



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
17.04.2019 Bulletin 2019/16

(51) Int Cl.:
F21V 15/01 ^(2006.01) **F21V 19/00** ^(2006.01)
F21S 4/20 ^(2016.01)

(21) Application number: **18197497.3**

(22) Date of filing: **28.09.2018**

(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
Designated Validation States:
KH MA MD TN

(72) Inventors:
• **ZANOTTO, Mr. Alberto**
I-35127 Padova (IT)
• **BALDO, Mr. Lorenzo**
I-31040 Giavera del Montello (Treviso) (IT)

(74) Representative: **Bosotti, Luciano Buzzi, Notaro & Antonielli d'Oulx**
Corso Vittorio Emanuele II, 6
10123 Torino (IT)

(30) Priority: **13.10.2017 IT 201700115838**

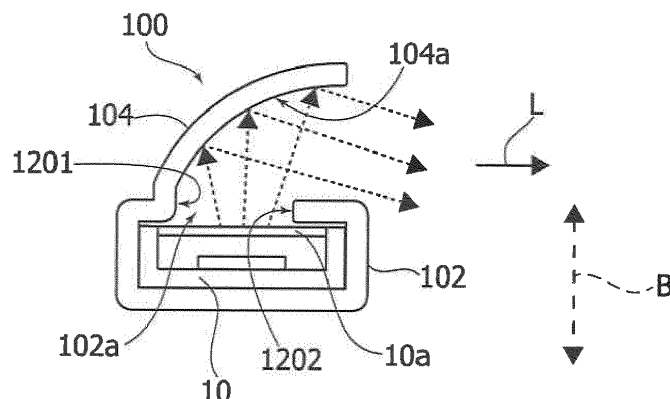
(71) Applicants:
• **OSRAM GmbH**
80807 München (DE)
• **OSRAM S.P.A. - SOCIETA' RIUNITE OSRAM EDISON CLERICI**
20126 Milano (IT)
Designated Contracting States:
IT

(54) **A LIGHTING DEVICE ACCESSORY, CORRESPONDING LIGHTING DEVICE AND METHOD**

(57) An accessory for lighting devices (100) comprises:
- a flexible elongated body (102) configured for receiving therein an elongated, strip-like lighting device (10), the elongated body (102) having a light-permeable light propagation portion (102a) extending lengthwise of the elongated body (102), and

gated body (102), and
- one or more flexible reflectors (104) extending along the elongated body (102), with a reflective surface of the light (104a) facing the light-permeable portion (102a) to reflect the light radiation propagating through the light-permeable portion (102a) of the body (102).

FIG. 9



DescriptionTechnical field

- 5 **[0001]** The description refers to lighting devices.
[0002] One or more embodiments can be applied to lighting devices using electrically-powered light radiation sources, for example, solid-state light radiation sources such as LED sources.

Technological background

- 10 **[0003]** In the art, lighting devices are known in the form of linear modules comprising an elongated substrate (for example, a flexible strip-like substrate) along which light radiation sources are distributed lengthwise
[0004] The strip-like substrate can be produced with a structure substantially similar to that of a printed circuit board (PCB) with the possibility of embedding the assembly formed by the substrate and the light radiation sources in a flexible
15 casing, for example, of polymeric material.
[0005] In this way it is possible to offer protection against external agents to the device, for example, with an IPx degree of protection.
[0006] These modules have intrinsic limitations regarding the possibility of bending due to the strip-like conformation of the substrate. These limitations may be undesirably reflected on the possibilities of use of the device, both regarding
20 the assembly and the configuration of light radiation emission.

Object and summary

- [0007]** One or more embodiments intend to contribute to overcoming these limitations.
25 **[0008]** According to one or more embodiments, this object is achieved thanks to an accessory having the characteristics referred to in the following claims.
[0009] One or more embodiments may concern a lighting device using such an accessory, as well as a corresponding method.
[0010] The claims form an integral part of the technical disclosure provided here in relation to the embodiments.
30 **[0011]** One or more embodiments may offer one or more of the following advantages:
- possibility of using a standard-type lighting device (light engine), for example, with front-emitting or top-emitting LEDs - both protected and non-protected
 - with improved characteristics, both at the level of assembly possibilities, and in terms of obtainable light distribution;
35 - possibility to change the size of the emission area and/or the light distribution by modifying the shape of one or more flexible reflector elements;
 - possibility to remove and re-use the lighting device (light engine) even after installation of the reflector element(s) (for example, by using one or more flexible reflectors with respect to which the lighting module can be made to slide or otherwise inserted and/or removed);
40 - possibility of masking elements of the lighting device or light engine (making them not visible from the outside) such as connectors, wires, cables, conductive tracks.

Brief description of the attached figures

- 45 **[0012]** One or more embodiments will be now described, purely by way of non-limiting example, with reference to the attached figures, wherein:
- Figures 1 and 2 schematically illustrate some aspects related to the use of flexible lighting modules,
 - Figure 3 is a perspective view of an accessory according to embodiments,
50 - Figure 4 is a cross-sectional view along the line IV-IV of Figure 3,
 - Figure 5, comprising two portions indicated respectively with a) and b), illustrates possible ways of using an accessory according to the embodiments,
 - Figure 6, comprising three portions indicated respectively with a) b) and c), illustrates possible ways of using an accessory according to the embodiments,
55 - Figures 7 and 8 illustrate possible criteria for fastening an accessory according to embodiments and a lighting device that uses the accessory, and
 - Figures 9 to 11 illustrate, according to an observation point approximately corresponding to the observation point of Figure 4, possible solutions which can be adopted in one or more embodiments.

[0013] It will be appreciated that, for clarity and simplicity of illustration, the various figures may not be reproduced on the same scale.

[0014] Likewise, it will be appreciated that exemplified characteristics (singly or in combination) in any of the attached figures can be applied (singly or in combination) to embodiments exemplified in any of the attached figures.

Detailed description

[0015] The following description illustrates various specific details, in order to provide a thorough understanding of various examples of embodiments according to the description. The embodiments can be obtained without one or more of the specific details, or with other methods, components, materials, etc. In other cases, known structures, materials or operations are not illustrated or described in detail so that the various aspects of the embodiments are not rendered unclear.

[0016] In the Figures, the numerical reference 10 indicates - in its entirety - a lighting device of the type currently referred to as a flexible linear module (or, briefly, "flex").

[0017] Such a lighting device may comprise a so-called light engine comprising, in turn, an elongated substrate (e.g. strip-like) 12, substantially similar to a flexible Printed Circuit Board (PCB) on which light radiation sources are distributed lengthwise, with electrical power supply 14. These can be, for example, solid state light radiation sources such as LED sources.

[0018] The light engine 12, 14 can be inserted into a housing or casing 16 capable of presenting, for example, a channel-like transverse profile.

[0019] The inner space of the casing 16 may possibly receive a sealing or potting mass 18 in order to give the light engine characteristics of protection against external agents, for example, with a degree of protection IPx.

[0020] Lighting devices as described above (both unprotected types - without a potting mass 18, and protected types - with a potting mass 18) are well known in the art, which makes it unnecessary to provide a more detailed description herein.

[0021] As far as it is concerned here, the device 10 (and the parts that compose it) can be seen as elements of indefinite length (shown here in cross-section), possibly susceptible to being cut to length according to the requirements of application and use.

[0022] Figure 1 exemplifies the possibility of arranging the light engine (substrate 12 and sources 14), so to speak, "horizontally" in the casing 16 (for example, resting on the bottom wall of the channel-shaped profile). In this way, the device 10 lends itself to being folded (taking advantage of the flexibility characteristics of the component parts) in a "vertical" direction (see the double arrow indicated by B in Figure 1), or rather, in the same direction in which the light radiation of the sources 14 is emitted starting from the front surface (i.e. from the open side of the casing 16), as schematically indicated by the arrow L in Figure 1.

[0023] Figure 1 refers, by way of example, to the use of front-emitting or top-emitting light radiation sources 14, or rather with the radiation emitted by the sources 14 which are located on the substrate 12 directed towards the front surface of the device 10.

[0024] Figure 2 exemplifies the possibility of arranging the light engine 12, 14 at one of the side walls of the casing 16, i.e. with the light engine arranged, so to speak, "vertically" with respect to the device 10.

[0025] In this case, it is possible to make the device 10 flexible in a direction transverse to the direction of emission of the light radiation (see also in this case the arrow indicated with L), as schematically represented by the double arrow B in Figure 2.

[0026] Both Figures 1 and 2 refer to lighting devices 10 in which the casing 16 is easily flexible (for example, being made of polymeric material, for example, silicone material), so that the flexibility characteristics of the device 10 are substantially dictated by the flexibility characteristics of the strip-like substrate 12, which bends more easily - as can be appreciated in both Figures 1 and 2 - in a perpendicular direction with respect to its general extension plane.

[0027] In order for the light radiation emitted by the sources 14 to be directed towards the front surface of the device 10, solutions such as the one exemplified in Figure 2 may envisage that the sources 14 (for example, LEDs) are of the side-emitting type and not front-emitting or top-emitting.

[0028] From the implementation point of view (these considerations are almost equally valid for both the solutions exemplified in Figures 1 and 2), production of a device 10 of the type considered here can envisage the co-extrusion of the flexible light engine 12, 14 in the casing 16, or rather lamination of the flexible light engine in the casing 16 (with possible subsequent application, in both cases, of the potting mass 18).

[0029] It is also possible to integrally produce or coat the casing 16 (for example, on the inner surface) with light-reflective material (for example, white silicone material) and/or to use light-diffusive material (for example, silicone with light-diffusion characteristics) for filling the inner volume of the casing 16 (e.g. at the potting mass 18 level).

[0030] This manner of proceeding may also possibly allow (by exploiting the reflection/diffusion of the light radiation in the inner volume of the casing 16) implementation of a solution, as exemplified in Figure 2, by using front-emitting or

top-emitting light radiation sources.

[0031] In the case of unprotected modules, referring to the solution of Figure 2 (to be clear, consider the solution of Figure 2, assuming that there is no potting mass 18), resorting to side-emitting light radiation sources, directed towards the front surface of the casing 16 may end up being an almost imperative solution, since it must also be considered that the side-emitting sources, for example LEDs, may have a higher cost compared to those with front-emitting sources, also considering the lower availability on the market.

[0032] One or more embodiments, as exemplified in Figure 3 and subsequent figures, are able to allow the use of a lighting device 10 of the type shown in Figure 1 (in which, by itself, the - main - flexibility direction B is parallel, or substantially parallel, to the main light emission direction L) achieving conditions of possible use substantially similar to those represented in Figure 2, i.e. conditions in which the (main) flexibility direction B is oriented in a direction transverse to the (main) direction of light radiation emission L. This can be done without using side-emitting light radiation sources 14 and/or without having to use potting masses 18 with diffusivity characteristics.

[0033] One or more embodiments can make it possible to achieve this result by using an accessory 100 which can be applied (e.g. fit) on a module 10 such as, for example, a module 10 (of the protected or unprotected type) as exemplified in Figure 1, i.e. using standard front- or top-emitting light radiation sources, for example LEDs.

[0034] In one or more embodiments, the accessory 100 may comprise a body portion 102 which can be fitted (according to different methods, as discussed below) on the device 10, and comprising a (frontal) portion permeable to the light 102a (for example, a continuous or discontinuous window or a continuous or discontinuous transparent portion) and a screen 104 e.g. curved, which can act as a reflector in such a way that the light radiation, emitted from the module 10 in a front direction through the front surface of the casing 16 and the light-permeable portion 102a, is reflected (on the intrados surface 104a, e.g. concave, of the screen 104) sideways with respect to the accessory 100 and to the module 10 received therein (see, for example, Figures 9 to 11 discussed below) in the direction (see arrow L) at least approximately perpendicular to the (main) bending direction represented by the double arrow B.

[0035] In one or more embodiments, the light-permeable portion 102a has opposite sides 1201 and 1202 (see, for example, Figures 3 and 4) that extend along the elongated body 102 and the reflector screen 104 extends (distally, that is, projecting) starting from one of the opposite sides (for example, starting from the side 1201, in the examples presented here) of the light-permeable portion 102a.

[0036] The accessory 100 can be made, in one or more embodiments with body 102 and screen 104 made of a piece, e.g. of flexible material, for example, elastic (with the use of materials such as silicone materials, rubber, etc.) with the consequent possibility of following the bending movement imparted to the module 10.

[0037] In one or more embodiments, the accessory 100 can be made (in its entirety, or limited to the screen 104, for example, at the surface 104a able to reflect the light) of material with light-reflective characteristics.

[0038] For example, in one or more embodiments, the accessory 100 can be made (in its entirety, or limited to a part of it, for example, the screen 104, for example, at the surface 104a able to reflect the light) with colored material and/or fluorescent characteristics.

[0039] This can be, for example, a material containing pigmented and/or fluorescent particles (e.g. coextruded particles).

[0040] In this way, it is possible, for example, to cause the light radiation emitted by the device equipped with the accessory 100 to be colored accordingly.

[0041] This can be, for example, light-colored material, for example white, such as silicone, with general light reflection/diffusion effects.

[0042] In one or more embodiments the light reflection characteristics can be achieved - just to give some possible examples, without limiting intentions - with a strip of metal material, such as aluminum, applied to the reflective surface of the screen 104, with the application of a light-reflective coating layer (e.g. white paint) or with an aluminizing treatment.

[0043] In one or more embodiments, the use of material with fluorescence characteristics facilitates the achievement of a gradual turnoff of the device, because, thanks to the presence of the fluorescent material, the device also emits light radiation for a (short) period of time after the light radiation sources 14 have been turned off.

[0044] It will be appreciated that the characteristics described above in relation to the accessory 100 (in its entirety or limited to part of it) can be identically applied to the sealing mass 108 which will be discussed below with reference to Figure 10.

[0045] The connotation of the element 100 as an accessory highlights the fact that it can be made, in one or more embodiments, as an element distinct from the module 10 (whatever the structure of the module itself, according to various possible known solutions, such as, for example, those shown in Figures 1 and 2) with subsequent coupling to the module 10, which can be implemented either at the manufacturing stage or with a coupling operation carried out at the moment of use, for example, by the end user, without special equipment being required for this purpose.

[0046] For example, the sequence of the two parts a) and b) of Figure 5 exemplifies the possibility of inserting a module 10 inside the body 102 of an accessory 100, by a (relative) sliding movement in the longitudinal direction, as exemplified in part a) of Figure 5.

[0047] Figure 6 exemplifies the possibility of creating the aforesaid coupling by exploiting the flexibility characteristics (of the body 102) of the accessory 100, which is able to be slightly spread apart at the light-permeable portion 102a, so as to allow the module 10 to be inserted (for example, according to snap-coupling) in such a way as to be able to achieve, in this case as well, a coupling condition (which can be seen in the portion b) of Figure 5 and the portion c) of Figure 6) in which the body part 102 of the accessory 100 surrounds the module 10 with the reflective screen 104 placed in front of the light-permeable portion 102a, so as to be able to produce the desired "side" reflection effect of the light radiation.

[0048] It will also be appreciated that the modalities for producing the coupling between the module 10 and accessory 100 exemplified in Figures 5 and 6 can also be implemented in a combined manner (sliding plus deformation).

[0049] The choice, in one or more embodiments, of using deformable (flexible) material for the accessory 10, such as silicone or rubber, facilitates the insertion of the module 10 inside the accessory 100, also being able to achieve a holding (elastic) force of the module 10 inside the accessory 100.

[0050] In one or more embodiments, the coupling condition between the module 10 and accessory 100 can be reinforced, for example, by applying adhesive material (in the form of tape or glue) at facing portions of the module 10 and the accessory 100.

[0051] In one or more embodiments, it is possible to produce the accessory 100 (or even just the reflective screen 104, or even just the reflective surface 104a) with materials having different reflectivity and/or color characteristics, using, for example, materials with specular reflection or diffusive-type characteristics.

[0052] In one or more embodiments, it is possible to adopt different configurations for the screen 104 compared to the general basin shape exemplified here, with a reflective surface with convexity directed towards the portion 102a, in order to give a G-shaped cross-sectional profile to the accessory 100.

[0053] In one or more embodiments, by adopting different conformations for the screen 104 (two possible examples being a rectilinear conformation or a convex conformation rather than a concave one), it is possible to modify the emission angles and/or the dimensions of the emission area of light radiation (see, for example, the arrow L in Figures 4 and 9 to 11).

[0054] Furthermore, in one or more embodiments, it is possible to use multiple reflectors 104 (hence the phrase "at least one reflector", which appears in the claims), for example, by providing a double screen with reflectors 104 on both the sides 1201, 1202 of the portion 120a. In this way, it is possible to produce side radiation emissions directed in opposite directions, for example, crossing each other, possibly with a front or top emission component resulting from the combination of the two.

[0055] The comparison between Figures 9 and 10 exemplifies the fact that, in one or more embodiments, the accessory 100 can be coupled with a non-protected module 10 (i.e. of the type in which the light engine 12, 14 does not have a potting mass, such as that indicated by 18 in Figures 1 and 2), instead providing the application of such a mass 108 (for example, based on silicone, glue, polyurethane or other known potting materials) within the volume defined by the screen 104 with respect to the module 10, which is in the body part 102 of the accessory.

[0056] As already mentioned, the previous considerations relating to the possible use of colored material and/or fluorescent material can be applied to the accessory 100 in its entirety, limited to part of it, to the sealing mass 108.

[0057] Figures 9 and 10 also exemplify the fact that the body part 102 of the accessory 100 does not need to be channel-shaped, instead being able to present an open bottom wall or opening with formations 102a, which can create a mechanical coupling with the casing 16 of the module 10 (e.g. with a combination of ribs and grooves provided, respectively, on either side of the body part 102 of the accessory 100 and the casing 16 of the module 10).

[0058] In particular, it will be appreciated that the various solutions presented in figures such as Figures 9 and 10 (as well as the combinations of characteristics exemplified with reference to the preceding figures) should not be interpreted as strictly limited, regarding their possibilities of use, to the solution in which they were presented.

[0059] As already said, in one or more embodiments, characteristics exemplified individually or in combination in any one of the attached figures can be applied, singly or in combination, to embodiments exemplified in any other of the attached figures.

[0060] For example (without this listing being intended in a limiting sense) in one or more embodiments, the accessory 100, here exemplified as comprising a single material, may comprise several materials (for example, with different characteristics of light propagation/reflection/diffusion).

[0061] Similarly, the coupling configurations exemplified in Figures 10 and 11 with complementary ribs/grooves are merely exemplary of a wide range of possible mechanical coupling modes between the casing 100 and the module 10 (with the possible use of intermediate elements as well).

[0062] For example, the space indicated by 110 in Figure 10 is an example of the possible presence, once the accessory 100 (in any case produced and configured) is coupled with the module 10, of a space which can receive (possibly masking them with respect to the outside) elements such as connectors, wires, cables or electrically conductive tracks, which can facilitate the operation of the device 10.

[0063] For example, this may be the case of a module 10 coupled with the casing 100, for example by gluing, for example, with silicone glue.

[0064] Figures 7 and 8 exemplify modes that can be used to assemble an assembly comprising the module 10 and

the accessory 100 on a supporting structure (not shown in the figures).

[0065] For example, Figure 7 illustrates the possibility of using a bi-adhesive tape 120 for fastening, applied for example, to the bottom wall of the body part 102 of the accessory 100.

[0066] Figure 8, instead, exemplifies the possibility of using fastening formations for this purpose, such as screws or pegs 140, which can extend through the aforesaid bottom wall or, more generally, through the wall of the accessory 100. In one or more embodiments, the accessory 100 may comprise, as seen, a flexible material which can be easily perforated by said fastening formations 140, even without the need to provide holes - designed for this purpose - beforehand.

[0067] Other modalities of possible use for fastening may include, for example, studs or clips, fastening rails, etc.

[0068] It will be appreciated that assembly modes as exemplified in Figures 7 and 8 are suitable to be implemented both with the module 10 (already) inserted in the accessory 100, and operating on the accessory 100 before placing it inside (for example, according to modalities exemplified in Figures 5 and 6) the module 10.

[0069] In one or more embodiments, an accessory for lighting devices (e.g. 100) may comprise:

- a flexible elongated body (e.g. 102) configured for receiving therein an elongated, strip-like lighting device (e.g. 10), the elongated body having a light-permeable light propagation portion (e.g. 102a) extending lengthwise of the elongated body (102), and
- at least one flexible reflector (e.g. 104) extending lengthwise of the elongated body, the at least one reflector having a light-reflective surface (e.g. 104a) facing the light-permeable portion to reflect light radiation propagated there-through.

[0070] In one or more embodiments, the body and the at least one reflector can be in one piece with each other.

[0071] In one or more embodiments, the at least one reflector may comprise a reflective surface of the concave light with a concavity directed towards the light-permeable portion.

[0072] In one or more embodiments, the light-permeable portion may have opposite sides (e.g. 1201, 1202) extending along the body, and at least one reflector may extend (e.g. protruding) from one (e.g. 1201) of opposite sides of the light-permeable portion.

[0073] In one or more embodiments, the body can be channel-shaped, with the light-permeable portion at the open side of the channel shape.

[0074] In one or more embodiments, the accessory may have a substantially G-shaped cross-sectional profile.

[0075] In one or more embodiments, the body may have an open side opposite to the light-permeable portion.

[0076] In one or more embodiments, the body may present formations (e.g. 102b) for mechanical coupling with the lighting device.

[0077] In one or more embodiments, at least part of the accessory may comprise colored material and/or fluorescent material.

[0078] In one or more embodiments, an assembly may comprise:

- an accessory according to one or more embodiments, and
- a strip-like elongated lighting device received in the body of the accessory, with a light-emitting surface (10a) of the lighting device extending at the light-permeable portion of the accessory.

[0079] One or more embodiments may comprise a light-permeable sealing mass (e.g. 108) between the light-emitting surface of the lighting device and the reflective surface of the at least one reflector.

[0080] In one or more embodiments, said sealing mass may comprise colored material and/or fluorescent material.

[0081] In one or more embodiments, a method may comprise:

- providing an accessory according to one or more embodiments, and
- coupling an elongated strip-like lighting device with the accessory, by a method selected from:
 - a relative lengthwise sliding movement of the lighting device and the body of the accessory (see e.g. Figure 5), and - alternatively or in addition to:
 - an elastic deformation of the body of the accessory with insertion of the lighting device into the elastically deformed accessory (see for example Figure 6).

[0082] Without prejudice to the underlying principles of the invention, the details of implementation and the embodiments may vary, even significantly, with respect to those illustrated here, purely by way of non-limiting example, without departing from the field of protection.

[0083] This field of protection is defined by the attached claims.

LIST OF REFERENCE SIGNS

5	Lighting device	10
	Accessory	100
	Elongated body	102
	Light propagation portion	102a
	Coupling formations	102b
10	Opposite sides of the light-permeable portion	1201, 1202
	Flexible reflector	104
	Light-reflective surface	104a
	Sealing mass	108

Claims

1. A lighting device accessory (100), comprising:

- a flexible elongated body (102) configured for receiving therein an elongated, strip-like lighting device (10), the elongated body (102) having a light-permeable light propagation portion (102a) extending lengthwise of the elongated body (102), and
- at least one flexible reflector (104) extending lengthwise of the elongated body (102), the at least one reflector (104) having a light-reflective surface (104a) facing the light-permeable portion (102a) to reflect light radiation propagated therethrough.

2. The accessory (100) of claim 1, wherein the elongated body (102) and the at least one reflector (104) are one-piece with each other.

3. The accessory (100) of claim 1 or claim 2, wherein the at least one reflector (104) comprises a concave light-reflective surface (104) with a concavity facing the light-permeable portion (102a).

4. The accessory (100) of any of the previous claims, wherein the light-permeable portion (102a) has opposed sides (1201, 1202) extending lengthwise of the body (102) and the at least one reflector (104) extends from one (1201) of the opposed sides of the light-permeable portion (102a).

5. The accessory (100) of any of the previous claims, comprising a channel-shaped elongated body (102) with the light-permeable portion (102a) at the open side of the channel shape.

6. The accessory (100) of any of the previous claims, wherein the accessory (100) has a substantially G-shaped cross sectional profile.

7. The accessory (100) of any of claims 1 to 4, wherein the body (102) has an open side opposite the light permeable portion (102a).

8. The accessory (100) of any of the previous claims, wherein the body (102) comprises mechanical coupling formations (102b) with the lighting device (10) .

9. The accessory (100) of any of the previous claims, wherein at least part of the accessory (100) comprises colored material and/or fluorescent material.

10. An assembly comprising:

- an accessory (100) according to any of claims 1 to 9,
- a strip-like lighting device (10) received in the body (102) of the accessory (100) with a light-emitting surface (10a) of the lighting device (10) extending at the light-permeable portion (102a) of the accessory (100).

11. The assembly of claim 10, comprising a light-permeable sealing mass (108) between the light-emitting surface (10a)

of the lighting device (10) and the reflective surface (104a) of the at least one reflector (104) .

12. The assembly of claim 11, wherein said sealing mass (108) comprises colored material and/or fluorescent material.

5 **13.** A method, including:

- providing an accessory (100) according to any of claims 1 to 9,
- coupling with the accessory (100) an elongated strip-like lighting device (10) by any of:
- 10 - relative lengthwise sliding movement of the lighting device (10) and the body (102) of the accessory (100), and/or
- elastic deformation of the body (102) of the accessory (100) with insertion of the lighting device (10) into the elastically deformed accessory (100).

15

20

25

30

35

40

45

50

55

FIG. 1

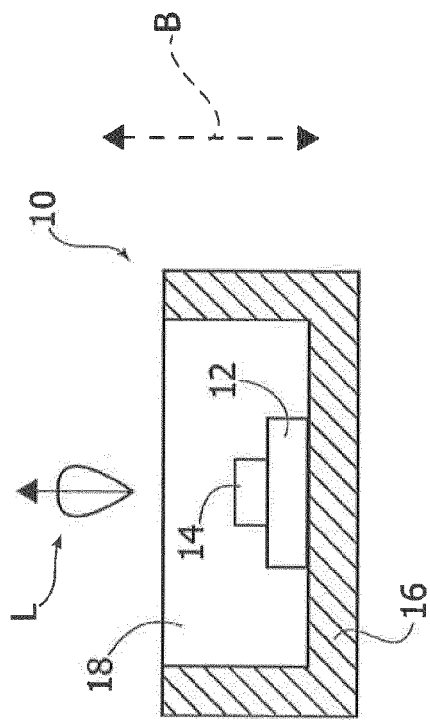


FIG. 2

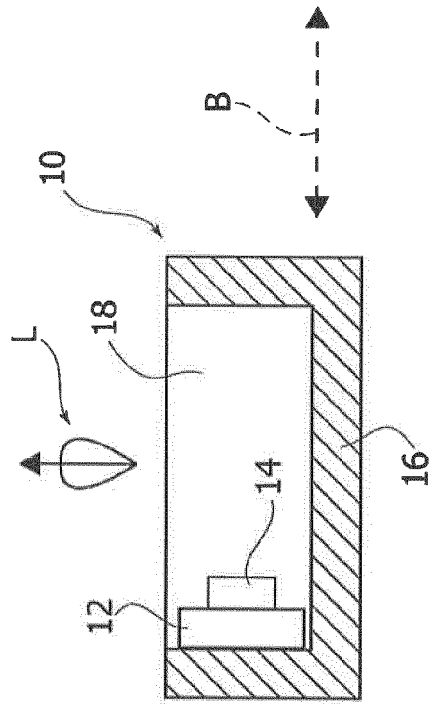


FIG. 3

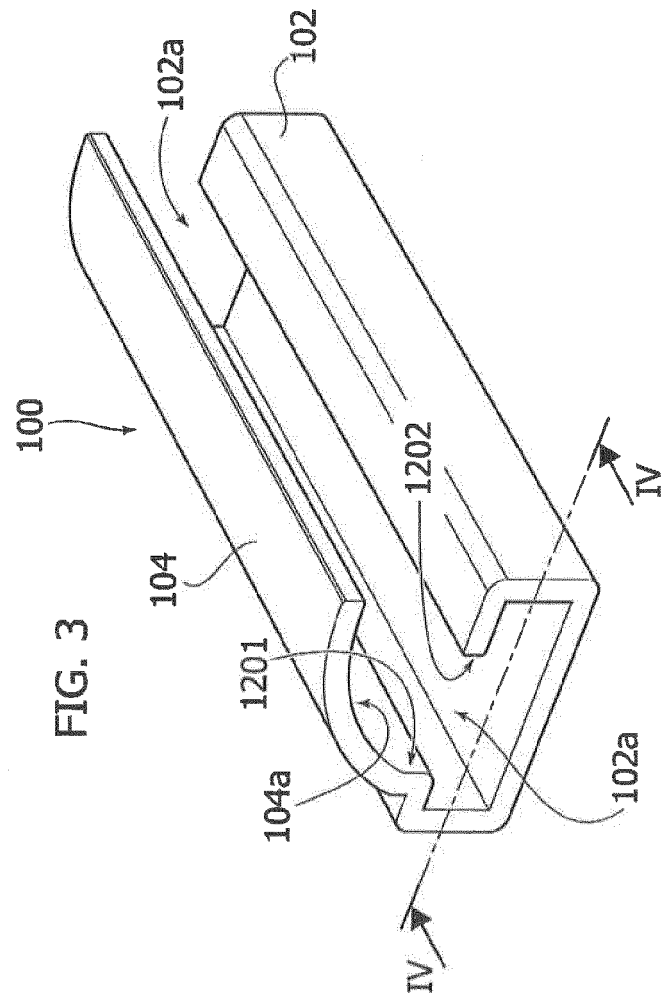


FIG. 4

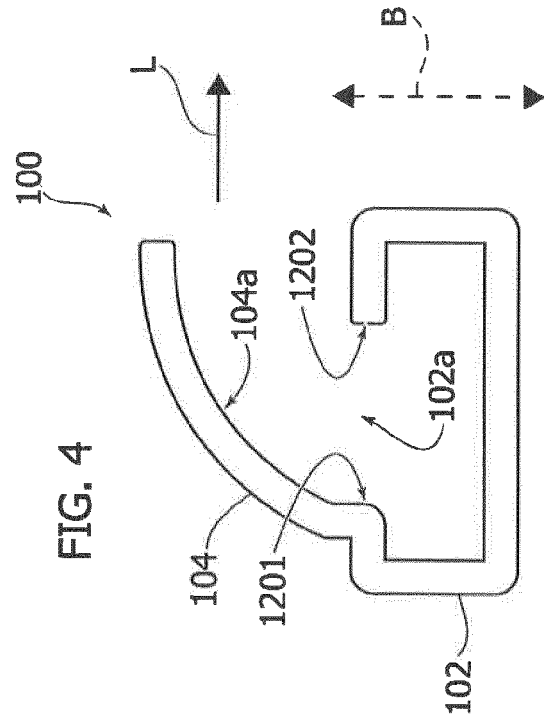


FIG. 5

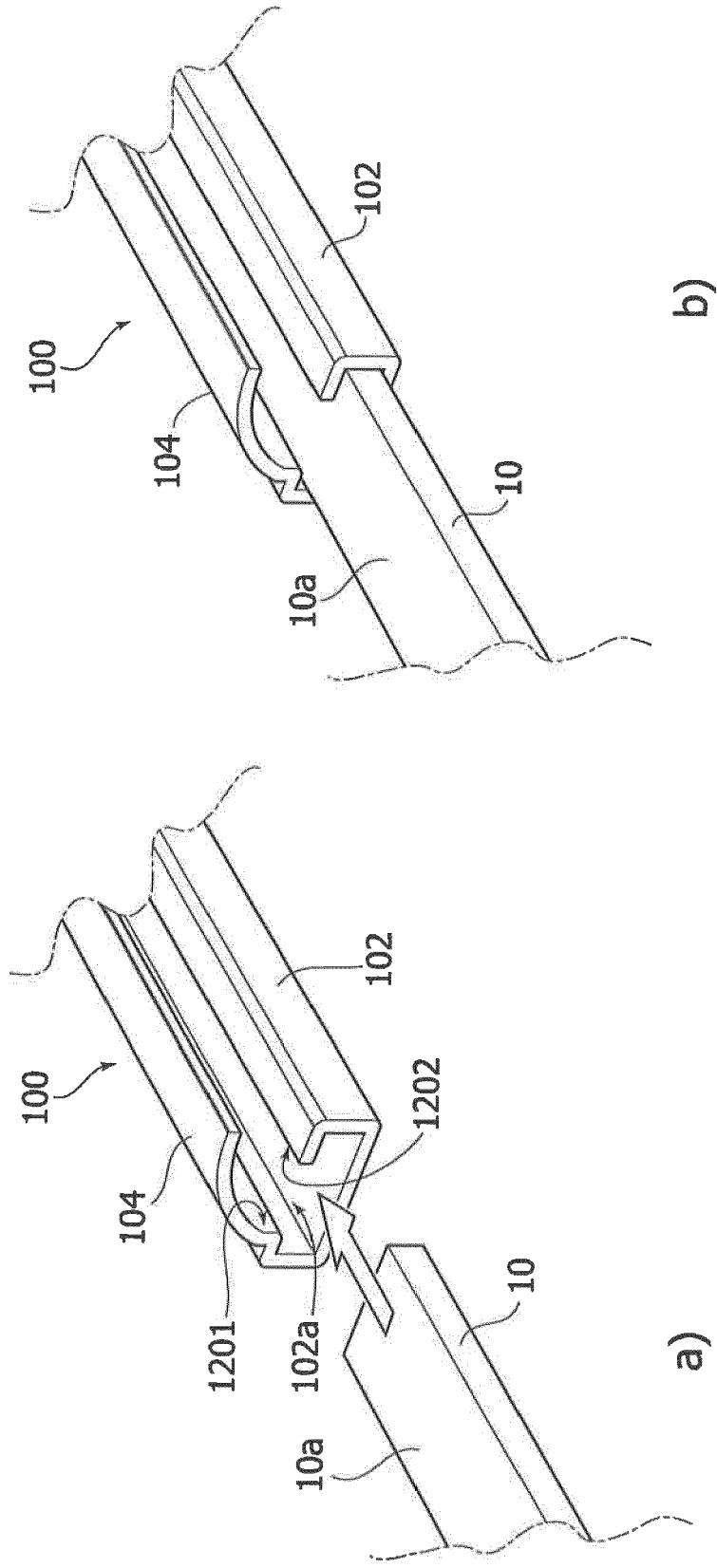


FIG. 6

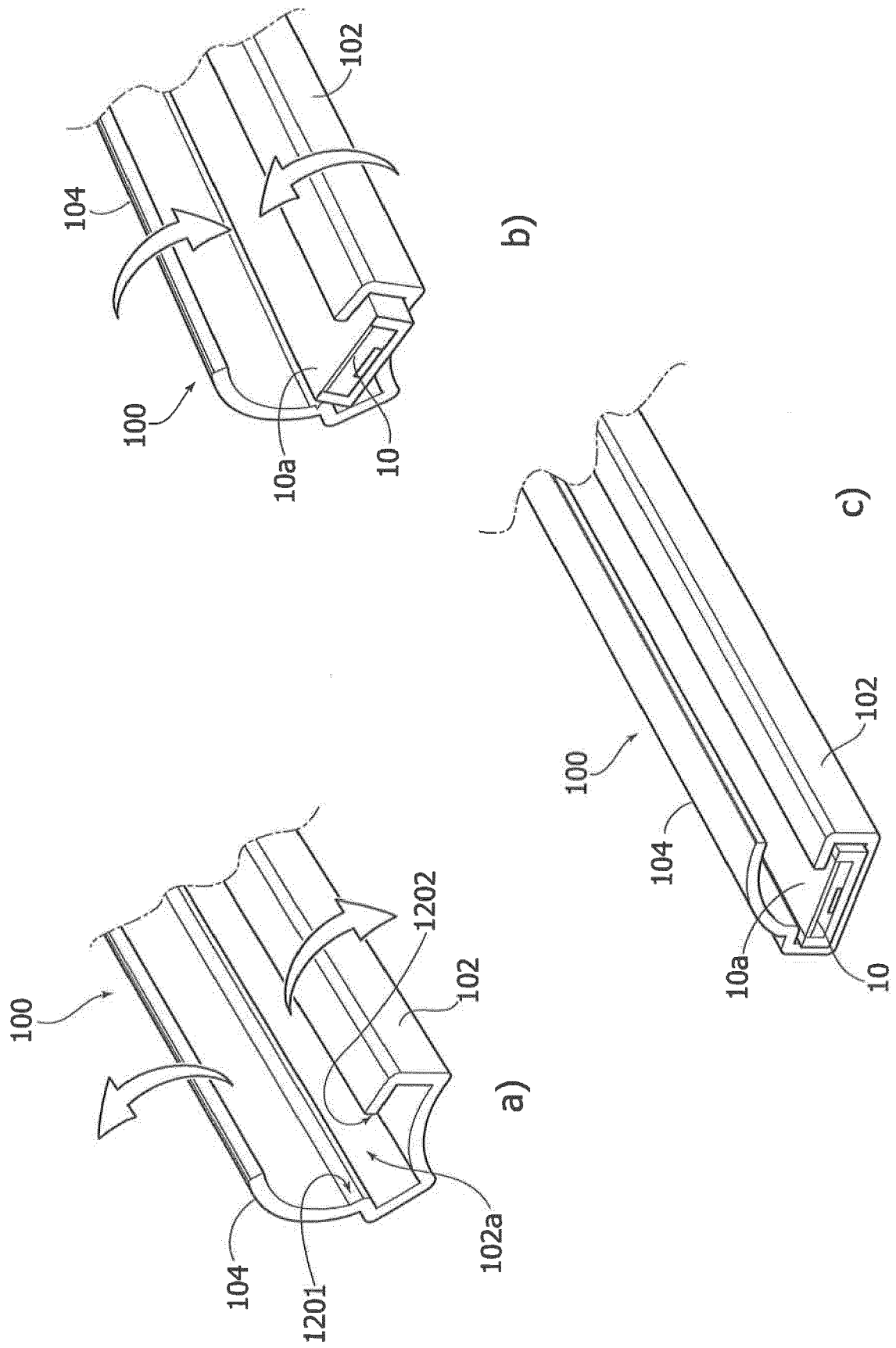


FIG. 8

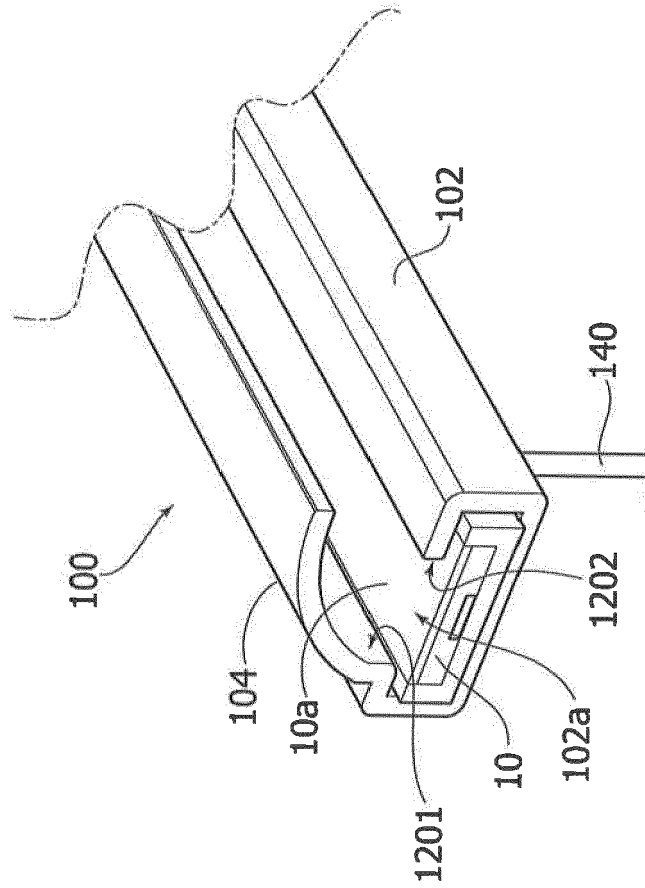


FIG. 7

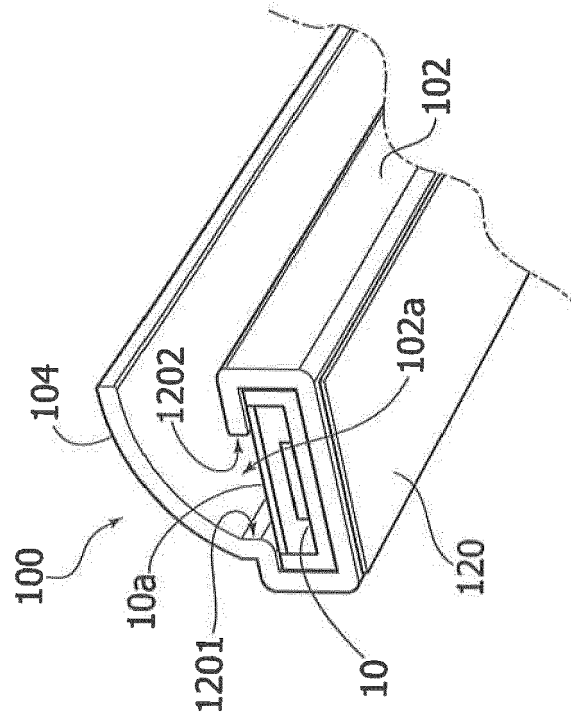


FIG. 9

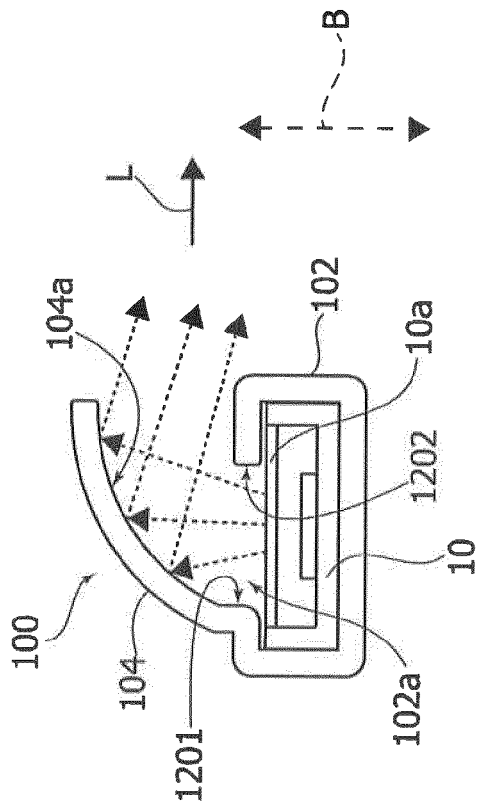


FIG. 10

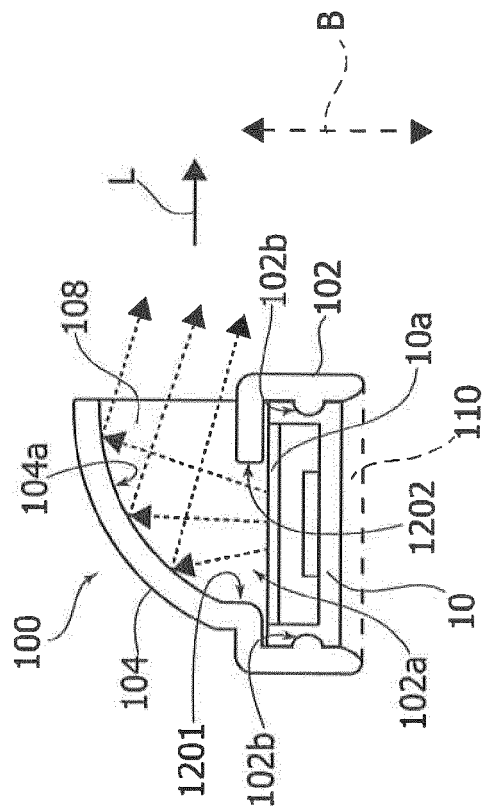
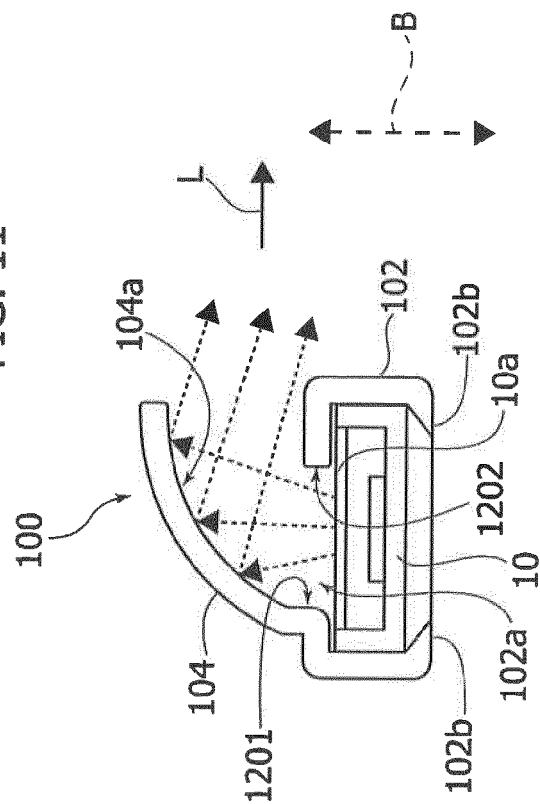


FIG. 11





EUROPEAN SEARCH REPORT

Application Number
EP 18 19 7497

5

10

15

20

25

30

35

40

45

50

55

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 2016/377783 A1 (TANAHASHI OSAMU [JP] ET AL) 29 December 2016 (2016-12-29) * paragraphs [0019] - [0023]; figures 2,3 *	1,3,7,9,10,13	INV. F21V15/01 F21V19/00 F21S4/20
X	US 2016/097516 A1 (HOWARD ANDREW [US]) 7 April 2016 (2016-04-07) * paragraphs [0020] - [0025]; figures 3, 6 *	1,2,4,6,8,9,11	
X	WO 2008/014682 A1 (YAO ZHIFENG [CN]) 7 February 2008 (2008-02-07) * paragraphs [0046] - [0048]; figures 1,2,6 *	1-3,5,9-12	
			TECHNICAL FIELDS SEARCHED (IPC)
			F21V F21S
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 31 October 2018	Examiner Krikorian, Olivier
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 03.02 (P04C01)

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

EP 18 19 7497

5

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.

31-10-2018

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2016377783 A1	29-12-2016	DE 102016111527 A1	12-01-2017
		JP 2017015785 A	19-01-2017
		US 2016377783 A1	29-12-2016

US 2016097516 A1	07-04-2016	US 2016097516 A1	07-04-2016
		WO 2016057469 A1	14-04-2016

WO 2008014682 A1	07-02-2008	CN 101113806 A	30-01-2008
		WO 2008014682 A1	07-02-2008

15

20

25

30

35

40

45

50

55

EPO FORM P0459

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