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(54) **AN IMPROVED LIGHTING DEVICE**

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DISPOSITIF D'ÉCLAIRAGE AMÉLIORÉ

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EP 3 604 913 B1

Description

[0001] The present invention relates to an improved lighting device for a structure and/or installation in which illumination is required and/or provided, preferably for a roofing installation, in particular for a pergola or curtain, but also for a piece of furniture or a furnishing complement.

[0002] Currently, ever increasing number of pergolas, curtains or, in general, roofing installations are equipped with lighting elements that can be configured to illuminate the underlying surface of the cover and/or form courtesy lights and/or create special lighting effects, in particular RGB effects.

[0003] Until now this demand has been met by applying strips of lights, preferably strips of LED lights (also called "led strips"), within special seats provided in the metal components or anyway rigid of the roofing installation, or by applying them by adhesive directly on the surface of said components.

[0004] For example, in roller blinds the LED strips can be applied to the articulated arms and/or to the rigid beam which is moved and/or to the support structure of the curtain, while in the sliding curtains the LED strips are applied to the guides and/or uprights supporting the guides and/or other parts of the tent support structure.

[0005] Furthermore, in order to create a uniform beam of light starting from a strip of LEDs, thus avoiding having distinct and separate beams/points for each LED, it is necessary to provide - at a certain distance from the LED strip - a suitable semi-transparent cover.

[0006] In this regard, mainly for decorative purposes, extruded section bars of polymeric material (for example, silicone), inside which the LED diodes are embedded, have already been proposed on the market. Conveniently, to isolate the LED diodes with their electrical connections from the external environment, so as to prevent the entry of solid particles (dust or insects) or liquids, the extruded sections are then hermetically closed at their ends.

[0007] Therefore, the extruded section thus obtained, which is closed at its ends, is available on the market with predefined dimensions and, therefore, at the time of its installation it is difficult to customize according to the particular characteristics of the roofing installation, such as for example those defined by the length of the component of the cover to which the section bar - with the LED strips inside - must be applied. In particular, this type of extruded section with the LED diodes inside cannot be tailor cut according to the specific installation requirements since, otherwise, it would then be open at at least one of its ends and, therefore, the LED diodes would be exposed to solid particles and liquids from the external environment.

[0008] US 2012/0182755 presents a solution in which a LED strip is coupled with optics which allow a uniform diffusion of the light produced by the LED diodes of the strip itself, thus avoiding the formation of luminous

"spots". The LEDs and the optics are wrapped by covering films, which however do not by themselves define a suitable protection from the internal environment. Therefore, the LED strip diodes and the optics, partially wrapped by said covering films, are inserted inside a section bar which has the function of protecting them from dust and atmospheric agents. Furthermore, in order to obtain effective protection of the LEDs from the external environment, the section bar is closed at both ends by a pair of plugs.

[0009] However, this solution is not fully satisfactory since, in order to obtain the necessary protection of the LEDs from external agents, it is necessary that the containment profile is closed and sealed at its ends, thus preventing its easy customization during installation.

[0010] WO 2005/106320 presents a solution in which a LED strip is positioned inside a section bar, which is subsequently closed, and filled with a filling material (for example silicone) to cover and protect the LED diodes.

This solution is not fully satisfactory since the LED strip is not removable from the section and, therefore, in the event of failure of one or more of the LED diodes, it is necessary to replace the entire device (i.e. also the section bar).

[0011] US 2011/0007514 presents a solution in which a LED strip is inserted inside a section bar, which is subsequently sealed at the ends by plugs to allow insulation of the LED strip to be obtained inside the section bar itself. This solution, however, is not completely satisfactory since the plugs are particularly complicated to manufacture, thus making this solution particularly expensive; in particular, these plugs must be configured to allow ventilation inside the section, and at the same time they must keep the dust, humidity and atmospheric agents outside, as well as being able to engage by interlocking with the ends of the section.

[0012] Object of the invention is to propose a perfected lighting device to be installed on a component of an installation and/or a structure, preferably for a cover installation, which eliminates all the drawbacks found in the known solutions.

[0013] Another object of the invention is to propose a lighting device that is simple, easy and quick to install, even by unskilled personnel.

[0014] Another object of the invention is to propose a device that allows to have a uniform light substantially along its entire length.

[0015] Another object of the invention is to propose a device that is easily customizable and adaptable, even when in operation or during the installation.

[0016] Another object of the invention is to propose a device in which the lighting sources are always protected from the external environment.

[0017] Another object of the invention is to propose a device which is both improved and/or alternative to the traditional ones.

[0018] Another object of the invention is to provide a device that has an alternative characterization, both in

constructive and functional terms, with respect to the traditional ones. Another object of the invention is to propose a device that can be obtained in a simple, rapid manner and with low costs.

[0019] Another object of the invention is to provide a device that can be produced in series and in a quick and efficient manner.

[0020] Another object of the invention is to provide a device which allows to obtain lighting that are as a whole and aesthetically pleasing and that provides the viewer the sensation of being in front of a solution of high quality, both on the aesthetic and functional level.

[0021] Another object of the invention is to provide a device that is of high standards, both functional and constructive, and at the same time of accessible cost, thus allowing the possibility of its widespread distribution.

[0022] Another object of the invention is to propose a covering installation which is provided with a lighting device which provides a uniform and pleasant light, and which can be obtained and installed in a simple, rapid manner and with low costs.

[0023] All these aims, considered individually or in any combination thereof, and others which will be apparent from the description which follows are achieved, according to the invention with a lighting device to be installed in a structure and/or installation, preferably for a roofing installation, according to claim 1, as well as from a covering installation according to claim 14.

[0024] In particular, the present invention relates to an improved lighting device for an installation and/or for a structure in which lighting is required and/or provided, preferably for a roof installation, characterized in that it comprises:

- a section bar 30 made of extruded polymeric material and comprising a longitudinally extending seat,
- at least one LED strip 40 which is removably inserted and housed, at least in part, in said cavity 32 of said section bar 30, said LED strip 40 comprising a plurality of LED diodes 41, which are connected to each other, and a protective casing and/or coating 43, for covering said LED diodes 41, which is configured so that said LED strip 40 is already protected on its own against the penetration of dust and against any penetration of liquid substances, said protective casing and/or coating 43 of said LED strip 40 having protection level, defined according to IEC 60529, which:
 - as a first significant digit is greater than or equal to 5, preferably it is equal to 6,
 - as a second significant digit is greater than 1, preferably is equal to or greater than 4,

and also characterized by the fact that:

- in correspondence with at least one end of said section bar 30, said cavity 32 of said section bar 30 is and remains open/communicating towards the out-

side so as to allow the removable insertion of said at least one LED strip 40,

- said section bar 30 comprises at least one portion 35 which is configured to allow, at least in part, the transmission towards the external environment of the light generated by said LED strip 40.

[0025] Advantageously, the section bar 30 substantially acts as a containment for the LED strip 40 and as a diffuser for the light generated by said LED strip 40.

[0026] Conveniently, the longitudinally extending seat 31 comprises a cavity 32, preferably closed, which is defined inside said section bar 30.

[0027] Advantageously, the cross section of the section bar 30 is shaped so as to have at least one longitudinal opening for connecting the internal cavity 32 with the outside, this opening being configured to allow the insertion and removal of the LED strip 40 inside said cavity.

[0028] Preferably, the cross-section of the section bar 30 is shaped so that said internal cavity 32 is closed and separated from the outside, said internal cavity 32 being open and in communication with the outside only in correspondence with at least one end of said section bar 30.

[0029] Conveniently, the LED strip 40 is inserted inside the internal cavity 32 of the section bar 30 entering at the end 33 of said section bar 30 and then making it slide along the longitudinal extension of the section bar itself.

[0030] Advantageously, the internal cavity 32 of the section bar 30 has a longitudinal extension substantially corresponding to the length of the section bar itself.

[0031] Advantageously, the LED strip 40 is configured so as to have, by itself, an IP protection degree, which is defined according to the IEC 60529 standard, corresponding to IP65, IP66, IP67 or IP68.

[0032] Conveniently, the LED strip 40 is configured so as to have a degree of IP protection which makes it potentially suitable for being installed outside without the need for additional containment profiles and/or other protections.

[0033] Advantageously, the LED strip 40 comprises a plurality of LED diodes 41 which are supported and connected by means of a printed circuit 42.

[0034] Conveniently, a LED strip 40 comprises a plurality of LED diodes 41 which are configured to emit monochromatic light or are of the RGB type.

[0035] Advantageously, the section bar 30 and/or its internal cavity 32 are configured so as to dissipate the heat produced by the LED strip 40 when it is supplied.

[0036] Conveniently the LED strip 40 is entirely housed and hidden inside the internal cavity 32 of the section bar 30.

[0037] The LED strip 40 protrudes partly at one end 33 of said section bar 30 while a part of said LED strip 40 is inserted and housed inside said seat 31 of said section bar 30.

[0038] Advantageously, the section bar 30 is configured, at least in part, to homogeneously diffuse the light

produced by the LED strip 40.

[0039] Advantageously, the section bar 30 is configured to act as a gasket and/or decoration and/or finishing of an element of an installation and/or of a structure in which lighting and/or to be applied is required and/or provided inside a longitudinal groove 11 formed in a metal section 13 of said structure and/or said installation 1.

[0040] Advantageously, the section bar 30 is made of silicone and/or of PMMA and/or of PVC and/or rubber and/or other polymeric material, both synthetic and natural, with high elasticity.

[0041] Conveniently, said section bar 30 comprises entirely, or at least a portion thereof, at least one portion 35 which transmits the light produced by the LED diodes 41 of the LED strip 40 and which homogeneously diffuses the light produced from the LED diodes 41 of the LED strip 40. Advantageously, said portion 35 of the section bar 30 is configured to allow the transmission towards the external environment of the light generated by said LED strip 40 with an indicative loss of between about 0-50%.

[0042] The section bar 30 comprises a partially opaque portion, preferably with an opal and/or frost and/or milky white effect.

[0043] Preferably, the section bar 30 comprises at least two portions with different characteristics of both transmission and diffusion of the light produced by the LED diodes 41 of the LED strip 40. Advantageously, said at least two portions of the section bar 30 are obtained by using at least two different materials which are extruded together during the manufacturing of the section bar itself.

[0044] In particular, the present invention also relates to a covering installation 1, preferably of the type with a roll-up or pergola curtain, which is characterized in that it comprises at least one lighting device 18, with one or more of the characteristics described above and which is applied in one of the elements 2, 4, 6, 10, 18 of said installation.

[0045] Advantageously, the installation comprises a device for controlling the lighting device 18. The control device conveniently comprises a power supply connected to the mains supply or to a battery, and a processor which is preferably configured to perform a pulse width modulation PWM of the supply voltage of the LED diodes 41 of the strip 40. Advantageously, the processor is also configured to allow the wireless connection with an external device to control the activation/deactivation of the LED diodes 41 of said LED strip 40, as well as the variation of the brightness generated by these.

[0046] The present invention is hereinafter further clarified in some of its preferred embodiments shown in purely illustrative and not limiting purpose with reference to the attached drawings, in which:

Figure 1 shows a perspective view from below of a motorized roller blind provided with the lighting device according to the invention,

Figure 2 shows an enlarged detail of fig. 1,

Figure 3 shows another enlarged detail of fig. 1,

Figure 4 shows, in transverse section the profile of the lighting device,

5 Figure 5 shows a perspective view of the detail of fig. 3 before inserting the LED strip of the device according to the invention,

Figure 6 shows a perspective view of the detail of fig. 3 with the LED strip partially inserted,

10 Figure 7 shows a perspective view of the device according to the invention inserted into a groove made on a component and of the curtain.

15 **[0047]** As can be seen from the figures, the lighting device according to the invention, generally designated by the reference number 18, is applied/mounted, in the illustrated example, to a roll-up roof installation, in particular to a roller blind, indicated as a whole with the reference number 1.

20 **[0048]** The device 18 according to the present invention will be described below in particular with reference to its application in a roller blind 1, however it is intended that it can be applied in any covering installation, both pergola and a curtain, both vertical and inclined, both motorized and non-motorized, such as for example shutters, or even a sectional door. Moreover, the device according to the present invention can also be applied to a piece of furniture or to a complement of furniture, or the like, and in general it can be applied to any structure and/or installation in which lighting is provided and/or required.

25 **[0049]** Preferably, the roller blind 1 of fig. 1 is of the traditional type. Preferably, the roller blind 1 is motorized but could also be moved manually. In particular, the roller blind 1 is of the type with articulated arms, i.e. it is of the type that comprises a tubular shaft 2, a support structure 4 of the tubular shaft 2, a sheet 6, which can be wound around the tubular shaft 2 and unwound from this, a rigid beam 8, which is applied to the end of the sheet 6 opposite to that bound the tubular shaft 2, and a pair of articulated arms 10, which connect the rigid beam 8 to the support structure 4 and guide it in its translational movements with respect to the support structure 4.

30 **[0050]** Conveniently, the winding/unwinding of the sheet 6 can take place both along a substantially vertical direction, and along a direction more or less inclined with respect to the vertical.

35 **[0051]** The tubular shaft 2 can be for example a metal shaft which, suitably, can have any cross-section. The structure of the tubular shaft 2 may have a circular or polygonal section, for example hexagonal, octagonal or similar. Suitably, the tubular shaft is of the type traditionally used for curtains and/or for blinds.

40 **[0052]** Preferably, the support structure 4 can comprehend:

- a rigid metal band, which appropriately adheres to a

- fixed structure, for example to a wall of a building,
- a first pair of brackets 14 for fixing the rigid band to the fixed structure, and
- a second pair of brackets 16, preferably shaped as wings, which extend outwards from said rigid band and which appropriately support all ends of the equipped tubular shaft 2 that, advantageously, is provided with all the components necessary for its proper functioning, as will be described further below.

[0053] Suitably, the sheet 6 can be of any traditional type and does not require further explanation.

[0054] Conveniently, the rigid beam 8 can be constituted by a piece of metal or plastic profile and can have any section. Preferably, the rigid beam 8 is shaped so that when the curtain is in a wound condition, it adheres to the support structure 4 and forms with it a sort of container or "box", which houses inside it the tubular shaft 2, the sheet 6 wrapped on it and the articulated arms 10, which are in the folded condition.

[0055] Advantageously, the lighting device 18 may be assembled on any component of the coverage installation.

[0056] In particular, in the case of a roller blind 1 as shown in fig. 1, the lighting device 18 may be applied on the support structure 4 and/or on the articulated arms 10 and/or on the rigid beam 8 and/or the tubular shaft 2 and/or also on the sheet 6.

[0057] Preferably, the lighting device 18 is mounted on the rigid elements of the installation of coverage, such as in particular - in the case of a roller blind 1 - the support structure 4 and/or articulated arms 10 and/or the tubular shaft 2 and/or the rigid beam 8.

[0058] In particular, according to the invention, each lighting device 18 comprises:

- a section bar 30 made of extruded polymeric material and configured so as to present/define a seat 31 with longitudinal development,
- at least one LED strip 40, which is configured in such a way that - already on its own - results protected against the penetration of dust and against any penetration of liquids (in particular water), and which is removably inserted and housed, at least in part, in the seat 31 of the said section bar 30.

[0059] Conveniently, the seat 31 comprises a cavity 32 with a longitudinal extension which is defined inside the section bar 30. Preferably, said cavity 32 has a cross-section which is completely closed.

[0060] Advantageously, the section bar 30 substantially acts as a containment element for the LED strip 40 and as a diffuser for the light generated by the latter.

[0061] Advantageously, in an embodiment not shown here, the cross section of the section bar 30 is shaped so as to present at least one longitudinal opening connecting the internal cavity 32 with the outside and, suit-

ably, such an opening is used to allow the insertion and removal of the LED strip 40 inside the cavity.

[0062] Advantageously, each LED strip 40 comprises a set of LED diodes 41, i.e. electronic components which, when powered by electricity, emit light.

[0063] Preferably, the LED strip 40 is configured so that, alone, it results already completely protected against dust and/or already completely protected against water in the form of drops (with any tilt) and/or spatter and/or jets and/or waves and/or against the effects of temporary immersion and/or submersion in water.

[0064] The LED strip 40 is configured so as to have, by itself, a degree of protection IP - defined according to IEC 60529 (EN 60529) - that is:

- greater than or equal to 5, preferably equal to 6, as the first significant digit,
- greater than 1, preferably equal to or greater than 4, as the second significant digit.

[0065] Conveniently, for this purpose, the LED strip 40 comprises a protective casing or covering that surrounds and completely protects the LED diodes 41.

[0066] Preferably, the LED strip 40 has - by itself - IP65 or IP66 or IP 67 or IP68 protection level, defined according to the IEC 60529 standard (EN 60529).

[0067] Preferably, the LED strip 40 is configured in order to have a level of IP protection that makes it potentially suitable to be installed outside without the need for further retention section bars and/or other protections.

[0068] Conveniently, the LED diodes 41 are fixed - preferably by welding - on a printed circuit (PCB) 42, preferably flexible, which performs the function of support and electrical connection.

[0069] Advantageously, the LED diodes 41 can be configured to emit monochromatic light or they can be of the RGB type.

[0070] Advantageously, the LED strip 40 comprises a plurality of LED diodes 41 connected together by the printed circuit 42 and which, together with the latter, are contained within a protection coating 43 which has an IP protection level defined according to IEC 60529 (EN 60529) - that is:

- greater than or equal to 5, preferably equal to 6, as the first significant digit,
- greater than 1, preferably equal to or greater than 4, as the second significant digit.

[0071] Advantageously, the LED strip 40 comprises a plurality of LED diodes 41 connected together by the printed circuit 42 and which, with the latter, are at least partly coated - preferably completely - with a transparent resin (for example based on Silica) which defines a protective coating/covering that has an IP protection level - defined according to the IEC 60529 standard (EN 60529)

- that is:

- greater than or equal to 5, preferably equal to 6, as the first significant digit,
- greater than 1, preferably equal to or greater than 4, as the second significant digit.

[0072] Advantageously, the section bar 30 - and preferably also its internal cavity 32 - are configured so as to dissipate the heat produced by the LED strip 40 when it is supplied.

[0073] Advantageously, the internal cavity 32 of the section bar 30 has a longitudinal extension corresponding to the length of the section itself.

[0074] Conveniently, said internal cavity 32 is open (i.e. communicating towards the outside) at at least one end 33 of the section bar 30, preferably at both ends 33. Preferably, the inner cavity 32 of the section bar 30 is in communication with the exterior only at the ends 33 of said section.

[0075] Conveniently, the LED strip 40 is inserted inside the internal cavity 32 of the section bar 30 entering at the end 33 of the latter and then making it slide along the longitudinal extension of the section bar itself (see Figures 5 and 6).

[0076] Advantageously, the internal cavity 32 is configured (i.e. it is sized and shaped) at the same time to allow insertion by sliding and substantially stable locking inside it, preferably with a minimum clearance, of the LED strip 40.

[0077] Conveniently, for this purpose, the cavity 32 is sized and shaped to accommodate the LED strip 40 inside it so as to leave the latter a minimum displacement in the directions perpendicular to the insertion direction. More in detail, the cavity 32 has a shape such as to allow the insertion of the LED strip 40 and is slightly larger than the latter.

[0078] Preferably, the cavity 32 is internally delimited by a continuous surface, i.e. devoid of discontinuities, projections or appendages.

[0079] Advantageously, the LED strip 40 is inserted removably inside the cavity 32 of the section bar 30, so that it can be replaced in case of failure of one or more LED diodes of the strip itself.

[0080] Advantageously, the LED strip 40 can be easily removed from one of the ends 33 of the cavity 32 of the section bar 30, which for this purpose can be left open, i.e. not having plugs, nets, or other elements that allow their closure and/or or sealing. Conveniently, the protection of the LED diodes 41 is guaranteed by the fact that the LED strip 4 already alone is protected against dust penetration and against any penetration of liquid substances.

[0081] Conveniently, in the lighting device 18 according to the invention, the ends 33 of the cavity 32 of the section bar 30 are and always remain open towards the outside, i.e. there are no plugs, covers or other closing elements.

[0082] The LED strip 40 protrudes from one or both ends 33 of the section bar 30, however - having a high

IP protection degree (as defined above) - the solid particles or liquids of the external environment cannot enter in contact with the LED diodes 41 or with the electronic circuits of a strip itself. Conveniently, in this way, the LED strip 40 is not affected by the problem of environmental humidity even if it protrudes and exits from the ends 33 of the section bar 30.

[0083] Advantageously, the LED strip 40 can be entirely housed and hidden inside the internal cavity 32 of the section bar 30 and, appropriately, in this case, it may be shorter than the longitudinal extension of the section. Suitably, this allows to avoid having to necessarily cut the section bar 30 of length corresponding to the size of the LED strip 40.

[0084] Advantageously, the LED strip 40 has a longitudinal development with a substantially rectangular cross-section. Advantageously, the LED strip 40 can be positioned inside the cavity 32, so as to be in contact with a first internal surface and in the section bar 30, and preferably so as to emit light toward a second surface (opposite/facing said first surface) of the same profiled element.

[0085] Preferably, the LED strip 40 is inserted inside the cavity 32 so that the width of the strip develops substantially parallel to the width of the section bar 30 in which it is inserted.

[0086] Preferably, the section bar 30 is made of silicone, but could also be made in PMMA, in PVC, both with and without additives, or - in general - it could be made of rubber or other polymeric material, both synthetic and natural, with high elasticity. Conveniently, the section bar 30 can also be made of Plexiglas.

[0087] Preferably, the section bar 30 is made of elastic and flexible material and this is advantageous in that it facilitates its assembly by interlocking inside corresponding grooves 11 formed on the metal sections 13 (such as for example those of the articulated arms 10 of Figs. 2- 5) of an element of the roofing installation. Advantageously, the section bar 30 is configured (i.e. it is sized and shaped) so that - once inserted into the longitudinal groove 11 provided in the metal section 13 of an element 10 of the covering installation - it is substantially flush with the outer surface of the metal section itself, that is, without protruding radially from the latter.

[0088] Conveniently, the section bar 30 can be configured so as to act as a seal for an element of the roof installation.

[0089] Suitably, the section bar 30 comprises entirely, or at least in a part thereof, a portion 35 that transmits the light produced by the LED diodes 41 of the LED strip 40. Preferably, the portion 35 is also configured to spread evenly the light produced by the LED diodes 41 of the LED strip 40.

[0090] In particular, said portion 35 of the section bar 30 is configured to allow the transmission towards the external environment of the light generated by said LED strip 40 with an indicative loss of between about 0-50%.

[0091] Preferably, the section bar 30 comprises - in all

its longitudinal extension or at least in a part thereof - a transparent or translucent portion to allow the total transmission of the light produced by the LED diodes 41 of the LED strip 40 (i.e. with a loss of about 0%).

[0092] Advantageously, the section bar 30 comprises - in its entire longitudinal development or at least in a part thereof - a portion partially opaque, preferably with opal effect, frost (i.e. transparent or with frosted finish) or milky white, to allow at the same time the transmission and the homogeneous diffusion of the light produced by the LED diodes 41 of the LED strip 40. Appropriately, in this way, a uniform lighting effect is obtained, i.e. avoiding the "dots" effect (that is, of several distinct lights separate from each other).

[0093] Advantageously, the section bar 30 comprises at least two portions with different characteristics of both transmission and diffusion of the light produced by the LED diodes 41 of the LED strip 40. Conveniently, these two or more portions of the section bar 30 are obtained by using two or more different materials that are extruded together during the construction of the profile itself.

[0094] Advantageously, an electric cable 60 is associated with the LED strip 40 - preferably at one of its end portion - for connection to a power supply source, not shown, such as for example a battery or the mains.

[0095] Advantageously, the cables 60 connected to the LED strip 40 of the lighting devices 18 are electrically conductive connecting cables inside the components of the covering installation and, therefore, are hidden from view from the outside.

[0096] Advantageously, the LED strip 40 of device or lighting 18 is also connected to a control device (not shown). Preferably, but not exclusively, the control device is of the type described in the Italian patent application 102017000090501.

[0097] Conveniently, the control device comprises a power supply connected to the mains supply or to a battery, and a processor which is preferably configured to perform a pulse width modulation (PWM) of the supply voltage of the LED diodes 41 of the strip 40. Preferably, the processor is configured also to allow the wireless connection (preferably radio, via infrared, wi-fi...) with an external device (such as a remote control) to command the activation/deactivation of the LEDs 41, and the variation in brightness generated by these.

[0098] From the foregoing it is apparent that the lighting device according to the invention is somewhat advantageous and in particular:

- it is fast, practical and easy to apply,
- provides lighting that is uniform and aesthetically pleasing,
- the corresponding dimensions are easy to customize at the time of installation and are not affected by the length of the LED strip,
- the LED strips can protrude from the containment profile while remaining protected both from dust and liquids and from humidity.

[0099] In particular, moreover, the lighting device described here differs from US 2012/0182755, WO 2005/106320 and US 2011/0007514 in that the LED strip comprises a protective casing/covering - inside which the LED diodes are provided - such as to make the strip itself, already on its own, protected against the penetration of dust and against any penetration of liquid substances. This is particularly advantageous in that, while allowing the LED strip to be removed from the section bar for its replacement, it causes the strip itself to be partially housed outside the containment section, as well as allowing an open section to be provided which is not sealed at the ends (i.e. without caps, lids or other closing end elements), thus simplifying both the production of the section bar and the installation/removal of the strip in/from said section bar.

Claims

1. Improved lighting device (18) for an installation and/or for a structure in which lighting is required and/or provided, preferably for a roofing installation (1), comprising:

- a section bar (30) made of extruded polymeric material and comprising a longitudinally extending seat (31), said longitudinally extending seat (31) comprising a cavity (32) which is defined inside said section bar (30),

- at least one LED strip (40) which is removably inserted and housed, at least in part, in said cavity (32) of said section bar (30), said LED strip (40) comprises a plurality of LED diodes (41), which are connected to each other, and a protective casing and/or coating (43), for covering said LED diodes (41), which is configured so that said LED strip (40) is already protected on its own against the penetration of dust and against any penetration of liquid substances, said protective casing and/or coating (43) of said LED strip (40) having protection level, defined according to IEC 60529, which:

- as a first characteristic figure it is greater than or equal to 5, preferably equal to 6,
- as a second significant digit it is greater than 1, preferably equal to or greater than 4,

in correspondence with at least one end of said section bar (30), said cavity (32) of said section bar (30) is and remains open/communicating towards the outside so as to allow the removable insertion of said at least one LED strip (40),

said section bar (30) comprises at least one portion (35) which is configured to allow, at least in part, the transmission towards the external environment of the light generated by said LED strip (40),

and **characterized in that** said LED strip (40) protrudes partly at at least one end (33) of said section bar (30) while a part of said LED strip (40) is inserted and housed inside said seat (31) of said section bar (30).

2. Device according to claim 1 **characterized in that** to said LED strip (40) it is associated, in correspondence with one of its end portion, a cable (60) for connection to an electrical supply.
3. Device according to one or more of the preceding claims, **characterized in that** both ends (33) of the cavity (32) of the section bar (30) are and always remain open towards the outside, i.e. there are no plugs, covers or others closing elements.
4. Device according to one or more of the preceding claims, **characterized in that** the cross-section of the section bar (30) is shaped so that said internal cavity (32) is closed and separated from the outside, said internal cavity (32) being open and in communication with the outside only at at least one end of said section bar (30).
5. Device according to one or more of the preceding claims, **characterized in that** the protective casing and/or covering (43) of said LED strip (40) has a degree of protection, defined according to IEC 60529, which is level IP65 or IP66 or IP67 or IP68.
6. Device according to one or more of the preceding claims, **characterized in that** said protective casing and/or covering (43) is defined by a transparent resin with which said LED diodes (41) are at least partly - preferably completely - covered.
7. Device according to one or more of the preceding claims, **characterized in that** said cavity (32) has a longitudinal extension and has a cross section which is closed, said internal cavity (32) being open and in communication with the outside only in correspondence with at least one end of said section bar (30).
8. Device according to one or more of the preceding claims, **characterized in that** said LED strip (40) comprises a plurality of LED diodes (41) which are supported and connected by a printed circuit (42) and which are configured to emit light monochrome or are of the RGB type.
9. Device according to one or more of the preceding claims, **characterized in that** said section bar (30) is configured, at least in part, to uniformly diffuse the light produced by the LED strip (40).
10. Device according to one or more of the preceding claims, **characterized in that** said section bar (30)

comprises at least two portions with different characteristics both of transmission and of diffusion of the light produced by the LED diodes (41) of the LED strip (40), said at least two portions of the section bar (30) being obtained by using at least two different materials which are extruded together during the manufacture of the section bar itself.

11. Device according to one or more of the preceding claims, **characterized in that** said internal cavity (32) is configured to allow at the same time the insertion by sliding along the longitudinal development of the section bar (30) and the substantially stable locking inside the LED strip (40).
12. Device according to one or more of the preceding claims, **characterized in that** said section bar (30) and/or its internal cavity (32) are configured so as to dissipate the heat produced by the LED strip (40) when it is supplied.
13. Device according to one or more of the preceding claims, **characterized in that** said section bar (30) is configured to act as a gasket and/or decoration and/or finishing of an element of said structure and/or of said installation (1) and/or to be applied inside a longitudinal groove (11) formed in a metal section (13) of said structure and/or said installation (1).
14. Cover installation (1), preferably of the type with roll-up or pergola sheet, **characterized in that** it comprises at least one lighting device (18) according to one or more of the previous claims which is applied in one of the elements (2, 4, 6, 10, 18) of said installation.

Patentansprüche

1. Verbesserte Beleuchtungsvorrichtung (18) für eine Installation und/oder für eine Struktur, in der eine Beleuchtung erforderlich ist und/oder bereitgestellt wird, vorzugsweise für eine Dachinstallation (1), umfassend:
 - eine Abschnittsstange (30), die aus extrudiertem Polymermaterial besteht und einen in Längsrichtung verlaufenden Sitz (31) umfasst, wobei der in Längsrichtung verlaufende Sitz (31) einen Hohlraum (32) umfasst, der innerhalb der Abschnittsstange (30) definiert ist,
 - mindestens eine LED-Leiste (40), die, mindestens teilweise, entfernbar in den Hohlraum (32) der Abschnittsstange (30) eingesetzt und darin untergebracht ist, wobei die LED-Leiste (40) eine Vielzahl von LED-Dioden (41), die miteinander verbunden sind, und ein Schutzgehäuse und/oder eine Schutzbeschichtung (43) zum

Abdecken der LED-Dioden (41), das/die derart ausgelegt ist, dass die LED-Leiste (40) bereits für sich allein vor dem Eindringen von Staub und vor einem Eindringen von flüssigen Substanzen geschützt ist, umfasst, wobei das Schutzgehäuse und/oder die Schutzbeschichtung (43) der LED-Leiste (40) eine gemäß IEC 60529 definierte Schutzart aufweist, die:

- als eine erste charakteristische Zahl größer oder gleich 5, vorzugsweise gleich 6 ist,
- als eine zweite signifikante Ziffer größer als 1, vorzugsweise gleich oder größer als 4 ist,

wobei der Hohlraum (32) der Abschnittsstange (30), in Übereinstimmung mit mindestens einem Ende der Abschnittsstange (30), nach außen offen/kommunizierend ist und bleibt, um das entfernbare Einsetzen der mindestens einen LED-Leiste (40) zu ermöglichen,

wobei die Abschnittsstange (30) mindestens einen Abschnitt (35) umfasst, der dazu ausgelegt ist, mindestens teilweise, die Übertragung des durch die LED-Leiste (40) erzeugten Lichts in Richtung der externen Umgebung zu ermöglichen,

und **dadurch gekennzeichnet, dass** die LED-Leiste (40) teilweise an mindestens einem Ende (33) der Abschnittsstange (30) vorsteht, während ein Teil der LED-Leiste (40) innerhalb des Sitzes (31) der Abschnittsstange (30) eingesetzt und untergebracht ist.

2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** an die LED-Leiste (40), in Übereinstimmung mit einem Endabschnitt davon, ein Kabel (60) zur Verbindung mit einer Stromversorgung angeschlossen ist.
3. Vorrichtung nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** beide Enden (33) des Hohlraums (32) der Abschnittsstange (30) nach außen offen sind und immer offen bleiben, d. h., es sind keine Stecker, Abdeckungen oder andere Schließelemente vorhanden.
4. Vorrichtung nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Querschnitt der Abschnittsstange (30) derart geformt ist, dass der Innenhohlraum (32) geschlossen und von der Außenseite getrennt ist, wobei der Innenhohlraum (32) nur an mindestens einem Ende der Abschnittsstange (30) offen und in Kommunikation mit der Außenseite ist.
5. Vorrichtung nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Schutzgehäuse und/oder die Schutzabde-

ckung (43) der LED-Leiste (40) einen gemäß IEC 60529 definierten Grad an Schutz aufweist, der in der Schutzart IP65 oder IP66 oder IP67 oder IP68 besteht.

6. Vorrichtung nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Schutzgehäuse und/oder die Schutzabdeckung (43) durch ein durchsichtiges Harz definiert ist, mit dem die LED-Dioden (41) mindestens teilweise - vorzugsweise vollständig - abgedeckt sind.
7. Vorrichtung nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Hohlraum (32) eine Längserstreckung aufweist und einen Querschnitt aufweist, der geschlossen ist, wobei der Innenhohlraum (32) nur in Übereinstimmung mit mindestens einem Ende der Abschnittsstange (30) offen und in Kommunikation mit der Außenseite ist.
8. Vorrichtung nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die LED-Leiste (40) eine Vielzahl von LED-Dioden (41) umfasst, die durch eine gedruckte Schaltung (42) unterstützt und verbunden werden und die zum Emittieren von monochromem Licht ausgelegt sind oder vom RGB-Typ sind.
9. Vorrichtung nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Abschnittsstange (30), mindestens teilweise, zum gleichmäßigen Streuen des durch die LED-Leiste (40) erzeugten Lichts ausgelegt ist.
10. Vorrichtung nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Abschnittsstange (30) mindestens zwei Abschnitte mit verschiedenen Eigenschaften sowohl der Übertragung als auch der Streuung des durch die LED-Dioden (41) der LED-Leiste (40) erzeugten Lichts umfasst, wobei die mindestens zwei Abschnitte der Abschnittsstange (30) durch Verwenden von mindestens zwei verschiedenen Materialien erhalten werden, die während der Herstellung der Abschnittsstange selbst zusammen extrudiert werden.
11. Vorrichtung nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Innenhohlraum (32) zum gleichzeitigen Einsetzen durch Schieben entlang der Längsentwicklung der Abschnittsstange (30) und zum im Wesentlichen stabilen Verriegeln innerhalb der LED-Leiste (40) ausgelegt ist.
12. Vorrichtung nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Abschnittsstange (30) und/oder ihr Innen-

hohlraum (32) zum Ableiten der durch die LED-Leiste (40) erzeugten Wärme, wenn sie zugeführt wird, ausgelegt sind.

13. Vorrichtung nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Abschnittsstange (30) dazu ausgelegt ist, als eine Dichtung und/oder Dekoration und/oder Endoberfläche eines Elements der Struktur und/oder der Installation (1) zu wirken und/oder innerhalb einer in einem Metallabschnitt (13) der Struktur und/oder der Installation (1) gebildeten Längsnut (11) angebracht zu werden.
14. Abdeckungsinstallation (1), vorzugsweise vom Typ mit Aufroll- oder Pergolatuch, **dadurch gekennzeichnet, dass** sie mindestens eine Beleuchtungs- vorrichtung (18) nach einem oder mehreren der vorhergehenden Ansprüche umfasst, die in einem der Elemente (2, 4, 6, 10, 18) der Installation angebracht wird.

Revendications

1. Dispositif d'éclairage amélioré (18) pour une installation et/ou pour une structure dans laquelle un éclairage est requis et/ou fourni, de préférence pour une installation de toiture (1), comprenant:

- une barre profilée (30) en matériau polymère extrudé et comprenant un siège s'étendant longitudinalement (31), ledit siège s'étendant longitudinalement (31) comprenant une cavité (32) qui est définie à l'intérieur de ladite barre profilée (30),

- au moins une bande LED (40) qui est insérée et logée de manière amovible, au moins en partie, dans ladite cavité (32) de ladite barre profilée (30), ladite bande LED (40) comprend une pluralité de diodes LED (41), qui sont connectés les uns aux autres, et un boîtier de protection et/ou revêtement (43), pour recouvrir lesdites diodes LED (41), qui est configuré de telle sorte que ladite bande LED (40) est déjà protégée seule contre la pénétration de contre la poussière et contre toute pénétration de substances liquides, ledit boîtier de protection et/ou revêtement (43) de ladite bande LED (40) ayant un niveau de protection, défini selon CEI 60529, qui:

- en tant que premier chiffre caractéristique, il est supérieur ou égal à 5, de préférence égal à 6,
- en tant que deuxième chiffre significatif, il est supérieur à 1, de préférence égal ou supérieur à 4,

en correspondance avec au moins une extrémité de ladite barre profilée (30), ladite cavité (32) de ladite barre profilée (30) est et reste ouverte/communiquant vers l'extérieur de manière à permettre l'insertion amovible de ladite au moins une bande LED (40),

ladite barre profilée (30) comprend au moins une partie (35) qui est configurée pour permettre, au moins en partie, la transmission vers l'environnement extérieur de la lumière générée par ladite bande de LED (40),

et **caractérisé en ce que** ladite bande de LED (40) fait saillie partiellement à au moins une extrémité (33) de ladite barre de section (30) tandis qu'une partie de ladite bande de LED (40) est insérée et logée à l'intérieur dudit siège (31) de ladite barre profilée (30).

2. Dispositif selon la revendication 1 **caractérisé en ce qu'à** ladite bande de LED (40) il est associé, en correspondance avec l'une de ses portions d'extrémité, un câble (60) de connexion à une alimentation électrique.

3. Dispositif selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** les deux extrémités (33) de la cavité (32) de la barre profilée (30) sont et restent toujours ouvertes vers l'extérieur, c'est-à-dire qu'il n'y a pas de bouchons, de couvercles ou d'autres éléments de fermeture.

4. Dispositif selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** la section transversale de la barre profilée (30) est conformée de manière à ce que ladite cavité interne (32) soit fermée et séparée de l'extérieur, ladite cavité interne (32) étant ouverte et en communication avec l'extérieur uniquement à au moins une extrémité de ladite barre profilée (30).

5. Dispositif selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** le boîtier de protection et/ou le revêtement (43) de ladite bande de LED (40) présente un degré de protection, défini selon CEI 60529, qui est de niveau IP65 ou IP66 ou IP67 ou IP68.

6. Dispositif selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** ledit boîtier de protection et/ou revêtement (43) est défini par une résine transparente dont lesdites diodes LED (41) sont au moins partiellement - de préférence complètement - recouvertes.

7. Dispositif selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** ladite cavité (32) a une extension longitudinale et a une section transversale qui est fermée, ladite cavité interne (32)

étant ouverte et en communication avec l'extérieur uniquement en correspondance avec au moins une extrémité de ladite barre profilée (30).

8. Dispositif selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** ladite bande LED (40) comprend une pluralité de diodes LED (41) qui sont supportées et reliées par un circuit imprimé (42) et qui sont configurées pour émettre de la lumière monochrome ou sont de type RVB. 5
10
9. Dispositif selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** ladite barre profilée (30) est configurée, au moins en partie, pour diffuser uniformément la lumière produite par la bande LED (40). 15
10. Dispositif selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** ladite barre profilée (30) comprend au moins deux portions avec des caractéristiques différentes à la fois de transmission et de diffusion de la lumière produite par les diodes LED (41) de la bande LED (40), lesdites au moins deux parties de la barre profilée (30) étant obtenues en utilisant au moins deux matériaux différents qui sont extrudés ensemble pendant la fabrication de la barre profilée elle-même. 20
25
11. Dispositif selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** ladite cavité interne (32) est configurée pour permettre à la fois l'insertion par glissement selon le développement longitudinal de la barre profilée (30) et le verrouillage sensiblement stable à l'intérieur de la bande LED (40). 30
35
12. Dispositif selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** ladite barre profilée (30) et/ou sa cavité interne (32) sont configurées de manière à dissiper la chaleur produite par la bande LED (40) lorsqu'elle est alimentée. 40
13. Dispositif selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** ladite barre profilée (30) est configurée pour jouer le rôle de joint et/ou de décoration et/ou de finition d'un élément de ladite structure et/ou de ladite installation (1) et/ou pour être appliquée à l'intérieur d'une rainure longitudinale (11) formée dans une section métallique (13) de ladite structure et/ou de ladite installation (1). 45
50
14. Installation de couverture (1), de préférence du type à tôle enroulable ou pergola, **caractérisée en ce qu'elle** comprend au moins un dispositif d'éclairage (18) selon une ou plusieurs des revendications précédentes qui est appliqué dans l'un des éléments (2, 4, 6, 10, 18) de ladite installation. 55

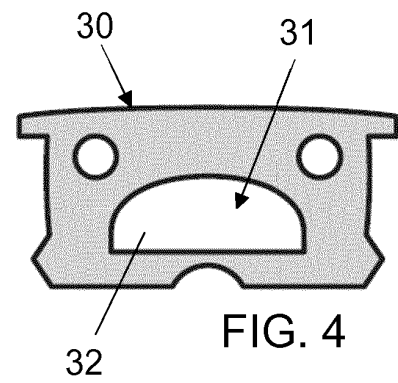
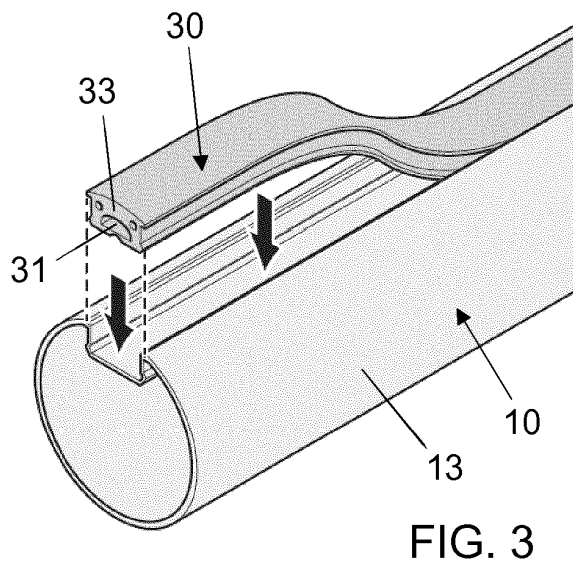
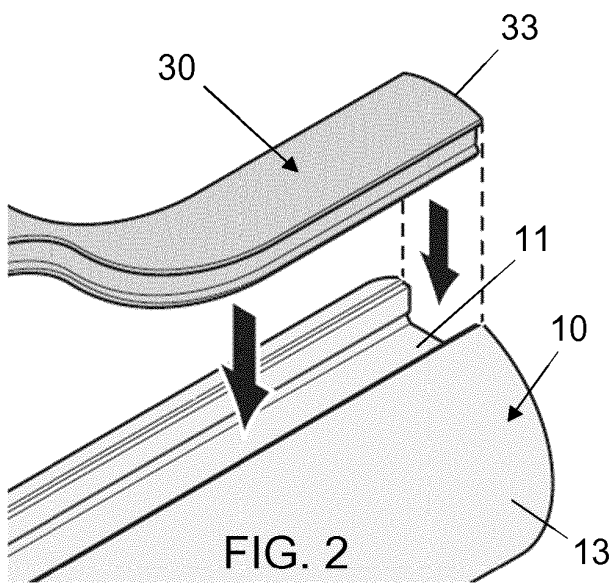
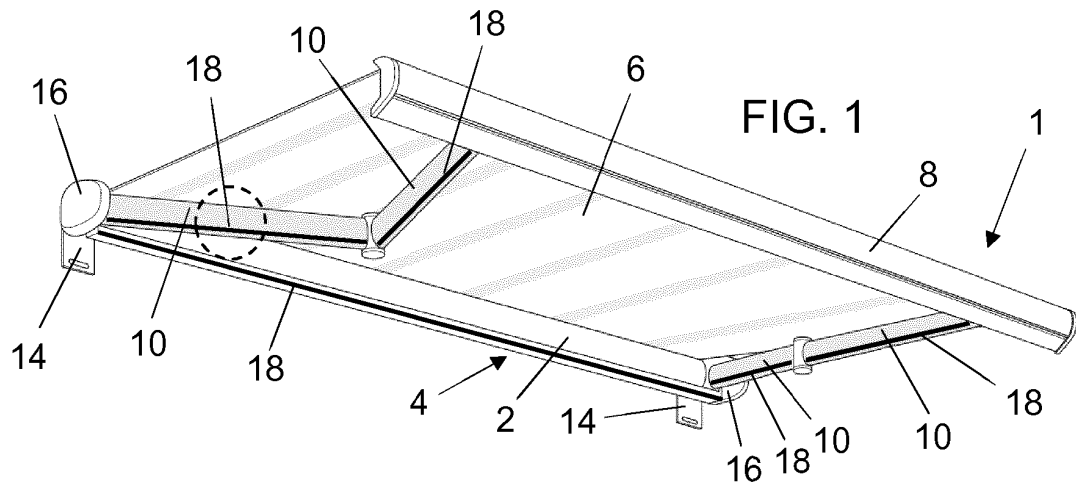


FIG. 5

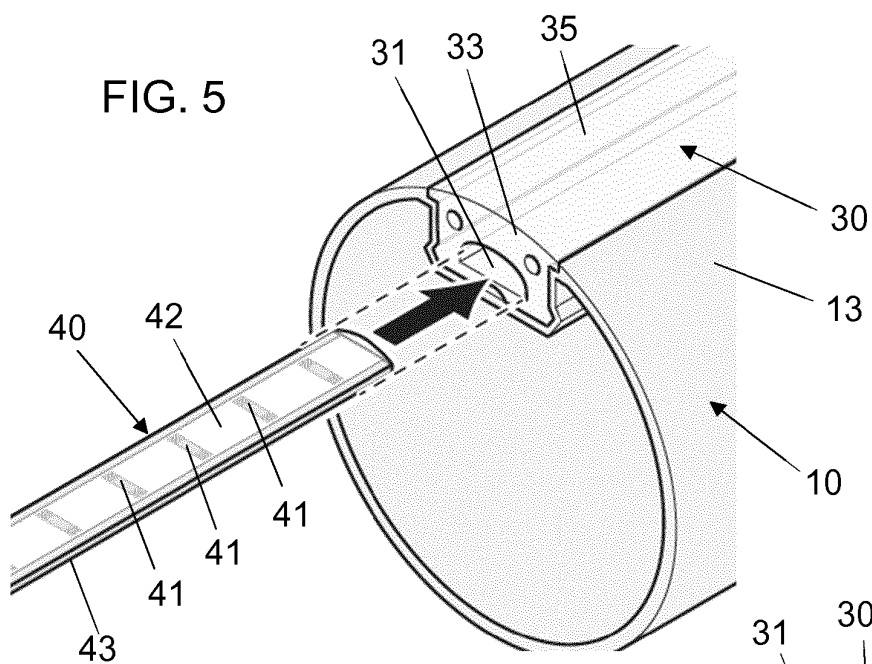


FIG. 6

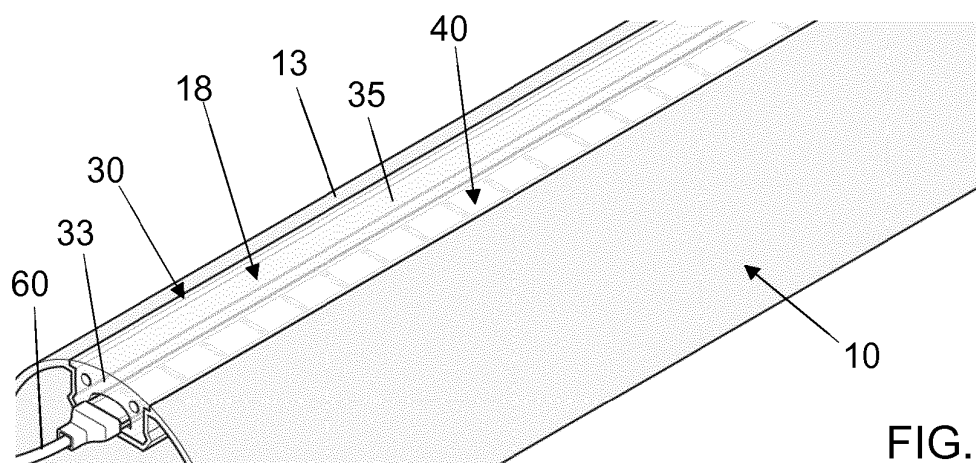
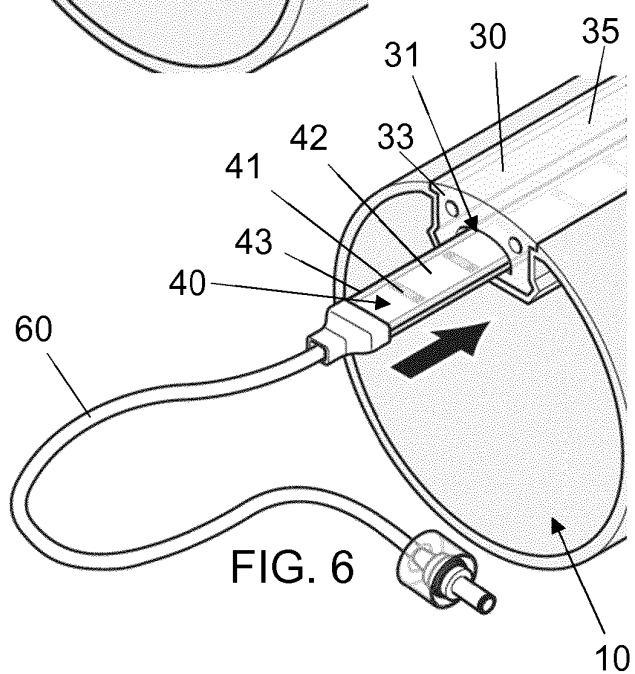


FIG. 7

REFERENCES CITED IN THE DESCRIPTION

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