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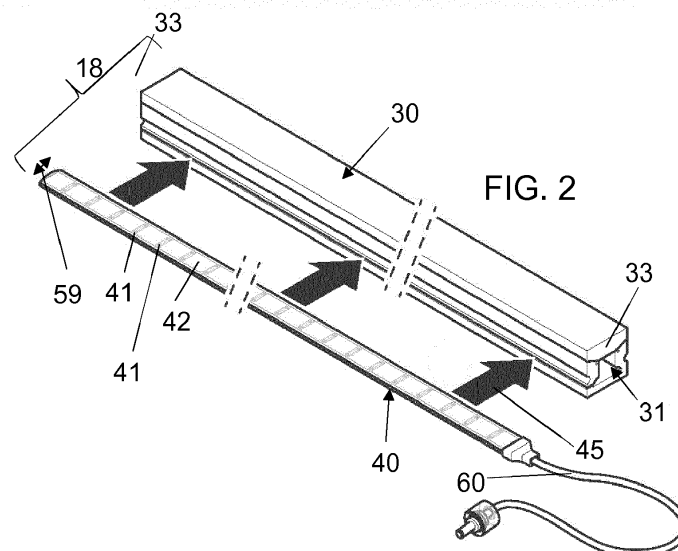
(54) **AN IMPROVED SECTION BAR**

(57) Improved section bar (30) to be applied to a structure and/or installation (1) in which lighting is provided and/or required, said profile being made of extruded polymeric material and being configured so as to define a seat (31) therein longitudinally extending to house a LED strip (40), and characterized in that said section bar (30):

- always presents, along at least a part of its longitudinal extension, at least one through opening (50), also longitudinally extending, in order to always put said hollow seat (31), which is defined inside the section bar itself (30), in communication with the outside

- is configured so that the insertion of said LED strip (40) inside the hollow seat (31) occurs through said through opening (50) and in a direction (45) which is angled, and which is preferably substantially orthogonal, with respect to the longitudinal development direction of the profile itself,

- comprises at least a portion which is configured to allow, at least in part, the transmission towards the external environment of the light generated by said LED strip (40) which is intended to be housed within said hollow seat (31).



## Description

**[0001]** The present invention relates to an improved section bar for furniture, furnishing complements or the like, for roofing installations, such as pergolas or curtains, and in general for all structures or installations in which lighting is provided and/or required.

**[0002]** Currently, an ever increasing number of furniture or furnishings complements, as well as pergolas or curtains, or other structures or installations in general, are equipped with lighting elements that can be configured to illuminate a certain area and/or to constitute courtesy lights and/or create special lighting effects, in particular RGB effects.

**[0003]** To date this requirement has been met by applying strips of lights, preferably strips of LED lights (also known as "led strips"), within special seats provided for in furniture or furnishing accessories, or by applying them by adhesive directly on the surface of the latter.

**[0004]** Furthermore, in order to create a uniform beam of light emitting 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.

**[0005]** In this regard, mainly for decorative purposes, extruded section bars of polymeric material (for example, silicone), within which the LED diodes are embedded have already been proposed on the market. However, this solution is not satisfactory since the LED strip is not removable and, therefore, a possible failure of the latter (for example when one or more LED diodes blast) requires the disposal of the section with the faulty LED strip, without any possibility of reuse.

**[0006]** Solutions have already been proposed in which the LED strip is removably inserted inside a closed longitudinal cavity which is defined inside the section bar. In particular, in these solutions, a termination of the LED strip is inserted inside the section bar at the open end of the latter and is then made to slide along the longitudinal extension of the section bar itself. In this case, 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 open.

**[0007]** Also, this solution is not completely satisfactory since the insertion of the LED strip by its sliding inside and along the longitudinal cavity of the section can cause the strip to break or in any case an undesired deformation thereof which over time facilitates irreparable damage to said strip.

**[0008]** Furthermore, in the case of a LED strip coated with protective resins (for example silicone), friction is created in correspondence with the walls delimiting the inner cavity which prevents the easy sliding and sliding of the LED strip within this cavity.

**[0009]** In some cases, to solve this drawback, sections are used whose cross-sectional dimensions are appropriately oversized so as to be able to obtain inside it a

cavity having dimensions with the cross-section considerably larger than those of the LED strip, and this in order to allow an easy longitudinal sliding of the latter into and along the aforementioned cavity. However, this solution is not satisfactory since the transversely oversized profile, in addition to having a more important visual impact, is generally not suitable for being applied to furniture or furnishing accessories, in particular in order to define the finishes or seals at their edges.

**[0010]** US 2010/0061095 describes a device comprising a tubular plastic profile which is provided with an internal cavity for housing a flexible printed circuit comprising a plurality of LED diodes. The printed circuit is inserted inside the section through a longitudinal opening which is subsequently closed thanks to a tongue-and-groove coupling defined by corresponding parts (i.e. a shaped appendix and a corresponding shaped recess), both obtained in the tubular section itself.

**[0011]** US 2014/0268736 describes an extruded profile made of polymeric material to contain an LED strip and thus create a lighting device. The section defines an internal cavity configured to house the LED strip which is accessible through an opening which, under use conditions, is closed by folding an articulated portion of the section, which then interlocks with another wall of the section.

**[0012]** The US 2010/0061095 and US 2014/0268736 solutions are not however fully satisfying as the interlocking coupling/engagement can deteriorate with time, in particular also due to the loss of elasticity of the material with which the section bar is made, thus making closure less efficient. Moreover, in particular for sections having a considerable longitudinal development, it is particularly difficult to lock/unlock the coupling/interlocking joint for all of said longitudinal development. Moreover, once the interlocking coupling/engagement has been activated, the cavity for housing the LEDs is isolated from the outside and, in particular, since there is no adequate ventilation inside said cavity, there is the risk of having undesired overheating.

**[0013]** WO 2005/106320 presents an elongated and flexible lighting system which includes a section bar made of flexible material and an array of light sources mounted on a flexible printed circuit configured to be housed inside a longitudinal cavity provided in the profile itself. The section includes a slit that connects the internal cavity with the outside and allows to insert the printed circuit board inside the cavity itself. In conditions of use, the slit is closed - and the cavity is therefore isolated from the outside - by means of clips, or directly by filling the cavity with a filler material. However, this solution is not fully satisfactory as it requires additional external components (such as clips) or, by filling the cavity with material, in the event of a fault, it is no longer possible to remove the LED strip and it is therefore necessary to replace the whole device. In any case, by completely isolating the internal cavity from the outside and, in particular, since there is no adequate ventilation inside said

cavity, there is the risk of having undesired overheating.

**[0014]** The object of the invention is to propose section bar which eliminates all the drawbacks of the known solutions.

**[0015]** Another object of the invention is to propose a section bar to protect a LED strip from the external environment.

**[0016]** Another object of the invention is to propose a section bar in which a LED strip can be inserted simply, easily and quickly.

**[0017]** Another object of the invention is to propose a section bar which allows to have a uniform light substantially along its entire length.

**[0018]** Another object of the invention is to propose a section bar whose length is easily customizable and adaptable, even when installed and at the moment of installation.

**[0019]** Another object of the invention is to propose a section bar which allows a suitable ventilation for the LED strip destined to be housed inside said section bar.

**[0020]** Another object of the invention is to propose a section bar that is both improved and/or alternative to the traditional ones.

**[0021]** Another object of the invention is to provide a section bar which has an alternative characterization, both constructive and functional terms, compared to the traditional ones.

**[0022]** Another object of the invention is to propose a section bar which can be obtained in a simple, rapid manner and with low costs.

**[0023]** Another object of the invention is to provide a section bar that can be produced in series, quickly and efficiently.

**[0024]** Another object of the invention is to provide a section bar that has high standards, both functional and constructive, and at the same time of an accessible cost, thus allowing the possibility of its widespread distribution.

**[0025]** Another object of the invention is to realize a section bar that can be used with standardized dimensions of LED strips and/or the type and dimensions commercially available.

**[0026]** Another object of the invention is to provide a section bar which can be used as a gasket and/or as a finishing profile and/or as a decoration.

**[0027]** Another object of the invention is to propose a lighting device which can be obtained and configured in a simple, rapid and low-cost way and which allows to obtain an illumination that is overall aesthetically pleasing and, thus providing the observer with the feeling of being in front of a high quality solution, both aesthetically and functionally.

**[0028]** All these purposes, considered individually or in any combination thereof, and others which will become apparent from the description that follows are achieved, according to the invention with a section bar as according to claim 1, as well as a lighting device according to claim 13.

**[0029]** In particular, the present invention relates to an

improved section bar 30 to be applied to a structure and/or installation 1 in which lighting is provided and/or required, said section bar being made of extruded polymeric material and being configured so as to define inside it a hollow seat 31 with longitudinal extension for housing a LED strip 40, and characterized in that said section bar 30:

- always presents, along at least a portion of its longitudinal extension, at least one through opening 50, also longitudinally extending, in order to always put said hollow seat 31 inside the section bar itself 30, in communication with the outside.
- is configured so that the insertion of said LED strip 40 inside the hollow seat 31 occurs through said through opening 50 and in a direction 45 which is angled, and which is preferably substantially orthogonal, with respect to the longitudinal development direction of the profile itself,
- comprises at least a portion which is configured to allow, at least in part, the transmission towards the external environment of the light generated by said LED strip 40 which is intended to be housed within said hollow seat 31.

**[0030]** Conveniently, said longitudinal opening 50 always remains open to define an air passage between the inside of the hollow seat 31 and the outside.

**[0031]** Advantageously, said longitudinal opening 50 has dimensions configured to prevent the passage of the LED strip 40 both in entrance and at the exit from said hollow seat 31. Advantageously, said section bar 30 is configured so that the insertion of the LED strip 40 inside the hollow seat 31 takes place causing the widening of the longitudinal opening 50 of the section bar 30 so as to define a passage 54 of such width as to allow said insertion.

**[0032]** In particular, the section bar 30 has said at least one longitudinal opening 50 also in its use and/or installation condition, that is when the LED strip is inserted inside the hollow seat 31.

**[0033]** Conveniently, the hollow seat 31 is never isolated and separated from the external environment of the section itself. Conveniently, even in the absence of external stresses, the hollow seat 31 is and remains in communication with the outside of the section bar through said through opening.

**[0034]** Conveniently, at said through opening there are no engagement, for example interlocking means, to close or cover the through opening itself. In particular, said through opening is defined between two portions which always remain mutually spaced.

**[0035]** Suitably, no sealants or other filling materials are provided/used inside the hollow seat 31.

**[0036]** Advantageously, the hollow seat 31 of the section bar 30 is also open and in communication with the outside at one end 33, preferably of both ends, of said section bar.

**[0037]** Preferably, the section bar 30 is obtained so that the hollow seat 31 formed therein is closed and separated from the outside at the ends 33 of said section bar.

**[0038]** Advantageously, in the absence of external stresses, the width of the longitudinal opening 50 is smaller than both dimensions of the cross section of the LED strip 40.

**[0039]** Advantageously, the section has a portion 51 which is elastically deformable so as to allow its rotation around a longitudinal portion 53 of said section bar, which acts as an articulation axis, following the application on said portion 51 of an external force 49.

**[0040]** Advantageously, the cross-sectional area of the hollow seat 31 is larger than the area of the cross section of the LED strip 40 intended to be inserted and housed in said seat.

**[0041]** Conveniently, the hollow seat 31 has a first zone 36 intended to house the LED strip 40 and a second zone 37 which faces and/or communicates with said first zone and which is meant to remain always empty.

**[0042]** Preferably, the hollow seat 31 has, at least in part, a profile complementary to that of the LED strip 40 to be housed therein.

**[0043]** Conveniently, the hollow seat 31 is shaped so that, once the LED strip 40 is inserted, it remains stably in position in said seat.

**[0044]** Advantageously, said hollow seat 31 comprises appendages to lock said LED strip 40 inside said seat.

**[0045]** Conveniently, the section bar is configured, at least in part, to uniformly diffuse the light produced by the LED strip 40 housed and inserted in said hollow seat 31.

**[0046]** Advantageously, the section bar is in silicone and/or in PMMA and/or in PVC and/or in rubber and/or other polymeric material, both synthetic and natural, with high elasticity.

**[0047]** Conveniently, the section bar comprises entirely, or at least in 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 uniformly diffuses the light produced by the LED diodes 41 of the LED strip 40.

**[0048]** 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 between about 0-50%.

**[0049]** Preferably, the section bar comprises a transparent or translucent portion. Preferably, the section bar comprises a partially opaque portion, preferably with an opal and/or frost and/or milky white effect.

**[0050]** Preferably the section bar 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.

**[0051]** Preferably, the section 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, 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 construction of the section itself.

**[0052]** Conveniently, the section is externally configured to act as a sealing and/or finishing and/or decoration section of said structure and/or of said installation and/or structure 1 to which it is intended to be applied.

**[0053]** Preferably, the section is configured to substantially act as a containment for the LED strip 40 and as a diffuser for the light generated by said LED strip 40.

**[0054]** Moreover, the present invention relates to a lighting device 18, preferably of the type to be installed on a piece of furniture, on a piece of furnishing complement or the like, on a roofing installation or on a structure or installation in which illumination is provided and/or request, and characterized in that it comprises at least one section bar 30 as described above and a LED strip 40 which is removably housed inside the hollow seat 31 defined in said section; suitably, said LED strip 40 is inserted in said hollow seat 31 passing through said longitudinal opening 50 of said section bar 30 and in a direction 45 which is angled, and which is preferably substantially orthogonal, with respect to the direction of longitudinal development of the profile itself.

**[0055]** Conveniently, a cable 60 is connected to said LED strip 40, at a terminal portion thereof, for connection to an electrical supply.

**[0056]** Advantageously, the LED strip 40 is configured so as to have, by itself, a degree of IP protection, which is defined according to the IEC 60529 standard, which 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.

**[0057]** In particular, preferably, 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 or IP66 or IP67 or IP68.

**[0058]** Advantageously, 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 sections and/or other protections.

**[0059]** Preferably, the LED strip 40 comprises a plurality of LED diodes 41 which are supported and connected by means of a printed circuit 42.

**[0060]** Conveniently, the LED strip 40 comprises a plurality of LED diodes 41 that are configured to emit monochromatic light or are of the RGB type.

**[0061]** Advantageously, the LED strip 40 is entirely housed and hidden inside the internal cavity 32 of the section bar 30.

**[0062]** Advantageously, the LED strip 40 can in part exit outside in correspondence with 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.

**[0063]** The present invention also relates to an installation and/or structure, such as for example a piece of furniture and/or a furnishing complement and/or a roof installation, in which lighting is provided and/or required, and characterized by the fact of comprising at least one lighting device 18 as described above, the section bar 30 of said device 18 being applied to a surface or inside an element of said installation and/or structure.

**[0064]** Suitably, the installation comprises a device for controlling said at least one lighting device 18.

**[0065]** Advantageously, 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 for the supply voltage of the LED diodes 41 of the strip. 40.

**[0066]** Preferably, the processor is also configured to allow 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.

**[0067]** The present invention is hereinafter further clarified in some of its preferred embodiments shown in purely illustrative purpose and not limiting with reference to the attached drawings, in which:

- Figure 1 shows a perspective view from above of a piece of furniture to which an improved section member according to the invention is applied,
- Figure 1a shows an enlarged detail of fig. 1 according to a perspective view from below;
- Figure 2 shows a perspective view of a first embodiment of the section according to the invention before the insertion of the LED strip,
- Figure 3 is a perspective view of an enlarged detail of fig. 2,
- Figure 4 shows a cross-section of the section of fig. 2 in a first configuration,
- Figure 5 shows a perspective view of the detail of fig. 3 with its portion to be moved going from the first to the second configuration,
- Figure 6 shows the cross section of the section of fig. 2 in the second configuration,
- Figure 7 shows a perspective view of the section of fig. 2 in the second configuration to allow the insertion of a LED strip,
- Figure 8 shows a perspective view of the section of fig. 2 with a LED strip inside,
- Figure 9 shows a perspective view of a second embodiment of the section according to the invention before the insertion of the LED strip,
- Figure 10 shows a perspective view of an enlarged detail of fig. 9,
- Figure 11 shows a cross-section of the section of fig. 9 in a first configuration,
- Figure 12 is a perspective view of the detail of fig. 9 in the second open configuration,
- Figure 13 shows the cross-section of the section bar

- Figure 14 shows a perspective view of the section bar of fig. 9 in a second open configuration to allow the insertion of a LED strip,
- Figure 15 shows a perspective view of the section bar of fig. 9 with inserted to its interior a LED strip.

**[0068]** 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 piece of furniture, indicated as a whole with the reference number 1. In particular, in the illustrated example, the device 18 is applied to the lower surface of a wall unit 1 so as to illuminate the underlying area, i.e. that at the TV 2.

**[0069]** Suitably, it is understood that the lighting device 18 can be applied to a to any structure or installation, such as for example to the mobile 1 but also to a furnishing accessory or similar, to a roofing installation, such as a pergola or a tent, and in general can be applied to any structure or installation where lighting is required or required. Conveniently, the lighting device 18 can be applied in any and desired position of said structure or installation 1.

**[0070]** In particular, according to the invention, each lighting device 18 comprises a section bar 30 which is made of extruded polymeric material and which is configured so as to define inside it a hollow seat 31 with longitudinal development for housing a LED strip 40. Conveniently, in fact, the lighting device 18 also comprises at least one LED strip 40 which is removably inserted and housed, at least in part, in the hollow seat 31 of said section bar 30.

**[0071]** Conveniently, in a substantially traditional manner, the hollow seat 31 of the section bar 30 is open and in communication with the outside at the ends 33 of said section bar. Alternatively, according to the invention, in an embodiment not shown here, the section bar 30 is obtained so that the hollow seat 31 formed inside it is closed and separated from the outside at one or both ends 33 of said profiled.

**[0072]** The section bar 30 has also, along the entirety or a large part of its longitudinal extension, at least one through opening 50, which also has a longitudinal development, to put into communication the hollow seat 31 defined inside the section bar 30 with the outside.

**[0073]** Conveniently, the hollow seat 31 is entirely delimited/surrounded by the walls of the section bar 30 with a single interruption at the longitudinal opening 50.

**[0074]** In other words, the cross section of the hollow seat 31 is in communication with the external environment only at said longitudinal opening 50.

**[0075]** Advantageously, the hollow seat 31 is in communication with the external environment, through the longitudinal opening 50, even when the section bar 30 is in an unstressed condition (i.e. in the absence of external stresses). Conveniently, even in the absence of external

stresses, the longitudinal opening 50 defines a passage for the entry of external air into the hollow seat 31 in which the LED strip 40 is intended to be housed, thus allowing an appropriate ventilation of the latter and avoiding overheating problems caused by the LED strip destined to be housed in said hollow seat 31.

**[0076]** Conveniently, in the absence of external stresses, the longitudinal opening 50 has dimensions such as to prevent the passage of the LED strip 40. Preferably, for this purpose, the width of the longitudinal opening 50 is lower with respect to both dimensions of the cross section of the LED strip 40.

**[0077]** The section bar 30 is configured so that the insertion of the LED strip 40 inside the hollow seat 31 takes place in a direction 45 which is angled - and which is preferably substantially orthogonal - with respect to the direction of the longitudinal development of the section itself (see figs 7 and 14). Conveniently, the insertion (or removal) of the LED strip 40 inside the hollow seat 31 takes place by widening of the longitudinal opening 50 of the section bar 30 so as to define a passage 54 of such amplitude as to allow said insertion (or removal).

**[0078]** Advantageously, the longitudinal opening 50 is formed so as to separate two portions, respectively 51 and 52, of the section bar 30 from each other. Conveniently, the two portions 51 and 52 separated from the opening 50 can be defined by two distinct walls, adjacent to each other and angled, of the section bar 30 (see the first embodiment in Fig. 4) or can be defined on the same wall of the section bar 30 (see the second embodiment in Fig. 11).

**[0079]** Advantageously, as mentioned, this longitudinal opening 50 is used to allow the insertion and removal of the LED strip 40 inside the hollow seat 31. Conveniently, in this case, the section bar 30 has, in correspondence with the longitudinal opening 50, at least one portion 51 which is elastically deformable so as to allow its movement - preferably its rotation around a longitudinal portion 53 of said section member from the articulation axis - following the application on said portion 51 of an external force 49 by the installer. Preferably, the section bar 30 has a single portion 51 which is elastically deformable so as to allow its movement - preferably by its rotation around a longitudinal portion 53 of said section which acts as an articulation axis - following application. on said portion 51 of an external force 49 by the installer.

**[0080]** Preferably, the deformable portion 51 is not provided with means for the engagement by interlocking with the portion 52. Suitably, in essence, the deformable portion 51 is never in contact with the portion 52, thus allowing to define/leave always an opening 50 between said two portions.

**[0081]** Conveniently, the section bar 30 is configured to pass - following the application of an external force 49 - from a first configuration (corresponding to the use and installation condition of the section bar 30) - in which the hollow seat 31 is substantially isolated from the outside, except at the longitudinal opening 50 - to a second de-

formed and opening configuration for inserting the LED strip 40 in the hollow seat 31 (or for removal from the latter). Conveniently, once the LED strip 40 has been inserted/removed and the application of the external force 49 to the portion 51 is interrupted, the section bar 30 returns by itself (by elastic return) from the second deformed opening configuration to the first configuration.

**[0082]** More in detail, in the second deformed opened configuration, the opening 50 of the section bar 30 is elastically widened following the application of an external force 49 by the installer so as to cause rotation of the portion 51 around the portion 53 and thus defining a passage 54 of such amplitude as to allow the insertion/removal of the LED strip 40 inside the hollow seat 31. Then, once the LED strip 40 has been inserted inside the hollow seat 31, to return to the first configuration, the application of the external force 49 is interrupted, so that the portion 51 returns elastically in position by partially closing the passage 54 and arriving to redefine the opening 50 with the portion 52, opening which - as mentioned - it is of a size such as to prevent the passage of said LED strip 40.

**[0083]** Advantageously, once the LED strip 40 has been inserted into the hollow seat 31, the opening 50 can be closed so as to at least partially isolate (at least along the longitudinal extension of the section bar 30) the hollow seat 31 from the outside.

**[0084]** Suitably, the cross-section of the section bar 30 is shaped and dimensioned so that its internal hollow seat 31 presents a dimension 35 which corresponds to (i.e. is substantially equal) or is slightly larger than the larger dimension (i.e. the width 59) of the section of the LED strip 40 which is intended to be inserted inside it.

**[0085]** Advantageously, the section bar 30 - and preferably also its inner hollow seat 31 - are configured so as to dissipate the heat produced by the LED strip 40 when it is supplied. In particular, for this purpose, the cross-sectional area of the hollow seat 31 is larger than the area of the cross section of the LED strip 40. This also allows the air of the external environment to enter the hollow seat 31 crossing the opening 50, to circulate inside the said hollow seat 31 to then exit from the latter always through the opening 50.

**[0086]** Preferably, the hollow seat 31 has a first zone 36 designed to house the LED strip 40 and a second zone 37 which faces and/or communicates with said first zone and which is destined to always remain empty (i.e. even when the LED strip has been inserted inside said hollow seat 31). Conveniently, the presence of the second zone 37 allows to dissipate the heat produced by the LED strip 40 which is housed in the first zone 36.

**[0087]** Preferably, the hollow seat 31 has a profile which, at least in part, is complementary to that of the LED strip 40 to be housed therein.

**[0088]** Conveniently, the hollow seat 31 is shaped so that, once the LED strip 40 is inserted, it remains stably in position in said seat. Advantageously, for this purpose, for example, locking appendices are provided.

**[0089]** Conveniently, inside the hollow seat 31, the

LED strip 40 can be positioned in contact with the surface of a side adjacent to the opening 50. Advantageously, the LED strip 40 may also emit light substantially in the direction of the opposite surface compared to the surface of contact.

**[0090]** In particular, advantageously, once inserted, the LED strip 40 can be in support and in contact with the inner surface (i.e. facing the inside of the hollow seat 31) of the deformable portion 51, thus facilitating the insertion/removal of the LED strip 40 in/from said hollow seat 31.

**[0091]** Conveniently, the section bar 30 substantially acts as a protective container for the LED strip 40 and also as a diffuser for the light generated by it.

**[0092]** Advantageously, each LED strip 40 comprises a set of LED diodes 41, i.e. electronic components which emit light when supplied with electricity. 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.

**[0093]** Advantageously, the LED diodes 41 can be configured to emit monochromatic light or they can be of the RGB type. Advantageously, the LED strip 40 is configured so that - already on its own - is protected against the penetration of dust and against any penetration of liquids (in particular water).

**[0094]** Preferably, the LED strip 40 is configured so that, alone, 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.

**[0095]** Advantageously, the LED strip 40 is configured so as to have, by itself, a degree of protection IP - defined in accordance with IEC 60529 - which 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.

**[0096]** Preferably, the LED strip 40 has - by itself - protection degree IP65, IP66, IP 67 or IP68.

**[0097]** Preferably, 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 sections and/or other protections.

**[0098]** 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 protective casing 43 which gives the strip a degree of IP protection - defined according to IEC 60529 - which 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.

**[0099]** 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 silicon dioxide) which gives the strip a degree of IP protection

- defined according to IEC 60529 - which 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.

**[0100]** Advantageously, the LED strip 40 can protrude 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 comes out from the ends of the section bar 30.

**[0101]** In addition, any changes of the atmosphere in this regard, for example moisture or variations of atmospheric dust concentration, which are transmitted inside the hollow seat 31 through the opening 50, do not constitute a detriment to the operation of the LED strip 40.

**[0102]** Advantageously, the LED strip 40 can be entirely housed and hidden inside the hollow seat 31 of section bar 30 and, appropriately, in this case, may have shorter length with respect to the longitudinal axis of the profiled bar. Suitably, this avoids having to necessarily cut the section bar 30 of length corresponding to the size of the LED strip 40.

**[0103]** Preferably, the section bar 30 is made of silicone, but could also be made of 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.

**[0104]** 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 made on corresponding metal or rigid sections of the piece of furniture or of the furnishing complement. Advantageously, the section bar 30 is configured (i.e. it is sized and shaped) so that - once inserted into the longitudinal groove of a piece of furniture or a furnishing complement - it is substantially flush with the surrounding outer surface of these. Advantageously, the section bar 30 can also be associated with the surface of a piece of furniture, of a furnishing complement or of any structure or installation in general by traditional mechanical fixing means or adhesive means.

**[0105]** Suitably, the section bar 30 can be externally configured to act as a profile of the gasket or the finish

or decoration of a furniture, of a furnishing complement or the like.

[0106] Conveniently, the section bar 30 consists entirely, or at least part of it, of a portion that transmits the light produced by the LED diodes 41 of the LED strip 40. Preferably, this portion is also configured to uniformly diffuse the light produced by the LED diodes 41 of the LED strip 40.

[0107] In particular, said portion 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%.

[0108] Preferably, the section bar 30 comprises - in all its longitudinal extension or at least in a part thereof - a transparent 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%).

[0109] 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 a 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 and separate lights between them).

[0110] Advantageously, the section bar 30 comprises at least two portions with different characteristics of both transmission and homogeneous 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 manufacture of the section itself.

[0111] Advantageously, the LED strip 40 is associated - preferably at one end portion thereof - a connector and/or electrical cable connection 60 with a mains power source, not shown, such as for example a battery or the electricity grid.

[0112] Advantageously, the cables 60 connected to the LED strip 40 of the lighting devices 18 are electrically conductive cables connected to the interior of the piece of furniture or to the furnishing complement and are therefore hidden from view from the outside.

[0113] Advantageously, the LED strip 40 of lighting device 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.

[0114] 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 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 LED diodes 41 of the activation/deactivation, as well as the change in brightness generated by these.

[0115] From the foregoing it is apparent that the section according to the invention is advantageous and in particular:

- it allows a rapid or practical or easy insertion of the LED strip inside it without risk of causing damage to the latter,
- prevents overheating of the LED strip that is inserted inside it,
- allows lighting that is uniform and aesthetically pleasing,
- the dimensions of its cross section (i.e. width and thickness) can also be particularly small and be suitable for the type of strip used, thus allowing the housing of LED strips having different widths.

## Claims

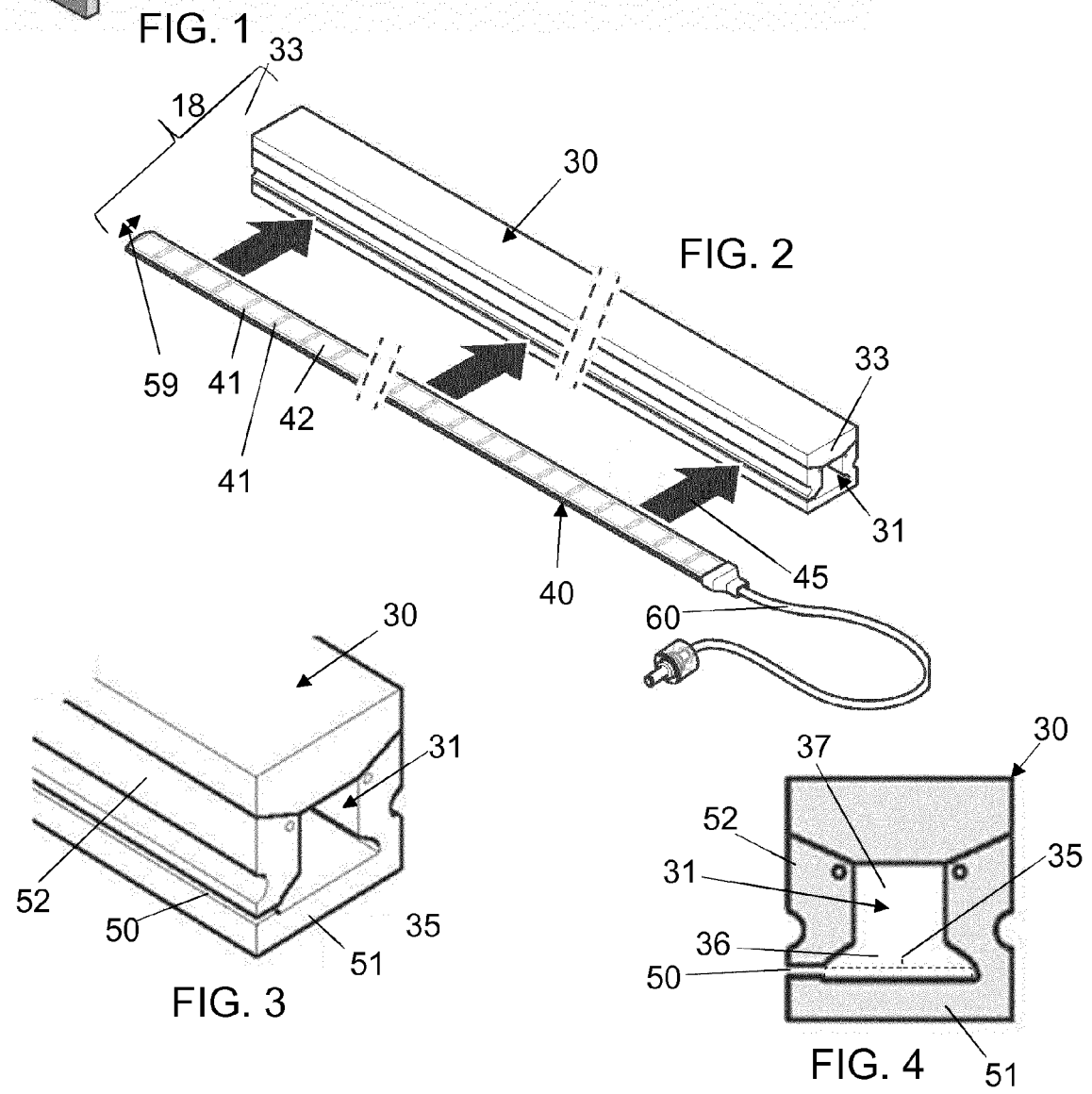
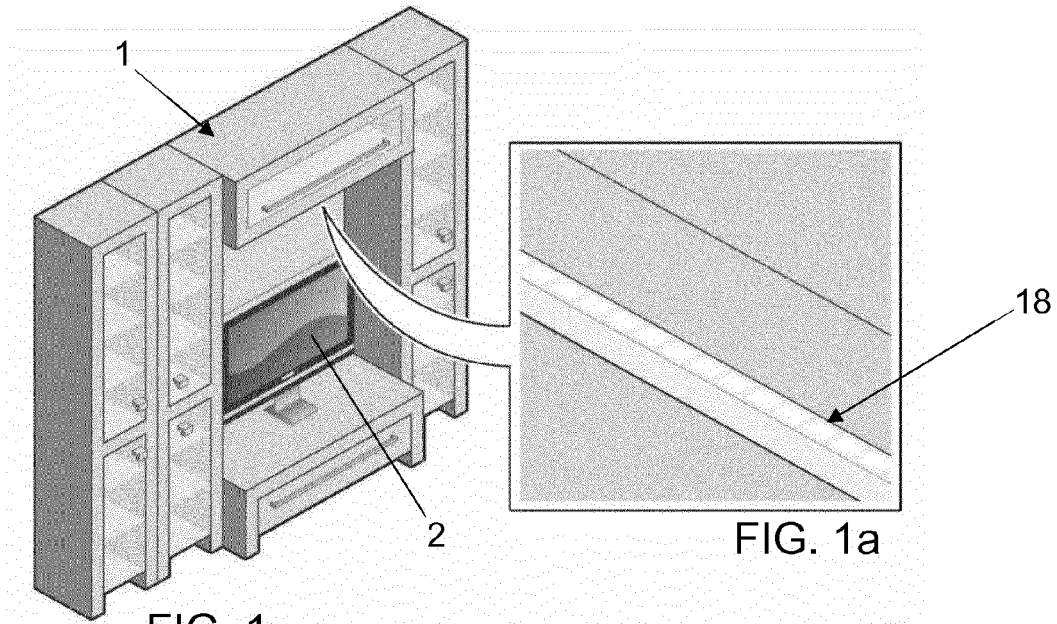
1. Improved section bar (30) to be applied to a structure and/or installation (1) in which lighting is provided and/or required, said profile being made of extruded polymeric material and being configured so as to define a seat (31) therein longitudinally extending to house a LED strip (40), and **characterized in that** said section bar (30):

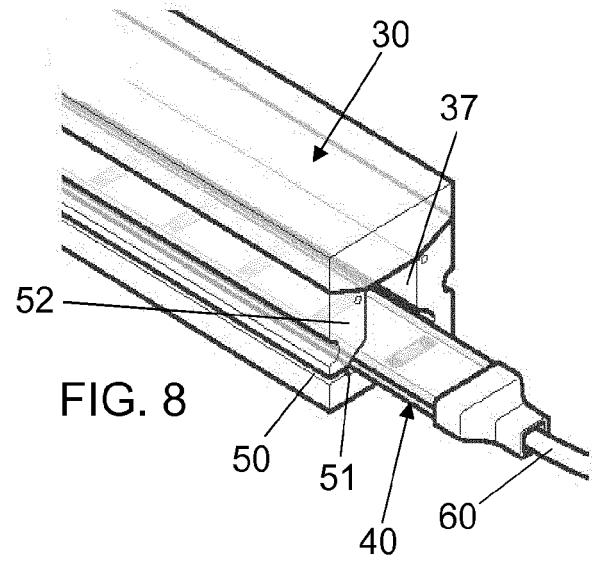
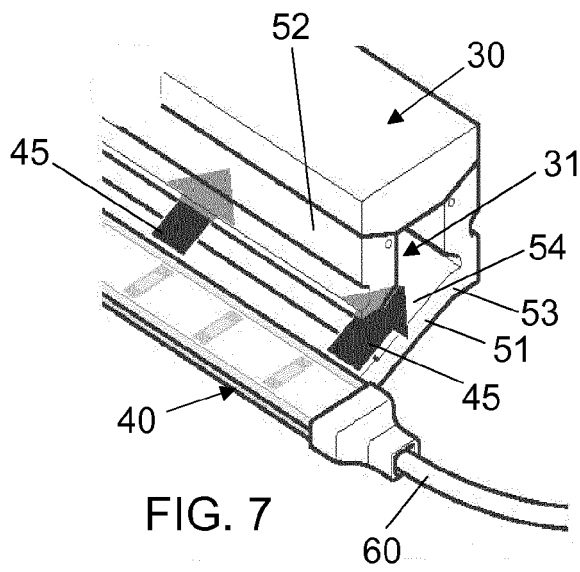
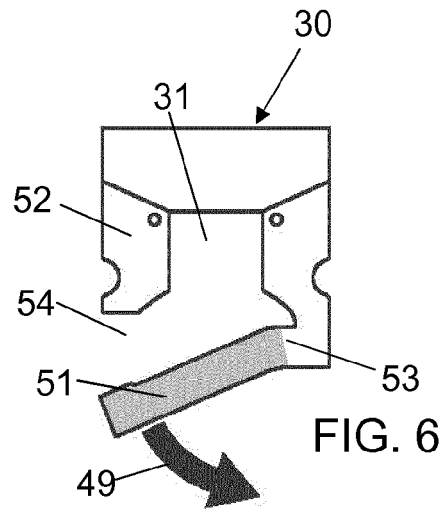
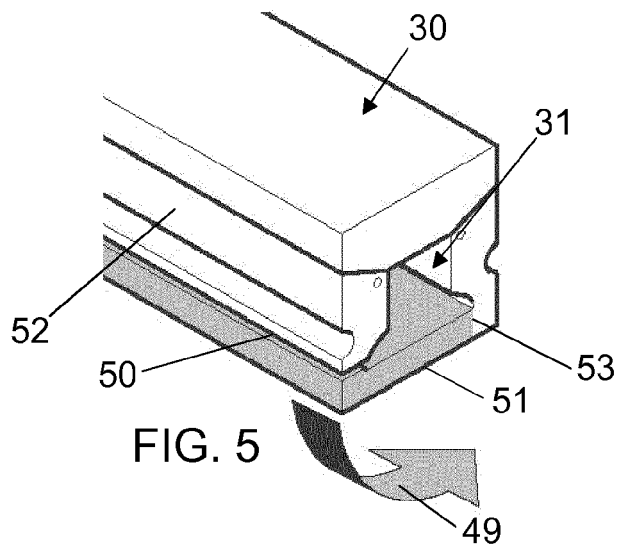
- always presents, along at least a part of its longitudinal extension, at least one through opening (50), also longitudinally extending, in order to always put said hollow seat (31), which is defined inside the section bar itself (30), in communication with the outside
- is configured so that the insertion of said LED strip (40) inside the hollow seat (31) occurs through said through opening (50) and in a direction (45) which is angled, and which is preferably substantially orthogonal, with respect to the longitudinal development direction of the profile itself,
- comprises at least a portion which is configured to allow, at least in part, the transmission towards the external environment of the light generated by said LED strip (40) which is intended to be housed within said hollow seat (31).

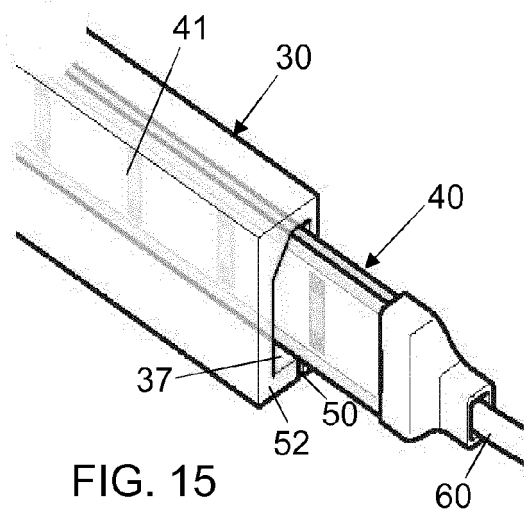
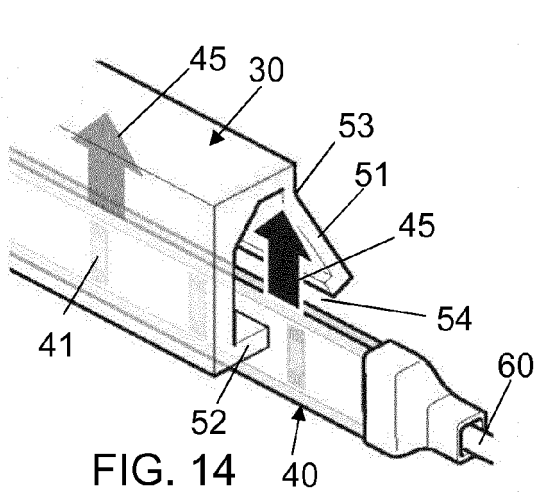
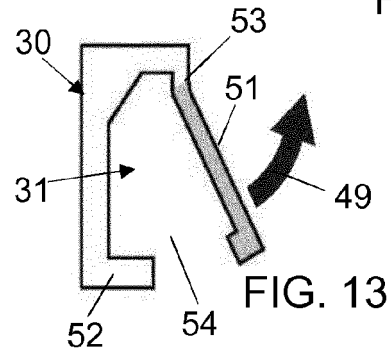
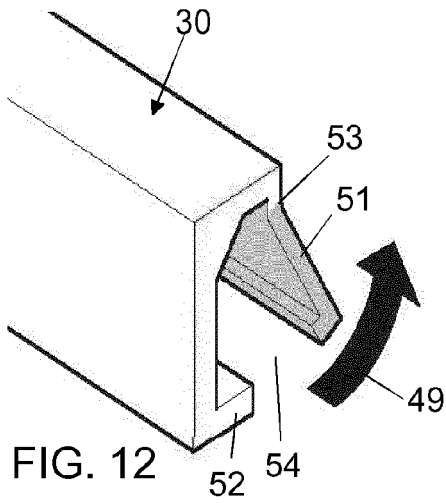
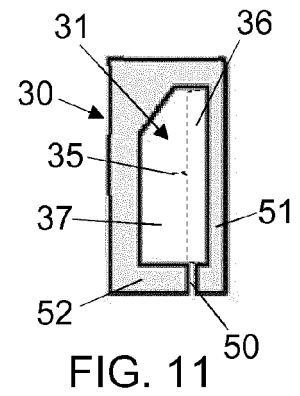
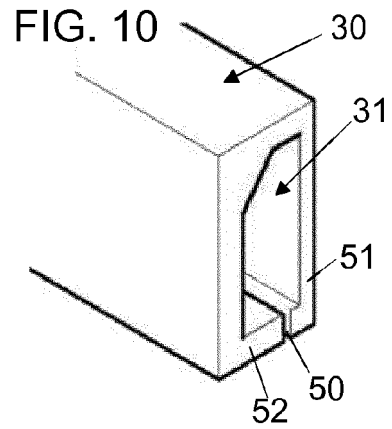
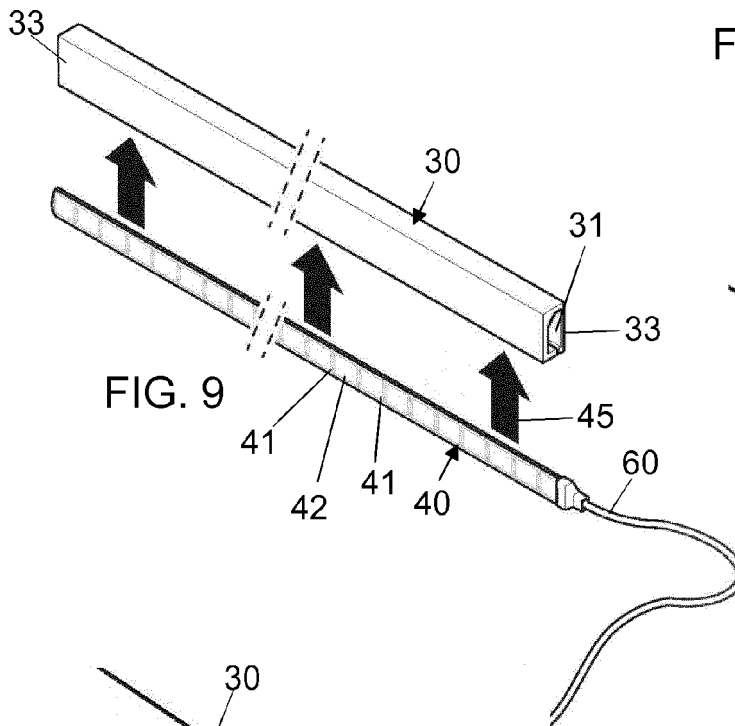
2. Section bar according to claim 1 **characterized in that:**

- said longitudinal opening (50) has, in the absence of external stresses, dimensions such as to prevent the passage of the LED strip (4) both at the entrance and at the exit from said hollow seat (31), and
- said section bar (30) is configured so that the insertion of the LED strip (40) inside the hollow

- seat (31) takes place causing the widening of the longitudinal opening (50) of the section bar (30) so as to define a passage (54) of such amplitude as to allow said insertion.
3. Section according to one or more of the preceding claims, **characterized in that** said longitudinal opening (50) is formed so as to separate two portions (51, 52) from each other, which are formed on the same wall or on two distinct walls of the section bar (30).
  4. Section bar according to one or more of the preceding claims, **characterized in that** said section bar (30) has, at the longitudinal opening (50), a portion (51) which is elastically deformable so that, following the application of an external force (49), said section bar passes from a first configuration, corresponding to the condition of use and installation of the section bar itself, in which the hollow seat (31) is in communication with the outside through said longitudinal opening (50), to a second deformed opened configuration in which the hollow seat (31) is in communication with the outside through a passage (54) of such amplitude as to allow the insertion of the LED strip (40) within said hollow seat (31).
  5. Section bar according to one or more of the preceding claims, **characterized in that** its cross section is shaped and sized so that said hollow seat (31) has a dimension (35) which corresponds to or is slightly greater than the larger dimension of the cross section of the LED strip (40) which is intended to be inserted and housed in said hollow seat.
  6. Section bar according to one or more of the preceding claims, **characterized in that** the area of the cross section of the hollow seat (31) is larger than the area of the cross section of the LED strip (40) intended to be inserted and housed in said seat.
  7. Section bar according to one or more of the preceding claims, **characterized in that** the hollow seat (31) has, at least in part, a profile complementary to that of the LED strip (40) to be housed therein.
  8. Section bar according to one or more of the preceding claims, **characterized in that** said deformable portion (51) is configured to receive in support said LED strip (40) to be housed inside said hollow seat (31).
  9. Section bar according to one or more of the preceding claims, **characterized in that**, in correspondence with said through opening (50), engagement or hooking means are not provided for the facing portions of said section bar between which said pass-through opening (50) is defined.
  10. Section bar according to one or more of the preceding claims, **characterized in that** said section bar (30) is configured, at least for a portion thereof, to homogeneously diffuse the light produced by the LED strip (40) housed and inserted in said hollow seat (31).
  11. Section bar according to one or more of the previous claims, **characterized in that** it 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.
  12. Section bar according to one or more of the preceding claims, **characterized in that** it is externally configured to act as a sealing and/or finishing and/or decoration section of said structure and/or of said installation (1) to which it is intended to be applied.
  13. Lighting device (18), preferably of the type to be installed on a piece of furniture, on a furnishing complement or the like, on a roofing installation or on a structure or installation in which lighting is provided and/or required, characterized wherein at least one section bar (30) according to one or more of the preceding claims and a LED strip (40) which is removably housed inside the hollow seat (31) defined in said section bar, said LED strip (40) being inserted in said hollow seat (31) passing through said longitudinal opening (50) of said section bar (30) and according to a direction (45) which is angled, and which is preferably substantially orthogonal, with respect to the direction of longitudinal development of said section.
  14. Device according to one or more of the preceding claims, **characterized in that** the LED strip (40) is configured so as to have, by itself, a degree of IP protection, which is defined according to the IEC 60529 standard, which 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.
  15. Installation and/or structure, such as for example a roofing installation, a piece of furniture and/or a furnishing accessory, in which lighting is provided and/or required, **characterized in that** it comprises at least one lighting device (18) according to one or more of the preceding claims, the section bar (30) of said device (18) being applied to a surface or inside an element of said installation and/or structure.









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 Application Number  
 EP 19 18 8653

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| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                             |                                                     |                                                         |
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| Place of search<br>The Hague                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                             | Date of completion of the search<br>31 October 2019 | Examiner<br>Krikorian, Olivier                          |
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31-10-2019

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