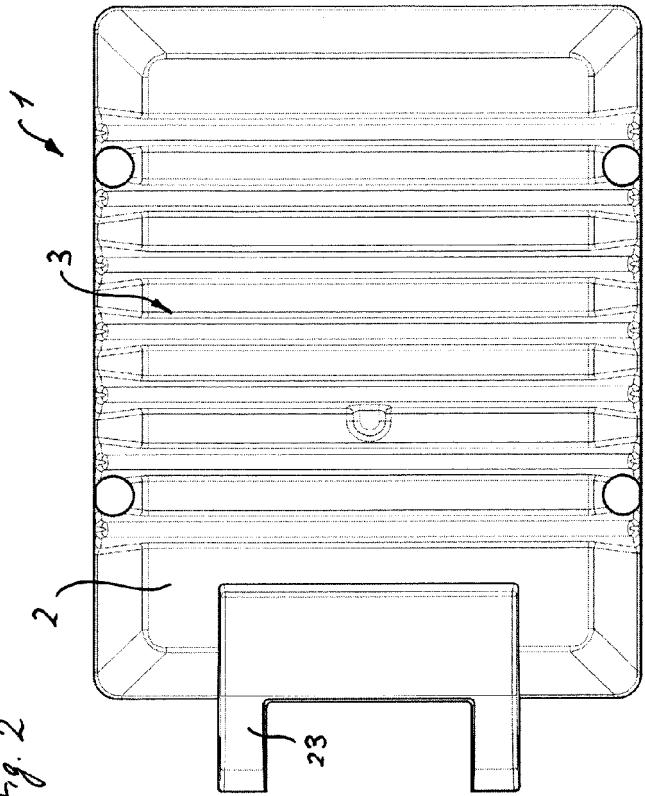
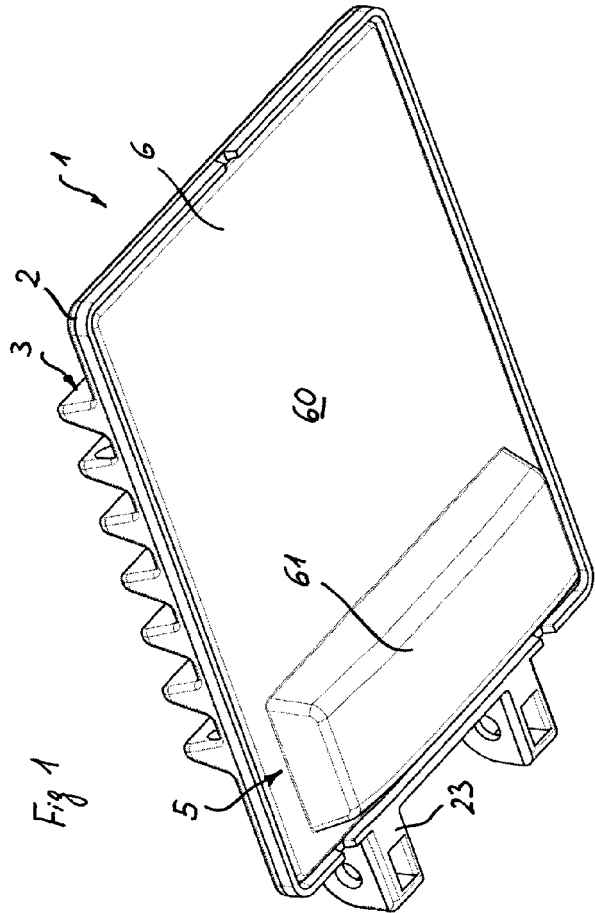


Fig. 1



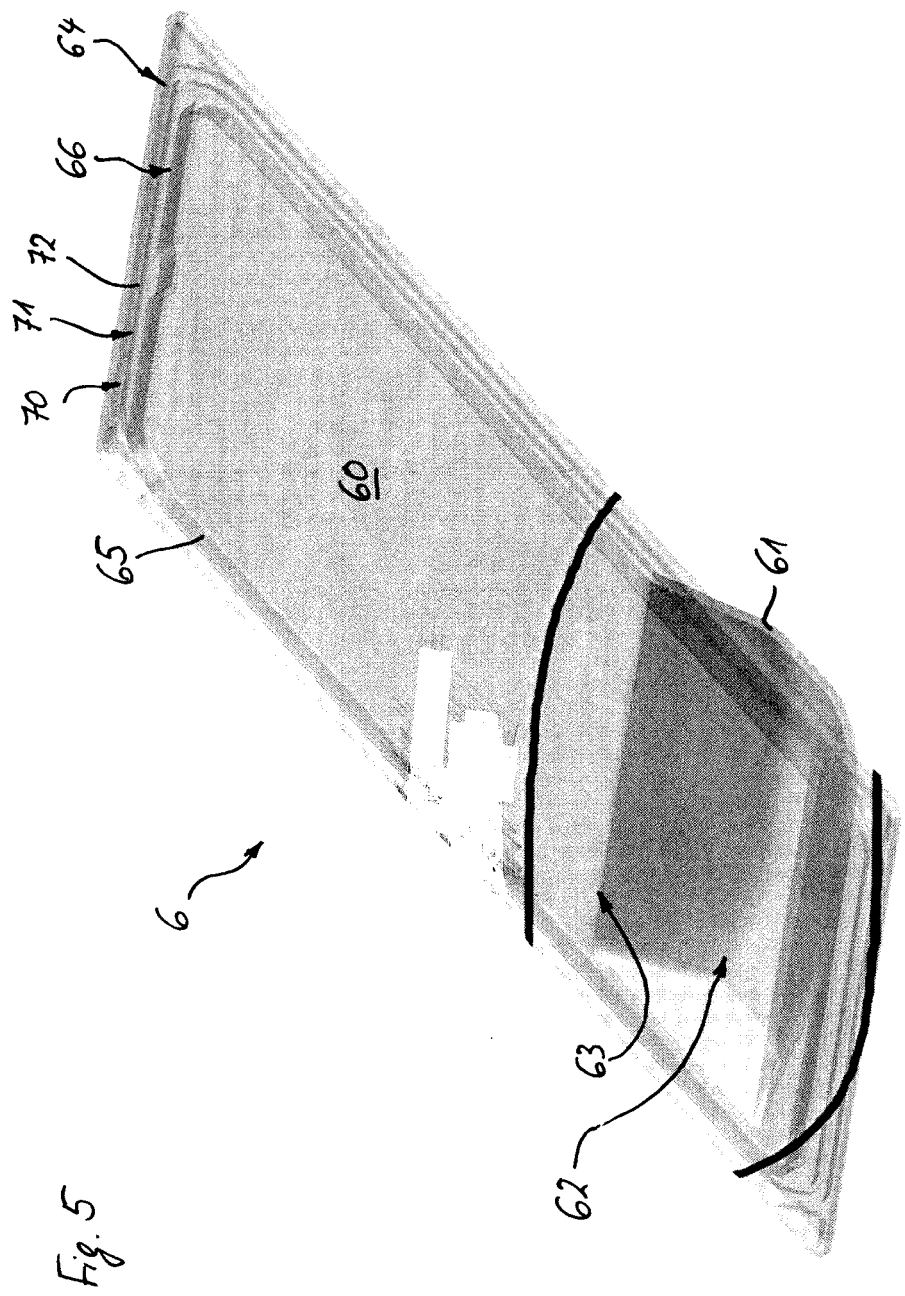
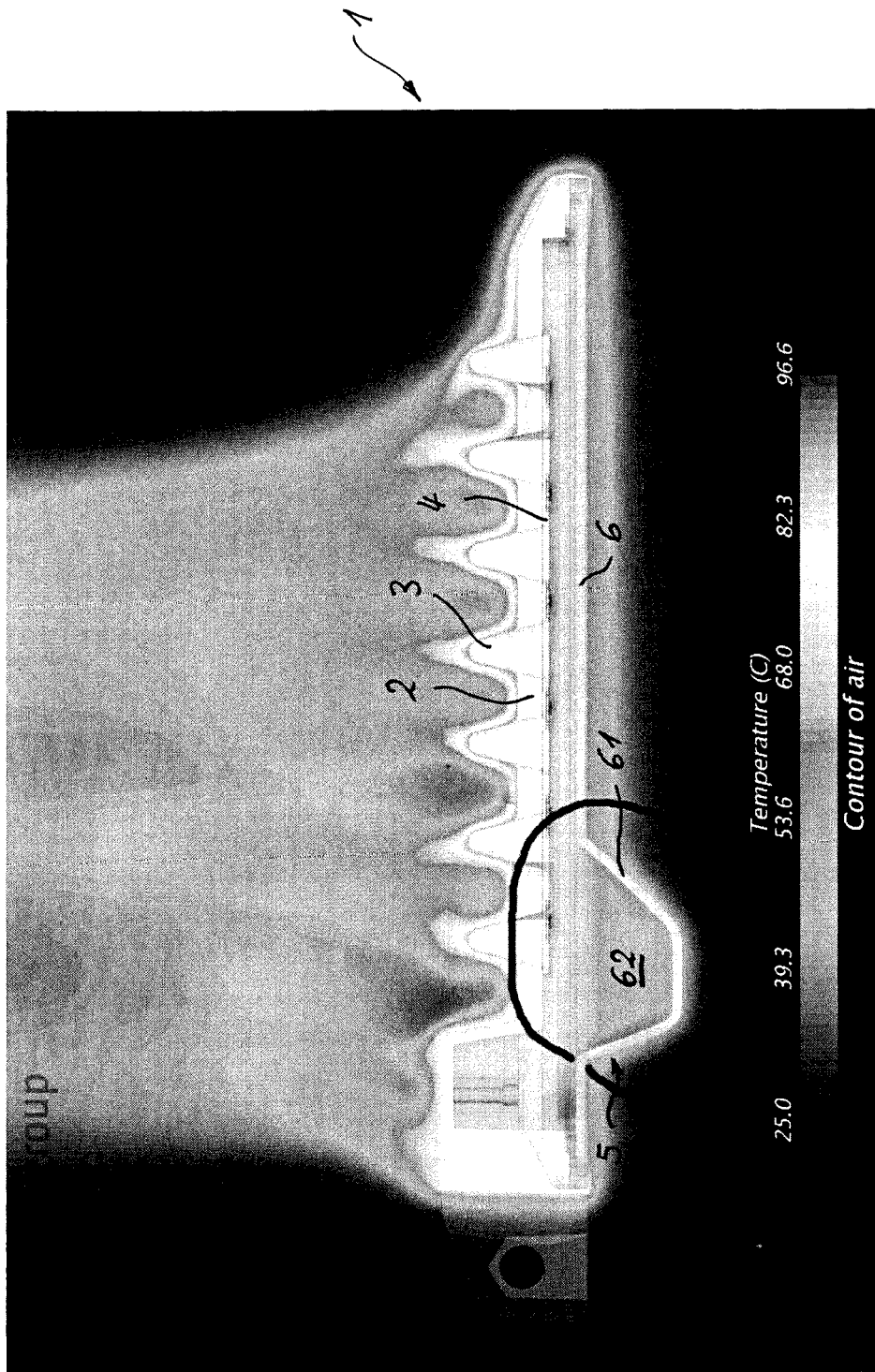


Fig. 6





EUROPEAN SEARCH REPORT

Application Number
EP 19 29 0120

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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 2016/053952 A1 (KUTI ANDRAS [HU] ET AL) 25 February 2016 (2016-02-25) * paragraph [0047] - paragraph [0050] * * paragraph [0060] - paragraph [0065] * * figures 3A, 4, 8, 9 *	1-9, 11-15	INV. F21V5/00 F21V3/02 F21S8/08 F21V23/00 F21V31/00
X	WO 2019/015976 A1 (SCHREDER SA [BE]) 24 January 2019 (2019-01-24) * page 11, line 25 - page 12, line 5 * * page 14, line 20 - page 16, line 28 * * figures 2, 5b *	1-8, 11-15	ADD. F21W131/103 F21V29/70 F21Y105/10 F21Y115/10
X	EP 3 199 861 A1 (OPPLE LIGHTING CO LTD [CN]) 2 August 2017 (2017-08-02) * paragraph [0018] - paragraph [0033] * * figures 1-7 *	1-9, 11-15	
X	US 2017/316660 A1 (CHONG MATTHEW JOHN [AU] ET AL) 2 November 2017 (2017-11-02) * paragraph [0014] - paragraph [0028] * * figures 1-5 *	1-9, 11-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			F21V F21S F21W F21Y
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 25 February 2020	Examiner Demirel, Mehmet
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	

EPO FORM 1503 03.82 (P04C01)

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

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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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25-02-2020

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50

55

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2016053952 A1	25-02-2016	CN 106574758 A	19-04-2017
		TW 201621209 A	16-06-2016
		US 2016053952 A1	25-02-2016
		US 2018356058 A1	13-12-2018
		WO 2016033019 A1	03-03-2016

WO 2019015976 A1	24-01-2019	AU 2018304415 A1	30-01-2020
		BE 1025411 A1	12-02-2019
		WO 2019015976 A1	24-01-2019

EP 3199861 A1	02-08-2017	CN 105276415 A	27-01-2016
		CN 105508906 A	20-04-2016
		CN 106931320 A	07-07-2017
		DE 202015009561 U1	19-04-2018
		EP 3199861 A1	02-08-2017
		WO 2016045304 A1	31-03-2016

US 2017316660 A1	02-11-2017	AU 2016203306 A1	16-11-2017
		CA 2929349 A1	29-10-2017
		MX 362263 B	10-01-2019
		US 2017316660 A1	02-11-2017
