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Schinzel

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[54] **COMBINED INSULATING STRIP AND ELECTRICAL CONDUCTOR AND CONDUCTOR SUPPORT ASSEMBLY INCLUDING THE SAME**

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[51] **Int. Cl.** **H01r 9/00;** H02g 5/04; B60m 1/34

[58] **Field of Search** ..... 174/70 C, 72 C, 97, 99 R, 174/99 B, 171; 191/23 R, 23 A, 45 A; 200/51 R, 51.07; 339/14 R, 20, 21 R, 21 S, 22 R, 22 B, 22 T, 23, 24

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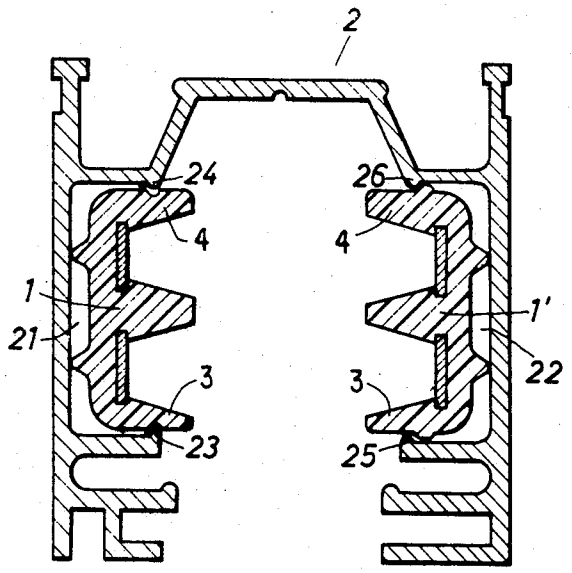
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[57] **ABSTRACT**

An insulating strip which is made of a hard synthetic material and which has longitudinally extending, parallel spaced outer legs and a base interconnecting the legs, supports a longitudinally extending conductor disposed in a receiving channel defined by the legs and the strip base. The reverse face of the base is provided with a longitudinally extending rib. The external face of each outer leg is provided with a longitudinally extending groove or rib which interlocks with rib-like projections on the lateral channel walls of a carrier member into which the insulating strip — with its legs extending outwardly — is inserted.

12 Claims, 3 Drawing Figures



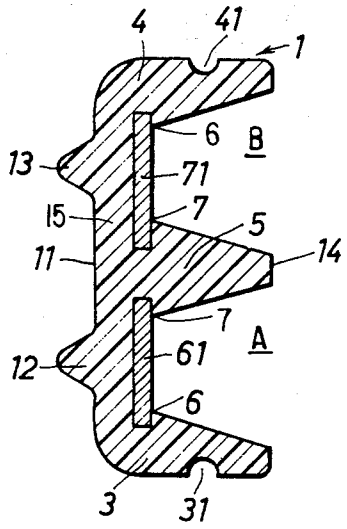


Fig.1

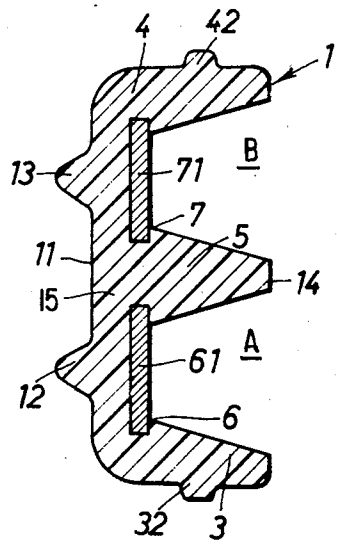


Fig.2

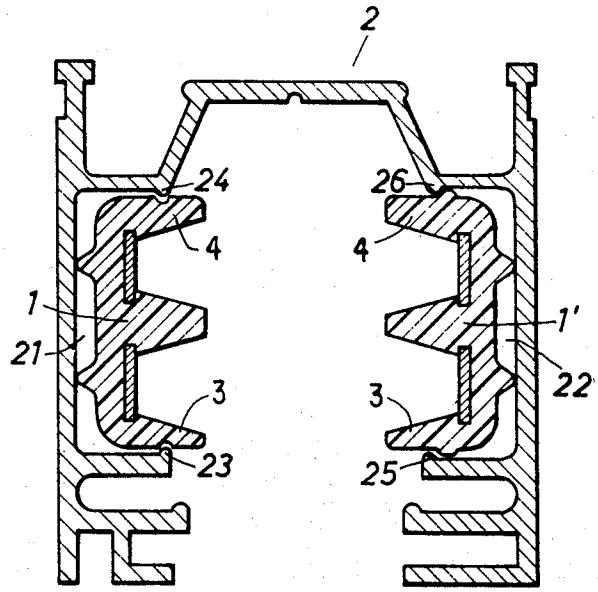


Fig.3

COMBINED INSULATING STRIP AND ELECTRICAL CONDUCTOR AND CONDUCTOR SUPPORT ASSEMBLY INCLUDING THE SAME

BACKGROUND OF THE INVENTION

This invention relates to a flat-section insulating strip made of a hard synthetic material such as hard polyvinyl chloride and supports flat conductors in longitudinally extending receiving channels. The insulating strip is further of the type which is supported laterally from opposite directions by the walls of a holding channel forming part of a carrier member such as a metal carrier rail having a U-shaped cross section.

Flat-section insulating strips of the aforeoutlined type are well known in the art. They find application in current distributor bars which serve for conducting current along walls or ceilings of building structures. A current-consuming device, such as an electric lamp, can be rapidly and easily connected to the distributor bar at any location along its length without major mounting work and without the use of screws, clamps, and the like, by simply inserting an adapter into the insulating strip. The adapter, associated with the current consuming device, has electric contacts which engage the conductors supported in the insulating strip. Such a simple attachment of loads to the current source may find application in museums, art galeries, show windows, warehouses, etc. It is thus a particular advantage of such current distributor bars that at any desired location of the bar, light sources may be attached or their position changed without the use of cords, outlet boxes or similar devices.

Known current distributor bars of the aforeoutlined type are formed generally of a metal carrier rail of U-shaped section which, as noted before, supports the flat-section insulating strips.

The conductors are usually slid longitudinally into grooves arranged immediately adjacent the strip base in the receiving channels provided in the insulating strip. Since, however, particularly in case of substantial conductor and strip lengths, tolerance-related difficulties have been encountered (jamming of the strip, for example), it has already been proposed to insert the conductors in the insulating strips simultaneously with the manufacture of the latter. For such a solution, extrusion processes are adapted, by means of which the conductors are provided at three sides with material which subsequently solidifies to constitute the insulating strip.

In case the insulating strip is made of a hard synthetic material, difficulties are encountered not only when the conductor is to be inserted into the insulating strip, but also when the insulating strip itself is to be inserted into the holding channel of the metal carrier rail (current distributor bar). Thus, tolerances relating both to the manufacture of the generally metal (preferably aluminum) carrier rail and the manufacture of the insulating strips have to be taken into consideration. In order to overcome the tolerance — related difficulties during the fitting-together of the carrier rail and the insulating strip, it has already been proposed to make the insulating strip of a soft synthetic material and to support the same by means of inwardly extending projections in the current distributor bars. Although in such a manner the tolerance-related difficulties may be surmounted to a certain extent, there is, however, introduced the danger that in case of excessive dimensional deviations, the soft synthetic strip deflects inwardly into the zone of the holding channels of the carrier rail and then there will be no sufficient space for properly accommodating the inserted adapter. As a result of such deformations, the contact prongs of the adapter may no longer be capable of engaging the conductor disposed along the base of the insulating strip. These disadvantages detract seriously from the advantages of known current-carrying assemblies described above.

Since a soft insulating strip for the aforeoutlined purpose has been found to be unsatisfactory, the problem of inserting the hard plastic insulating strip into the holding channels of the metallic carrier rails and thus the problem of surmounting the tolerance-related difficulties have further persisted.

SUMMARY OF THE INVENTION

It is an object of the invention to provide an improved flat-section insulating strip made of a hard synthetic material which is easily insertable, even along substantial lengths, into the holding channels of a carrier member such as a metal carrier rail.

This object and others to become apparent as the specification progresses, are accomplished by the invention according to which, briefly stated, the reverse (outer) face of the insulating strip base is provided with a longitudinally extending rib projecting therefrom and the external face of each outer strip leg is provided with a longitudinally extending groove or rib which interlocks with rib-like projections on the lateral walls of a holding channel which forms part of a carrier member and into which the insulating strip — with its legs extending outwardly from the holding channel — is inserted.

It is an advantage of the invention that by virtue of the integral rib on the reverse face of the insulating strip base, the pertinent tolerances are cancelled out, since the rib, in case of too narrow tolerances, is deformable due to the inherent elasticity of the synthetic material. Thus, while in known structures in which the entire reverse face of the strip base engages face-to-face the base of the holding channel of the metal carrier rail, there is a danger of jamming during assembly, such a danger is securely eliminated if the insulating strip is shaped according to the invention.

It is a further advantage of the invention that by virtue of the grooves or ribs provided in the external face of each outer leg it is ensured that when tolerance-related difficulties appear, a tolerance equalization will occur also in the lateral zones of the insulating strip and the holding channel of the carrier member. Thus, these zones will also not inconveniently resist insertion of the insulating strip into the holding channel of the carrier member.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. **1** and **2** are sectional veiws of two embodiments of the invention.

FIG. **3** is a sectional view illustrating the positioning of the two embodiments in a metal carrier rail.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Turning now to FIG. **1**, there is shown an insulating strip **1** of E-shaped section, having outer legs **3** and **4** and a center leg **5**. All of the legs have identical heights and are directly connected with the base **15** of the strip

1. The legs 3, 5 and 4, 5 as well as connecting portions of the strip base 15 define respective receiving channels A and B in the insulating strip 1. On the reverse face 11 of the strip base 15 there are provided two longitudinally extending, parallel, spaced ribs 12, 13 which are arranged centrally with respect to the receiving channels A and B, respectively. This arrangement has the advantage that the insulating strip 1, when the contact pins of the adapter (not shown) press against conductors 61, 71 supported in the strip 1 as it will be discussed later, cannot deform downwardly, since the ribs 12 and 13 oppose such a deformation.

On the external lateral surfaces of the outer legs 3 and 4 there are provided grooves 31 and 41, respectively, into which, as it is shown in FIG. 3, there extend inwardly projecting support ribs 23 and 24 provided in the holding channel 21 of the metal carrier rail 2. The provision of grooves 31 and 41 was found to be expedient when both the insulating strip and the carrier member 2 are manufactured with narrow tolerances.

At the front side of the insulating strip 1, the base 15 and the walls of the outer legs 3 and 4 as well as the base 15 and the walls of the center leg 5 define two pairs of opposed grooves 6 and 7 for receiving edge zones of the conductors 61 and 71, respectively. The inner wall faces of the legs 3 and 4 and both faces of the center leg 5 are arranged obliquely with respect to the base 15 in such a manner that the cross section of all of the legs increases towards the base 15. This outwardly tapering configuration of the cross sections of legs 3, 4 and 5 may be maintained along their entire lengths from the base 15, as shown in the figures. It is feasible, however, to arrange only the outer zones of the inner wall faces of legs 3, 4 and 5 obliquely for guiding the contact pins, in which case the remainder of the inner wall faces of the legs 3, 4 and 5 extend normal to the base 15. The purpose of the oblique arrangement of the leg walls will become apparent as the specification progresses.

An anchoring of the flat conductors 61, 71 in the insulating strip 1 is ensured by designing the width of these conductors and the base-to-base distance of a cooperating groove pair 6, 7 greater than the width of the receiving channels A, B of the insulating strip 1 at their narrowest location. The flat conductors 61 and 71 may be slid into the grooves 6, 7 parallel to the length of the insulating strip 1. Such a procedure, however, requires a relatively high precision in the manufacture of both the insulating strip 1 and the metallic conductors 61, 71 because the latter, subsequent to mounting, should not be displaceable in the grooves 6, 7. It has been found advantageous to make the flat conductors 61, 71 simultaneously with the insulating strip 1 in a sole manufacturing process. In such a case, there is no need for a particular design of the grooves 6, 7 in the insulating strip 1; the flat conductors 61, 71 are surrounded at least from three sides by the flowing synthetic material of the strip and are thus enclosed thereby. Upon completing of this manufacturing process the conductors 61, 71 are immobilized in the solidified strip 1.

Turning now to FIG. 2, the embodiment illustrated therein is similar to that shown in FIG. 1, except that instead of channels 31, 41 there are provided, at the same location, web-like, longitudinally extending projections or ribs 32, 42 which serve for coupling the insulating strip 1' with the metal carrier rail 2. For this purpose, as illustrated in FIG. 3, the holding channel 22 of the metal carrier rail 2 includes retaining ribs 25, 26 which, when the insulating strip 1' is in place, are located beyond the web-like projections 32, 42 and engage that lateral side of the projections 32, 42 which are oriented towards the front 14 of the strip 1'. Similarly to the insulating strip 1, the insulating strip 1' may be slid longitudinally into the holding channel of the metal carrier rail 2. It is, however, also feasible to insert the insulating strip in a direction normal to its length by snapping it into the holding channel of the metal carrier rail 2. The ribs 32, 42 may be designed in such a manner that they support such a snapping-in operation and, subsequent to mounting, they are arranged lockingly behind the holding ribs 25, 26 of the carrier rail 2. The provision of ribs 32, 42 instead of grooves 31, 41 is expedient when the insulating strip and/or the carrier member are manufactured with large or indeterminable tolerances. With the FIG. 2 embodiment it is ensured that it is the terminal faces of the ribs 32, 42 which engage the walls of the holding channel 22, rather than substantial areas of the external faces of the outer legs 3 or 4. Since the ribs 32, 42 may be designed in such a manner that differing tolerances may be compensated in the negative range by deformations of material, no difficulties will be encountered in the lateral wall zones when the insulating strip is inserted into the holding channel of the carrier member. The purpose of the inwardly increasing cross section of the strip legs is that in case the afore-noted negative tolerances reach such an extent that the outer strip legs deform inwardly into the receiving channel, the access to the conductors will not be obstructed. Since the rib-like projections 25, 26 in the holding channel 22 engage the outer strip legs 3, 4 not far from their outer (free) ends, the deformations in the outer strip legs occur in a zone remote from the base 15 and thus the zone close to the base 15 (including the grooves 6, 7) remains unaffected.

In FIG. 3, the insulating strips 1 and 1' designed according to the invention, are shown mounted in the respective holding channels 21, 22 of the metal carrier rail 2. It is seen that the left-hand holding channel 21 of the carrier 2 accommodates an insulating strip 1 according to the FIG. 1 embodiment, whereas the oppositely located right-hand holding channel 22 of the carrier rail 2 holds an insulating strip 1' according to the FIG. 2 embodiment. Although the rib-like projections 23, 24 in the channel 21 substantially correspond to the rib-like projections 25, 26 in the channel 22, the difference in the manner of retaining the two strips 1 and 1' due to the differently configured outer faces of the legs 3 and 4, is well observable in FIG. 3. It is noted that for the sake of clarity the legs 3, 4 are shown slightly out of contact with the carrier member 2. Thus, the insulating strip 1 is held by virtue of the projections 23, 24 extending into the channels 31, 41, respectively, while the insulating strip 1' is held by virtue of the projections 25, 26 protruding behind the projections 32, 42, respectively. It has been found advantageous to have the strip legs 3, 4 and 5 extend outwardly beyond the rib-like projections 23, 24 or 25, 26. In this manner an optimum guidance for the contact prongs of the adapter to be inserted into the insulating strip is ensured.

By virtue of the insulating strip designed according to the invention it is possible to use hard synthetic materials as the strip material and to insert the insulating strip into the holding channel of the metal carrier rail without tolerance related difficulties. The ribs 12, 13 at the

outer reverse face **11** of the strip base **15** further serve for stabilizing and supporting the strip within the holding channel of the metal carrier rail **2.** Also, by virtue of the ribs **12, 13,** less material may be used without thereby introducing disadvantages generally inherent in the reduction of a cross section.

It will be understood that the above description of the present invention is susceptible to various modifications changes and adaptations, and the same are intended to be comprehended within the meaning and range of eqivalents of the appended claims.

I claim:

1. In a conductor support assembly, including:

a carrier member having wall means that define a longitudinally extending holding channel; an insulating strip made of a hard synthetic material and having two longitudinally extending outer legs, a center leg and a base which together give the insulating strip an E-shaped section, the base having a thickness and a reverse face and each outer leg having an external face, each said outer, leg, said center leg, and a portion of the strip base extending therebetween defining a longitudinally extending receiving channel in said insulating strip; and a conductor held in each receiving channel of the insulating strip; the strip being inserted in and coextensively with the holding channel of the carrier member with the legs of the insulating strip oriented outwardly from the holding channel; the improvement comprising in combination:

a. two parallel spaced, longitudinally extending ribs provided on said reverse face of the strip base centrally with respect to the one and the other of said receiving channels, said ribs extending outwardly from said reverse face for increasing said thickness and being oriented toward said wall means of said carrier member;

b. oppositely oriented rib-like projections provided on said wall means of said carrier member and extending away therefrom; and

c. locking means provided on the external face of each said outer leg interlocking with each said rib-like projection and retaining said insulating strip in the holding channel of said carrier member.

2. A conductor support assembly as defined in claim **1,** wherein said locking means provided on the external face of each said outer leg defines a continuous, longitudinally extending groove.

3. A conductor support assembly as defined in claim **1,** wherein said locking means provided on the external face of each said outer leg defines a continuous rib extending away from said external face.

4. A conductor support assembly as defined in claim **1,** wherein said legs of said insulating strip extend outwardly from said holding channel of said carrier member beyond said oppositely oriented rib-like projections provided in said wall means of said carrier member.

5. A conductor support assembly as defined in claim **1,** wherein said outer legs and said center leg have lateral faces that bound the receiving channels in said insulating strip, said lateral faces extending obliquely with respect to said strip base; said outer legs and said center leg having a cross section that increases towards said strip base.

6. A conductor support assembly as defined in claim **5** including means in said insulating strip defining a pair of oppositely oriented, longitudinally extending grooves in each receiving channel of said insulating strip, said grooves being situated immediately adjacent said base and receiving longitudinally edge zones of said conductors.

7. In a conductor support assembly including: a carrier member having wall means that define a longitudinally extending holding channel; an insulating strip made of a hard synthetic material and having parallel spaced outer legs and a base interconnecting the legs, the base having a thickness and a reverse face and the outer legs having an external face, the legs and a portion of the strip base extending therebetween defining a longitudinally extending receiving channel; and a conductor held in the receiving channel of the insulating strip; the strip being inserted in and coextensively with the holding channel of the carrier member with the legs of the insulating strip oriented outwardly from the holding channel; the improvement comprising in combination:

a. a longitudinally extending rib provided on said reverse face centrally with respect to said receiving channel, said rib extending outwardly from said reverse face for increasing said thickness and being oriented toward said wall means of said carrier member;

b. oppositely oriented rib-like projections provided on said wall means of said carrier member and extending away therefrom; and

c. locking means provided on the external face of each said outer leg interlocking with each said rib-like projection and retaining said insulating strip in the holding channel of said carrier member.

8. An assembly as defined in claim **7,** wherein said rib has a narrow crest for engaging said wall means of said carrier member substantially along a line only.

9. In an assembly including a longitudinal, conductor-supporting insulating strip made of a hard synthetic material and having longitudinally extending parallel spaced outer legs and a base interconnecting the legs, the base having a thickness and a reverse face and the outer legs having an external face, the legs and a portion of the strip base extending therebetween defining a longitudinally extending receiving channel; and a conductor held entirely within the receiving channel of the insulating strip, the improvement comprising in combination:

a. a longitudinally extending rib provided on said reverse face centrally with respect to said receiving channel, said rib extending outwardly from said reverse face for increasing said thickness; and

b. locking means provided on the external face of said outer legs for interlocking with lateral rib-like projections of a holding channel in which said insulating strip is insertable.

10. An assembly as defined in claim **9,** wherein said locking means on the external face of each said outer leg defines a continuous, longitudinally extending groove.

11. An assembly as defined in claim **9,** wherein said locking means on the external face of each said outer leg defines a continuous rib extending away from said external face.

12. An assembly as defined in claim **9,** wherein said insulating strip includes a center leg disposed between said outer legs, whereby said insulating strip has an E-shaped section, and said strip defines a longitudinally extending receiving channel between each adjacent pair of legs; and there are a plurality of said longitudinally extending ribs on said reverse face, said ribs being centrally positioned with respect to said receiving channels of said insulating strip.

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