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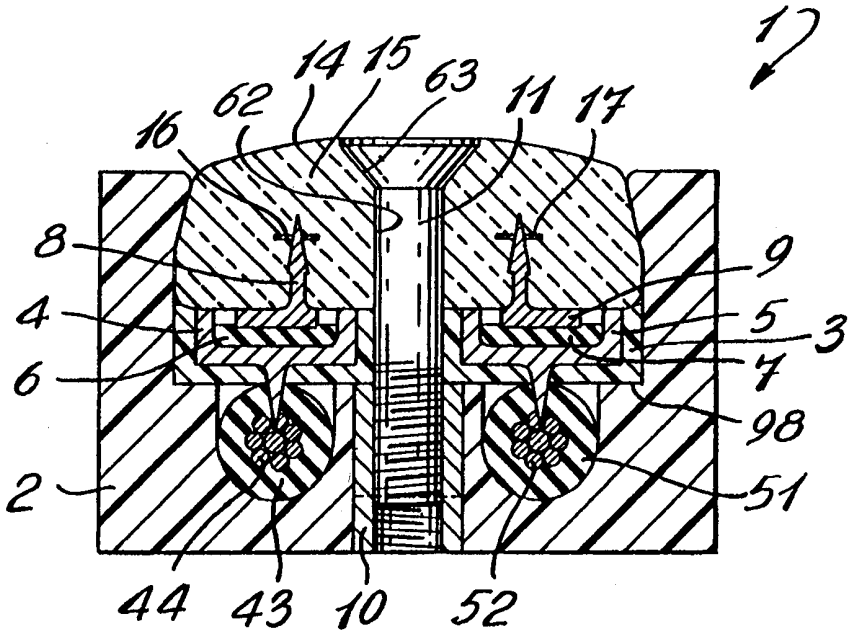
(54) Title: INSULATION–PIERCING CONNECTOR FOR CONNECTING INSULATED CABLES TO AN LED LIGHT STRIP

(57) Abstract

An insulation–piercing connector comprises first and second electrically conductive links for connecting first and second insulated cables with respective first and second conductors embedded in the extrusion of at least partially transparent insulating material of an LED light strip. The first link includes a first tapered member for piercing the insulation of the first cable and making contact with the first cable, and a second tapered member 180° apart from the first tapered member for piercing the transparent insulating material and making contact with the first conductor. The second link has a third tapered member for piercing the insulation of the second cable and making contact with the second cable, and a fourth tapered member 180° apart from the third tapered member for piercing the transparent insulating materiel and making contact with the second conductor. Each electrically conductive link comprises a first link portion including the tapered member for piercing the cable insulation and a second link portion including the tapered member for piercing the transparent insulating material. The first and second link portions comprise respective first and second base members through which the first and second link portions connect to each other through a resilient, electrically conductive pad. A housing device holds the different tapered members in contact with the respective cables and conductors.



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INSULATION-PIERCING CONNECTOR FOR CONNECTING INSULATED CABLES TO A LED LIGHT STRIP

BACKGROUND OF THE INVENTION

1. Field of the invention:

The present invention relates to a connector comprising electrically conductive tapered members for piercing the insulation of conductors and making contact with these conductors. An application of this insulation-piercing connector is to connect a pair of electric supply cables to the two longitudinal copper ribbons of a LED (Light Emitting Diode) light strip, respectively.

2. Brief description of the prior art:

LED light strips comprise a series of light emitting diodes distributed along the LED light strip. The light emitting diodes are supplied with electric current through a pair of spaced apart, longitudinal and electrically conductive copper ribbons. Both the light emitting diodes and the copper ribbons are embedded in an extrusion of at least partially transparent insulating plastic material.

LED light strips are currently used for many purposes, in particular in security lighting in aircrafts, buses, boats, buildings, etc.

To supply the light emitting diodes with electric current, electric supply cables have to be connected to the copper ribbons. Since the copper ribbons are usually exposed at each end of a LED light strip, a prior art connector has been proposed to connect electric supply cables to the exposed ends of the copper ribbons.

This prior art connector comprises a plastic housing containing a pair of spring-loaded pins. The spring-loaded pins are compression connected to respective electric supply cables and are applied to the exposed ends of the copper ribbons. In this manner, the supply cables are connected to the copper ribbons through the spring-loaded pins. The plastic housing is mounted to the end of the LED light strip with the spring-loaded pins applied to the exposed ends of the copper ribbons. For that purpose, a U-shaped metal bracket embraces the plastic housing and is secured to the at least partially transparent insulating material through a screw.

A drawback of the prior art connector is that connection of the supply cables to the copper ribbons is permitted only at the ends of the LED light strip where the ends of the copper ribbons are exposed. Another drawback of this prior art connector is its low reliability.

OBJECT OF THE INVENTION

An object of the present invention is therefore to provide an insulation-piercing connector capable of connecting supply cables to the copper ribbons at any location along a LED light strip.

SUMMARY OF THE INVENTION

More specifically, in accordance with the present invention, there is provided an insulation-piercing connector for electrically interconnecting first and second insulated conductors, comprising an electrically conductive link and a housing device. The electrically conductive link includes a first tapered member for piercing the insulation of the first conductor and making contact with this first conductor, and a second tapered member for piercing the insulation of the second conductor and making contact with this second conductor. The housing device holds the first tapered member in contact with the first conductor and the second tapered member in contact with the second conductor to thereby establish an electrical connection between the first and second conductors through the electrically conductive link.

The present invention also relates to an insulation-piercing connector for interconnecting (a) first and second insulated cables and (b) a LED light strip comprising an elongated body of at least partially transparent insulating material, a series of light emitting diodes distributed along the elongated body, and first and second spaced apart longitudinal conductors embedded in the transparent insulating material for electrically supplying the light emitting diodes. This insulation-piercing connector

comprises (a) a first electrically conductive link for interconnecting the first cable and the first conductor, including a first tapered member for piercing the insulation of the first cable and making contact with this first cable and a second tapered member for piercing the transparent insulating material and making contact with the first conductor, (b) a second electrically conductive link for interconnecting the second cable and the second conductor, including a third tapered member for piercing the insulation of the second cable and making contact with this second cable, and a fourth tapered member for piercing the transparent insulating material and making contact with the second conductor. The insulation-piercing connector further comprises a housing device (a) for holding the first tapered member in contact with the first cable and the second tapered member in contact with the first conductor to thereby establish a first electrical connection between the first cable and the first conductor through the first electrically conductive link, and (b) for holding the third tapered member in contact with the second cable and the fourth tapered member in contact with the second conductor to thereby establish a second electrical connection between the second cable and the second conductor through the second electrically conductive link.

In accordance to a preferred embodiment, the first and second tapered members are angularly spaced apart by an angle of 180°, and the third and fourth tapered members are also angularly spaced apart by an angle of 180°.

In accordance with another preferred embodiment of the insulation-piercing connector:

- each electrically conductive link comprises a first link portion including the tapered member for piercing the cable insulation, and a second link portion including the tapered member for piercing the transparent insulating material;

- the first and second link portions comprise respective first and second base members through which the first and second link portions connect to each other;

- the first base member is channel-shaped to define a channel cavity with a generally planar bottom face opposite to the tapered member of the first link portion, and a resilient, electrically conductive pad having a first face mechanically attached to the generally planar bottom face, and a second face; and

- the second base member has a generally planar face opposite to the tapered member of the second link portion, to rest on the second face of the resilient, electrically conductive pad.

In accordance with a further preferred embodiment of the insulation-piercing connector:

- the first electrically conductive link comprises a first link portion including the first tapered member and a second link portion including the second tapered member, the first and second link portions comprising respective first and second base members through which the first and second link portions connect to each other;

- the second electrically conductive link comprises a third link portion including the third tapered member and a fourth link portion including the fourth tapered member, the third and fourth link portions comprising respective third and fourth base members through which the third and fourth link portions connect to each other; and

- the housing device comprises:

- a housing channel defining a channel cavity with a generally planar bottom face;

- first and second longitudinal grooves in the generally planar bottom face to receive sections of the first and second insulated cables, respectively; and

- a generally flat cassette having:

- a first face applied to the generally planar bottom face of the housing channel after the sections of the first and second insulated cables have been inserted in the first and second longitudinal grooves, respectively; and

- a second face formed with:

- a first cavity with a bottom wall to receive the first base member after the first tapered member has passed through the bottom wall of the first cavity and has pierced the insulation of the first cable to make contact with the first cable; and

- a second cavity with a bottom wall to receive the third base member after the third tapered member has passed through the bottom wall of the second cavity and has pierced the insulation of the second cable to make contact with the second cable;

- the housing channel comprises first and second lateral walls having first and second mutually facing inner faces, the first and second mutually facing inner faces being formed with respective longitudinal and distal thickenings to clip the LED light strip on the second face of the cassette after the second and fourth tapered members have pierced the transparent insulating material to make contact with the first and second conductors, respectively;

- the housing channel also comprises a bottom wall, and wherein the housing device further comprises:

an insert-receiving aperture in the bottom wall of the housing channel;

an insert having a threaded hole, this insert fitting in the aperture with the threaded hole perpendicular to the bottom wall of the housing channel;

a first hole made in the elongated body of the LED light strip, and a second hole made in the generally flat cassette, these first and second holes being coaxial with the threaded hole of the insert; and

a screw inserted in the first and second coaxial holes, and then screwed in the threaded hole of the insert.

The objects, advantages and other features of the present invention will become more apparent upon reading of the following non restrictive description of a preferred embodiment thereof, given by way of example only with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the appended drawings:

Figure 1 is a cross sectional view of an insulation-piercing connector according to the present invention, interconnecting a pair of insulated cables to a LED light strip;

Figure 2 is an exploded view of the insulation-piercing connector of Figure 1, comprising a housing channel; and

Figure 3 is a perspective view of the housing channel of the insulation-piercing connector of Figures 1 and 2.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

In the appended drawings, the insulation-piercing connector is generally identified by the reference 1. As illustrated in Figures 1 and 2, the insulation-piercing connector 1 comprises a housing channel 2, a silicone rubber cassette 3, two cable insulation-piercing metallic link portions 4 and 5, two electrically conductive resilient rubber pads 6 and 7, and two LED light strip insulation-piercing link portions 8 and 9, a metallic nut insert 10 and a flat head machine screw 11. For example, the flat head machine screw 11 can be replaced by a truss head machine screw with a pair of washers (not shown).

Figure 1 further illustrates two insulated cables, for example two insulated stranded cables 44 and 52, and a LED light strip 14.

As can be seen in Figure 1, a LED light strip such as 14 comprises an elongated body, for example an extrusion 15 of insulating material, in particular but not exclusively plastic material. Embedded in the insulating material of the extrusion 15 are two spaced apart, longitudinal, parallel and coplanar metallic ribbon conductors 16 and 17. Also embedded in the insulating material of the extrusion 15 are light emitting diodes (not shown) having their anodes and cathodes respectively connected to the ribbon conductors 16 and 17. Accordingly, the light emitting diodes can be supplied through the ribbon conductors 16 and 17. Usually, the light emitting diodes are evenly distributed along the LED light strip 14. Obviously, the insulating material of the extrusion 15 is at least partially transparent to enable transmission of the light generated by the light emitting diodes (not shown).

Referring to Figures 2 and 3 of the appended drawings, the housing channel 2 comprises a bottom wall 18 and two lateral walls 19 and 20. The housing channel 2 defines a channel cavity defining a generally planar bottom face 21 constituted by the inner face of the bottom wall 18. A pair of longitudinal and parallel grooves 22 and 23 are made in the face 21 to receive respective sections of the two insulated stranded cables 44 and 52, respectively. As shown, the bottom of the grooves 22 and 23 is semicircular in cross section to adapt to the cylindrical shape of the insulated cables 44 and 52. Also, the depth of the grooves 22 and 23 corresponds to the diameter of the insulated stranded cables 44 and 52.

The bottom wall 18 of the housing channel 2 further comprises a central insert-receiving aperture 24. Aperture 24 has a generally rectangular cross section which is longer on the outer side of the bottom wall 18 to define a pair of abutment surfaces 25 and 26 (Figure 2).

The insert 10 is preferably mounted in the aperture 24 to form part of the housing channel 2. More specifically, the insert 10 is configured to fit in the aperture 24 and is inserted in this aperture 24 from the outer side of the bottom wall 18. In particular, the insert 10 includes a pair of end shoulders 27 and 28 structured to rest on the abutment surfaces 25 and 26, respectively. Finally, the insert 10 is formed with a central threaded hole 29 to receive the threaded shank of the screw 11. When the insert 10 is mounted in the aperture 24, the hole 29 is perpendicular to the bottom wall 18. Also, the shoulders 27 and 28 abut against the surfaces 25 and 26, respectively, to resist to the traction force exerted on the insert 10 by tightening of the screw 11.

Of course, it is within the scope of the present invention to provide complementary aperture 24 and insert 10 of various shapes. The shapes of the complementary aperture 24 and insert 19 as illustrated in the appended drawings are given for the purpose of exemplification only.

The distal portion of each lateral wall 19, 20 linearly thickens inwardly to form a wedge-like protuberance 30, 31 (Figures 2 and 3). The function of these wedge-like protuberances 30 and 31 is to clip the LED light strip 14 between the two lateral walls 19 and 20.

The flat silicone rubber cassette 3 (Figure 2) is so dimensioned that its face 98 fits on the generally planar bottom face 21 between the two lateral walls 19 and 20. Cassette 3 has a central hole 32 coaxial with the threaded hole 29 of the insert 10 to enable passage of the screw 11. On the other face 97, the generally flat cassette 3 comprises a pair of parallelepipedic cavities 33 and 34 having respective slit, thin bottom walls 35 and 36. More specifically, the bottom walls 35 and 36 are provided with respective, centered thin slits 35a and 36a parallel to the grooves 22 and 23. When the face 98 of the generally flat rubber cassette 3 is applied to the generally planar bottom face 21, the thin bottom walls 35 and 36 are positioned over the grooves 22 and 23, respectively.

Parallelepipedic cavity 33 further comprises a pair of tabs 101 and 102 on opposite sidewalls of the cavity 33, at the respective ends of the slit 35a. As can be seen, tabs 101 and 102 are spaced apart from the bottom wall 35. Parallelepipedic cavity 34 also comprises a pair of tabs 103 and 104 on opposite sidewalls of the cavity 34, at the respective ends of the slit 36a. Again, tabs 103 and 104 are spaced apart from the bottom wall 36. Tabs 101, 102, 103 and 104 are integrally formed in the sicilone rubber material of the cassette 3.

Referring to Figure 2, the metallic link portion 4, preferably made of copper (although other metals could be used), comprises a channel-shaped base member 37 defining a channel cavity 38 with a generally planar bottom face 39. Opposite to face 39, the metallic link portion 4 comprises a tapered member, more specifically the lance 41 presenting the general configuration of a plate having a tapered thickness

to define a distal insulation-cutting edge 42 passing through the thin slit 35a and piercing the insulation 43 (Figure 1) of the stranded cable 44.

In the same manner, still referring to Figure 2, the metallic link portion 5, preferably made of copper (although other metals could be used), comprises a channel-shaped base member 45 defining a channel cavity 46 with a generally planar bottom face 47. Opposite to face 47, the metallic link portion 5 comprises a tapered member, more specifically a lance 49 presenting the general configuration of a plate having a tapered thickness to define a distal insulation-cutting edge 50 passing through the thin slit 36a and piercing the insulation 51 (Figure 1) of the stranded cable 52.

Just a word to mention that each rubber pad 6, 7 is made from Ja-Bar™ Series 600 Silicone Rubber Product, consisting of monel wires in a silicone rubber matrix. The wires are oriented in the pad so that they run through the thickness and are only exposed at the ends. The wire density is 900 wires per square inch of rubber, and each individual wire is capable or carrying 1/4 A of current.

Referring back to Figure 2, the metallic link portion 8, preferably made of copper (although other metals could be used), comprises a base member 54 presenting the general configuration of a rectangular plate. A tapered member 55 is perpendicular to one face of the base member 54 and is positioned out of center on this base member (see Figure 2). Again, the tapered member 55 presents the general configuration of a plate having a tapered thickness. More specifically, the tapered member 55 has an arrow-shaped cross section to define a distal insulation-cutting

edge 56, and barbs 57 for preventing withdrawal of the tapered member 55 from the insulating material of the extrusion 15. The generally planar face 96 of the base member 54 is destined to be applied to the exposed face of the pad 6.

In the same manner, as illustrated in Figure 2, the metallic link portion 9, preferably made of copper (although other metals could be used), comprises a base member 58 presenting the general configuration of a rectangular plate. A tapered member 59 is perpendicular to one face of the base member 58 and is positioned out of center on this base member (see Figure 2). Again, the tapered member 59 presents the general configuration of a plate having a tapered thickness. More specifically, the tapered member 59 has an arrow-shaped cross section to define a distal insulation-cutting edge 60 and barbs 61 for preventing withdrawal of the tapered member 59 from the insulating material of the extrusion 15. The generally planar face 95 of the base member 58 is destined to be applied to the exposed face of the pad 7.

Finally, a hole 62 (Figure 1) with a taper portion 63 (alternatively a cylindrical portion of larger diameter) is made in the extrusion 15 of insulating material of the LED light strip 14 to receive the flat head machine screw 11 (alternatively the truss head machine screw).

The procedure for installing the insulation-piercing connector 1 in accordance with the present invention will now be described.

Step 1:

The tapered member 55 of link portion 8 is driven into the extrusion 15 of insulating material as shown in Figure 1 to pierce this insulating material and make contact with the copper ribbon 16, the barbs 57 preventing subsequent withdrawal of the tapered member 55 from the extrusion 15. In the same manner, the tapered member 59 of link portion 9 is driven into the extrusion 15 of insulating material as illustrated in Figure 1 to pierce this insulating material and make contact with the copper ribbon 17, the barbs 61 preventing subsequent withdrawal of the tapered member 59 from the extrusion 15. Hole 62 including taper portion 63 (alternatively a cylindrical portion of larger diameter) is made into the extrusion 15 of insulating material. These three operations will be advantageously made simultaneously by means of a specially designed tool (not shown) capable of correctly positioning the link portion 8 and 9 and the hole 62 on the LED light strip 14.

Step 2:

A section of cable 44 is positioned in the groove 22 and a section of cable 52 is positioned in the groove 23.

Step 3:

Face 98 of the generally flat rubber cassette 3 is then placed on the generally planar bottom face 21 of the housing channel 2.

Step 4:

Lance 41 of link portion 4 is inserted through the thin slit 35a of the bottom wall 35 and then driven through the insulation 43 to pierce the insulation 43 and make contact with the stranded cable 44. The base member 37 then seats in the cavity 33 as shown in Figure 1. In the same manner, lance 49 of link portion 5 is inserted through the thin slit 36a of the bottom wall 36 and then driven through the insulation 51 to pierce the insulation 51 and make contact with the stranded cable 52. The base member 45 then seats in the cavity 34 as shown in Figure 1. Again, a specially designed tool (not shown) will facilitate these operations.

Step 5:

The electrically conductive resilient rubber pad 6 is placed on the generally planar bottom face 39 of the channel-shaped base member 37 and is held in place by means of the tabs 101 and 102 formed integrally in the silicone rubber material of the cassette 3. Similarly, the electrically conductive resilient rubber pad 7 is placed on the generally planar bottom face 47 of the channel-shaped base member 45 and is held in place by means of the tabs 103 and 104 formed integrally in the silicone rubber material of the cassette 3.

Step 6:

The LED light strip 14 is clipped between the wedge-like protuberances 30 and 31 of the lateral walls 19 and 20. The face 96 of the base member 54 opposite to the tapered member 55 is then applied to the exposed face of the pad 6.

In the same manner, the face 95 of the base member 58 opposite to the tapered member 59 is then applied to the exposed face of the pad 7.

Step 7:

The flat head machine screw 11 (alternatively the truss head machine screw) is passed through hole 62 in the LED light strip 14 and hole 32 in the generally flat rubber cassette 3 and, finally, is screwed in the threaded hole 29 of the insert 10 and tightened to complete the installation of the LED light strip insulation-piercing connector. The screw 11 and insert 10 will of course fixedly secure the different components of the LED light strip insulation-piercing connector 1 together.

Link portion 4, pad 6 and link portion 8 then forms an electrically conductive link which interconnects the stranded conductor 44 and the copper ribbon 16. In the same manner, link portion 5, pad 7 and link portion 9 forms an electrically conductive link which interconnects the stranded conductor 52 and the metallic ribbon 17.

Also, the housing channel 2, the rubber cassette 3, the insert 10 and the screw 62 forms a housing device which:

- holds the tapered member 55 in contact with the copper ribbon 16 and the tapered member (lance) 41 in contact with the stranded conductor 44 to establish an electrical connection between the stranded conductor 44 and the copper ribbon 16

through the electrically conductive link formed by link portion 4, pad 6 and link portion 8; and

- holds the tapered member 59 in contact with the copper ribbon 17 and the tapered member (lance) 49 in contact with the stranded conductor 52 to establish an electrical connection between the stranded conductor 52 and the copper ribbon 17 through the electrically conductive link formed by the link portion 5, pad 7 and link portion 9.

The resilient, electrically conductive pads 6 and 7 will absorb vibrations to which the insulation-piercing connector 1 will be exposed to, thereby enabling this connector to maintain the electric connections established through the first electrically conductive link (link portion 4, pad 6 and link portion 8) and the second electrically conductive link (link portion 5, pad 7 and link portion 9).

Finally, just a word to mention that it is within the scope of the present invention to use a one piece electrically conductive link comprising the tapered members 41 and 55 instead or the three-piece link formed by link portion 4, pad 6 and link portion 8. It is also within the scope of the present invention to use a one piece electrically conductive link comprising the tapered members 49 and 59 instead or the three-piece link formed by link portion 5, pad 7 and link portion 9.

Although the present invention has been described hereinabove by way of a preferred embodiment thereof, this embodiment

can be modified at will, within the scope of the appended claims, without departing from the spirit and nature of the subject invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. An insulation-piercing connector for electrically interconnecting first and second insulated conductors, comprising:

an electrically conductive link including:

a first tapered member for piercing the insulation of the first conductor and making contact with said first conductor; and

a second tapered member for piercing the insulation of the second conductor and making contact with said second conductor; and

a housing device for holding the first tapered member in contact with the first conductor and the second tapered member in contact with the second conductor to thereby establish an electrical connection between the first and second conductors through the electrically conductive link.

2. An insulation-piercing connector as recited in claim 1, wherein, when said electrical connection between the first and second conductors is established, the first and second tapered members are angularly spaced apart by 180°.

3. An insulation-piercing connector as recited in claim 1, wherein the first and second tapered members comprise respective distal insulation-cutting edges to pierce the insulation of the first and second conductors, respectively, and make contact with said first and second conductors.

4. An insulation-piercing connector as recited in claim 1, wherein the electrically conductive link comprises a first link portion including the first tapered member and a second link portion including the second tapered member, the first and second link portions comprising respective first and second base members through which the first and second contacts connect to each other.

5. An insulation-piercing connector as recited in claim 4, wherein the electrically conductive link further comprises a resilient, electrically conductive pad for interconnecting the first and second base members.

6. An insulation-piercing connector for interconnecting (a) first and second insulated cables and (b) a LED light strip comprising an elongated body of at least partially transparent insulating material, a series of light emitting diodes distributed along the elongated body, and first and second spaced apart longitudinal conductors embedded in said at least partially transparent insulating material for electrically supplying the light emitting diodes, said insulation-piercing connector comprising:

a first electrically conductive link for interconnecting the first cable and the first conductor, including:

a first tapered member for piercing the insulation of the first cable and making contact with said first cable; and

a second tapered member for piercing said at least partially transparent insulating material and making contact with the first conductor;

a second electrically conductive link for interconnecting the second cable and the second conductor, including:

a third tapered member for piercing the insulation of the second cable and making contact with said second cable; and

a fourth tapered member for piercing said at least partially transparent insulating material and making contact with the second conductor; and

a housing device (a) for holding the first tapered member in contact with the first cable and the second tapered member in contact with the first conductor to thereby establish a first electrical connection between the first cable and the first conductor through the first electrically conductive link, and (b) for holding the third tapered member in contact with the second cable and the fourth tapered member in contact with the second conductor to thereby establish a second electrical connection between the second cable and the second conductor through the second electrically conductive link.

7. An insulation-piercing connector as recited in claim 6, wherein:

the first and second tapered members are angularly spaced apart by an angle of 180° when the first electrical connection is established; and

the third and fourth tapered members are angularly spaced apart by an angle of 180° when the second electrical connection is established.

8. An insulation-piercing connector as recited in claim 6, wherein the first, second, third and fourth tapered members each present the general configuration of a plate having a tapered thickness to define a distal insulation-cutting edge.

9. An insulation-piercing connector as recited in claim 6, wherein each of said first and second electrically conductive links comprise:

a first link portion including the tapered member for piercing the cable insulation; and

a second link portion including the tapered member for piercing said at least partially transparent insulating material;

wherein the first and second link portions comprise respective first and second base members through which said first and second link portions connect to each other.

10. An insulation-piercing connector as recited in claim 6, 8 or 9, wherein the second and fourth tapered members each have an arrow-shaped cross section and each have barbs to prevent withdrawal of the second and fourth tapered members from said at least partially transparent insulating material.

11. An insulation-piercing connector as recited in claim 9, wherein:

the first base member is channel-shaped to define a channel cavity with a generally planar bottom face opposite to the tapered member of the first link portion, and a resilient, electrically conductive pad having:

a first face mechanically attached to the generally planar bottom face; and

a second face; and

the second base member has a generally planar face opposite to the tapered member of the second link portion, to rest on the second face of the resilient, electrically conductive pad.

12. An insulation-piercing connector as recited in claim 11, wherein the second base member has the general configuration of a rectangular plate, and wherein the tapered member of the second link portion is perpendicular to the rectangular plate and positioned out of center on said rectangular plate.

13. An insulation-piercing connector as recited in claim 11, wherein the resilient, electrically conductive pad is made of electrically conductive rubber material.

14. An insulation-piercing connector as recited in claim 6, wherein:

- the first electrically conductive link comprises a first link portion including the first tapered member and a second link portion including the second tapered member, the first and second link portions comprising respective first and second base members through which said first and second link portions connect to each other;

- the second electrically conductive link comprises a third link portion including the third tapered member and a fourth link portion including the fourth tapered member, the third and fourth link portions comprising

respective third and fourth base members through which said third and fourth link portions connect to each other; and

- the housing device comprises:

- a housing channel defining a channel cavity with a generally planar bottom face;

- first and second longitudinal grooves in the generally planar bottom face to receive sections of the first and second insulated cables, respectively; and

- a generally flat cassette having:

- a first face applied to the generally planar bottom face of the housing channel after the sections of the first and second insulated cables have been inserted in the first and second longitudinal grooves, respectively; and

- a second face formed with:

- a first cavity with a bottom wall to receive the first base member after the first tapered member has passed through the bottom wall of the first cavity and has pierced the insulation of the first cable to make contact with said first cable; and

- a second cavity with a bottom wall to receive the third base member after the third tapered member has passed through the bottom wall of the second cavity and has pierced the insulation of the second cable to make contact with said second cable.

15. An insulation-piercing connector as recited in claim 14, wherein the housing channel comprises first and second lateral walls having first and second mutually facing inner faces, the first and second

mutually facing inner faces being formed with respective longitudinal and distal thickenings to clip the LED light strip on the second face of the cassette after the second and fourth tapered members have pierced said at least partially transparent insulating material to make contact with the first and second conductors, respectively.

16. An insulation-piercing connector as recited in claim 15, wherein the housing channel comprises a bottom wall, and wherein the housing device further comprises:

an insert-receiving aperture in the bottom wall of the housing channel;

an insert having a threaded hole, said insert fitting in the aperture with the threaded hole perpendicular to the bottom wall of the housing channel;

a first hole made in the elongated body of the LED light strip, and a second hole made in the generally flat cassette, said first and second holes being coaxial with the threaded hole of the insert; and

a screw inserted in the first and second coaxial holes, and then screwed in the threaded hole of the insert.

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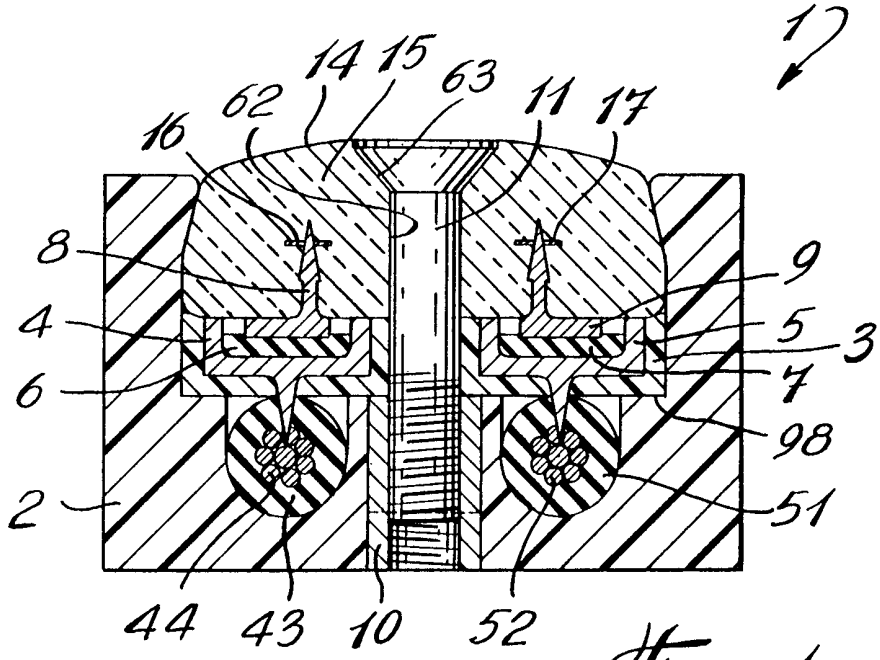
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Fig. 1

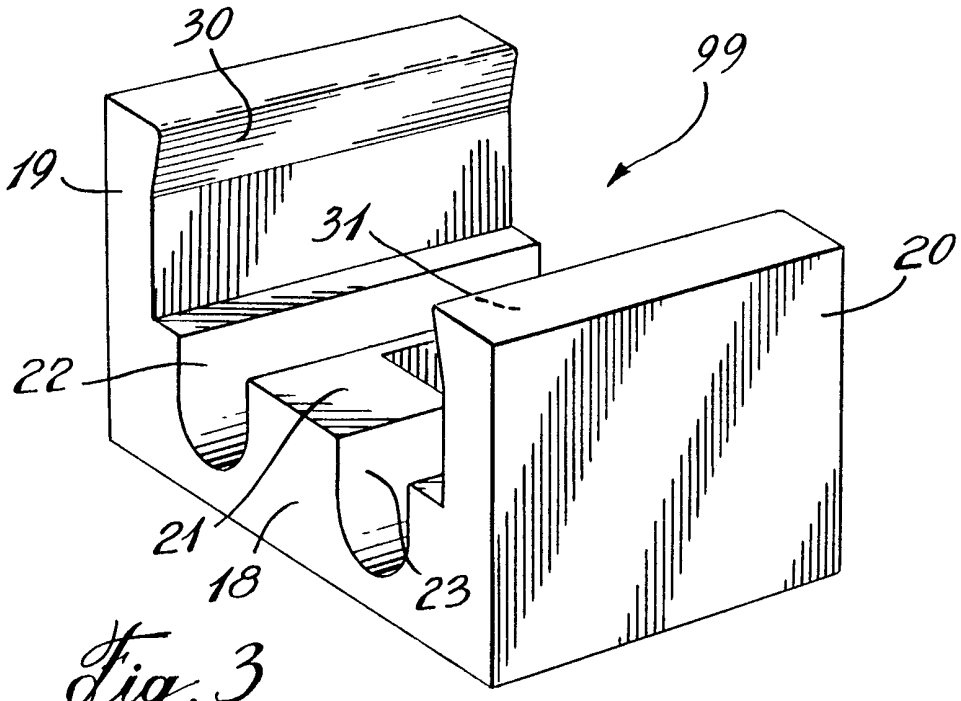
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Fig. 3

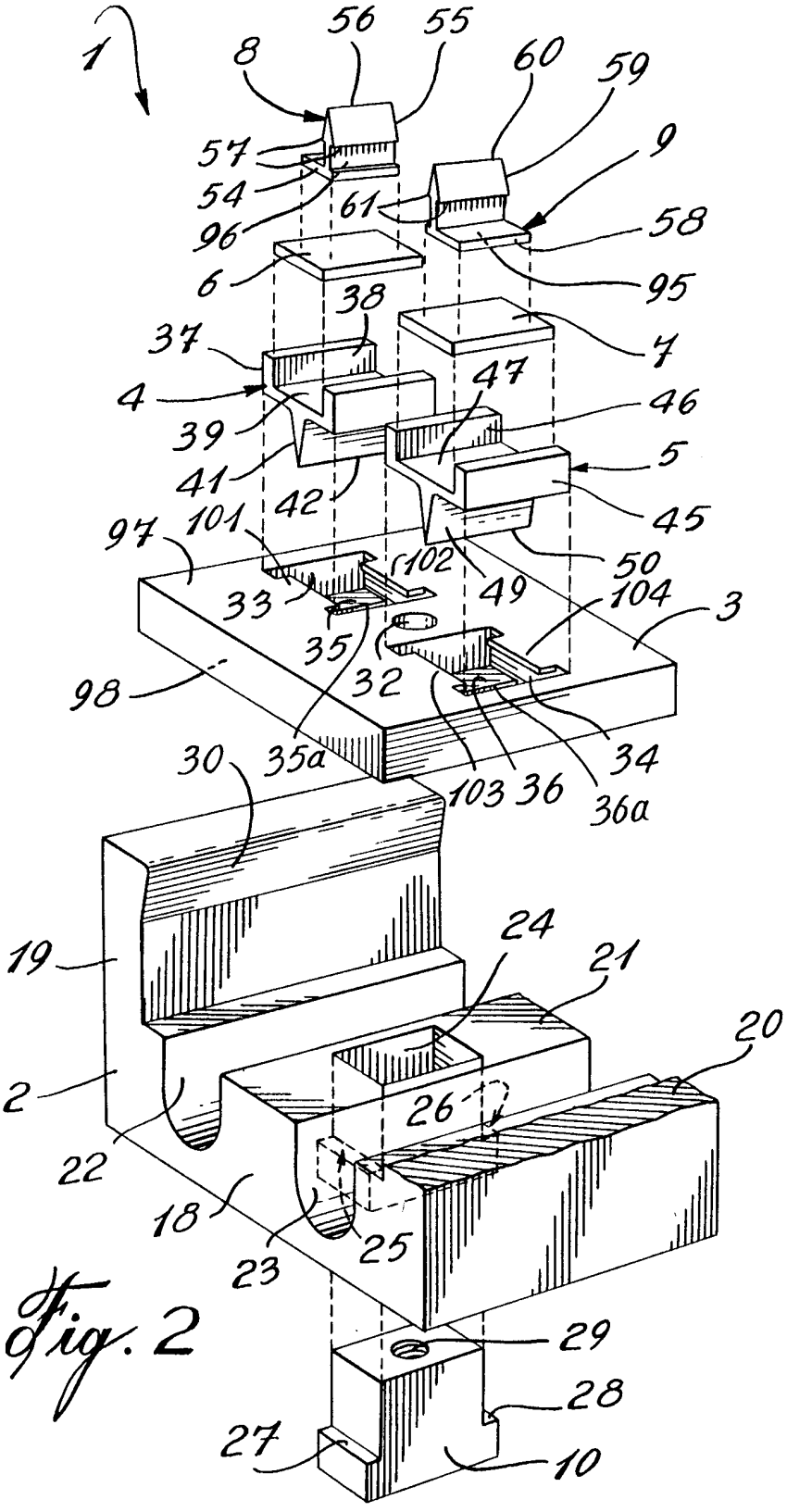
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Fig. 2