

[54] MODULAR CONDUCTOR SYSTEM

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339/177 R

[51] Int. Cl. H01r 13/60

[58] Field of Search 339/20-24, 221, 339/47-49, 206-210; 285/397; 174/99

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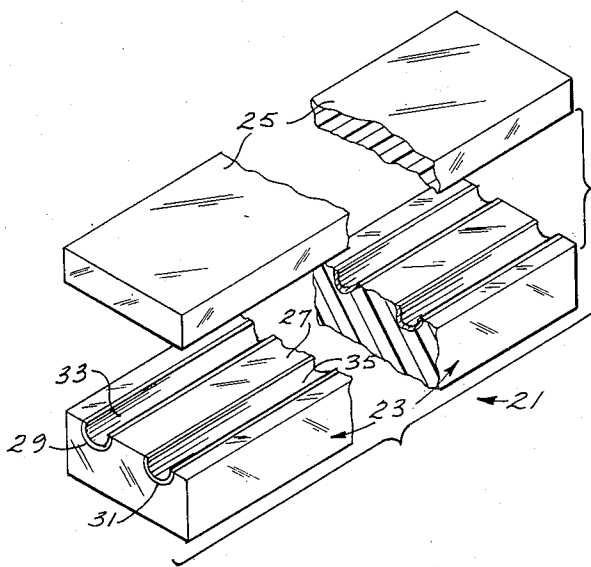
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[57]

ABSTRACT

A modular conductor system for electrical circuit wiring. The system includes a composite insulated conductor assembly having first and second elongate members of substantially homogeneous electrically nonconductive material, each of the members having substantially uniform transverse dimensions and substantially planar ends. The first member includes a plurality of spaced-apart channels each extending lengthwise of the member in a surface thereof. Electrically conductive members, each having a relatively thin substantially uniform cross section fit snugly lengthwise and conform to the surface of corresponding ones of the channels such that the side edges of the conductive members are substantially flush with the surface of the first elongate member. The second elongate member extends the length of the first, and has a surface secured to the surface of the first member in which the channels extend, confining the conductive members in the channels. A space between each of the conductive members and the surface of the second elongate member defines openings at the ends of the composite conductor. Relatively short electrically conductive connector pins are receivable in the openings for joining together a plurality of the composite conductor assemblies in electrically conductive relationship. Each of the connector pins has a cross section conforming to the cross section of the openings at the ends of the joined elongate members, the pins having rough surfaces such that they are tightly gripped in the openings. Various modules may be used with such composite conductor assemblies, e.g., a receptacle module, a switch module, connector modules, and a wiring adaptor module which connects the modular wiring system to wire conductors of a power distribution system.

11 Claims, 17 Drawing Figures



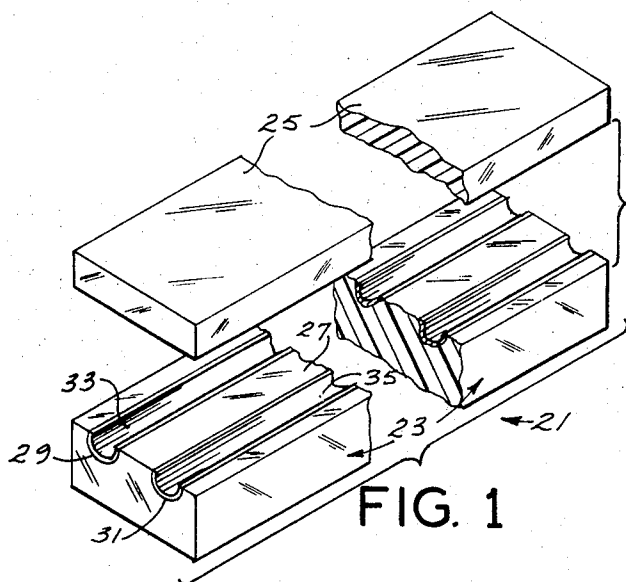


FIG. 1

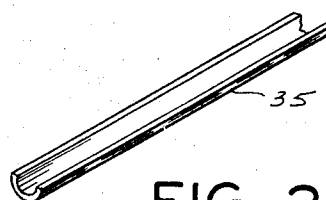


FIG. 2

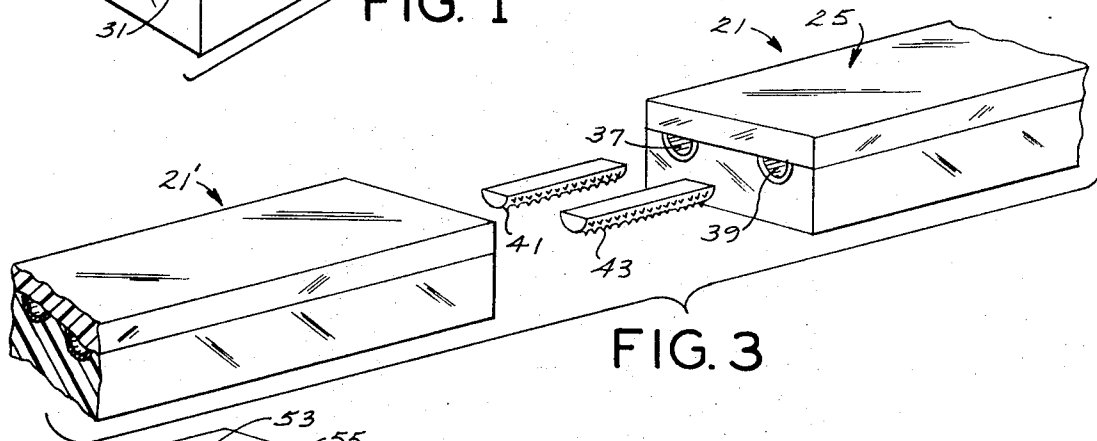


FIG. 3

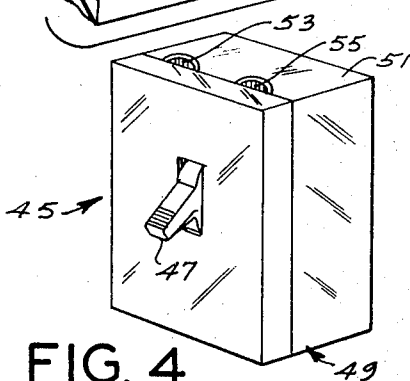


FIG. 4

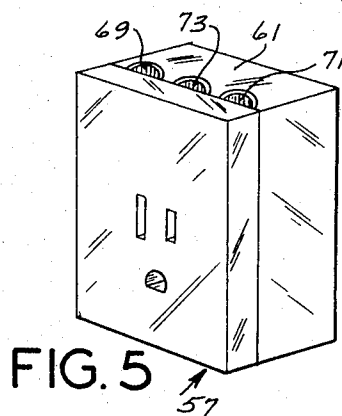


FIG. 5

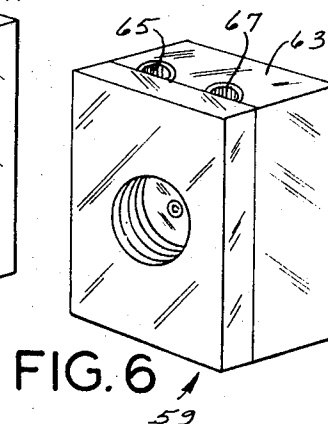


FIG. 6

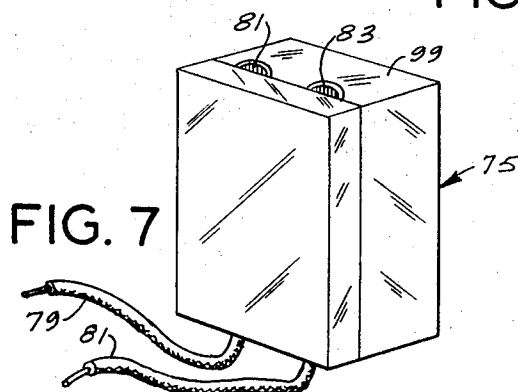


FIG. 7

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FIG. 8

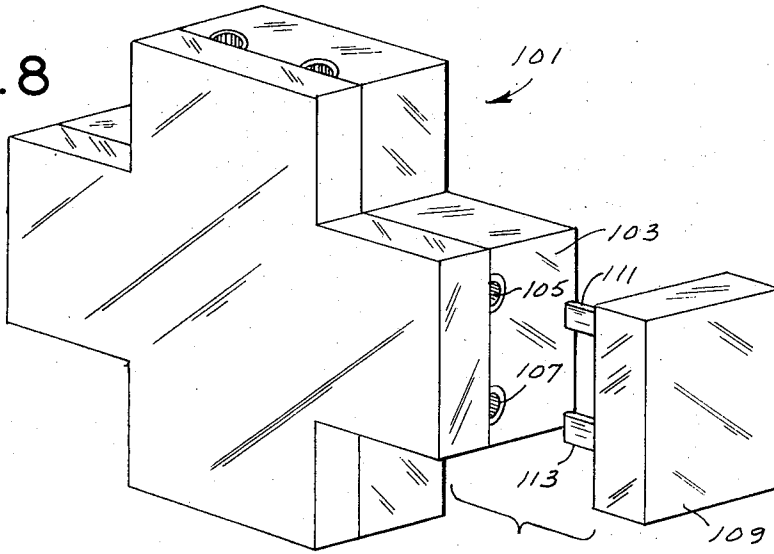


FIG. 9

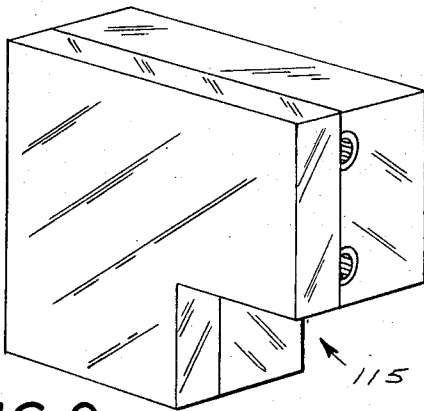


FIG. 10

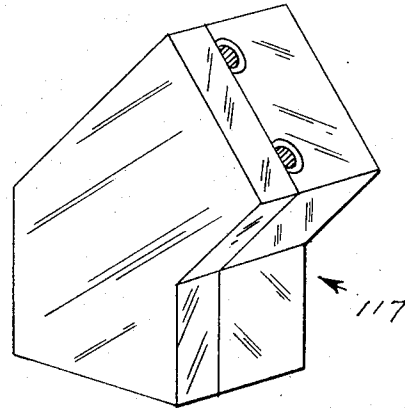


FIG. 11

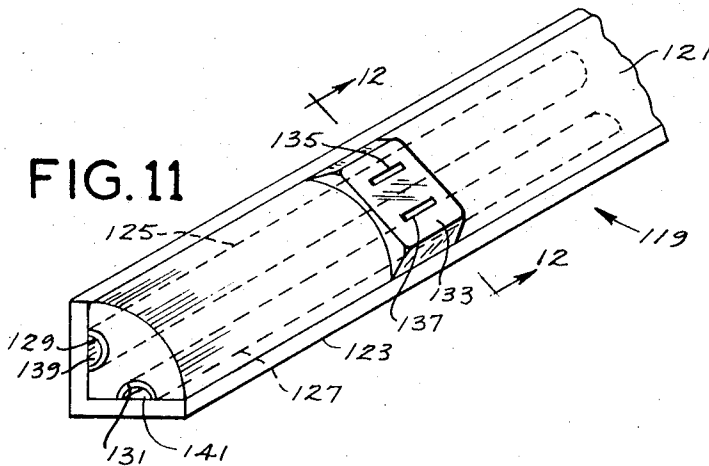


FIG. 12

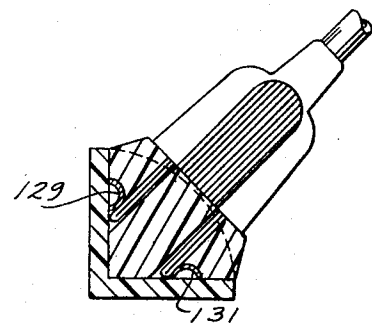


FIG. 13

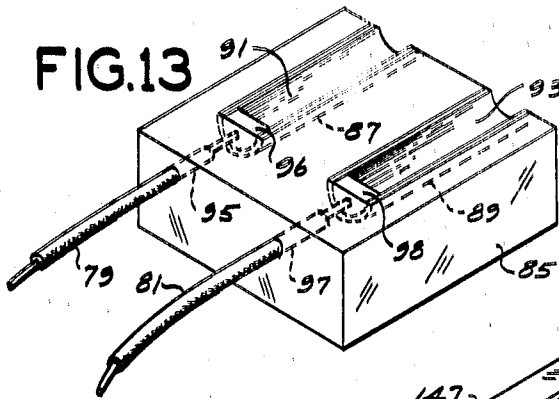


FIG. 14

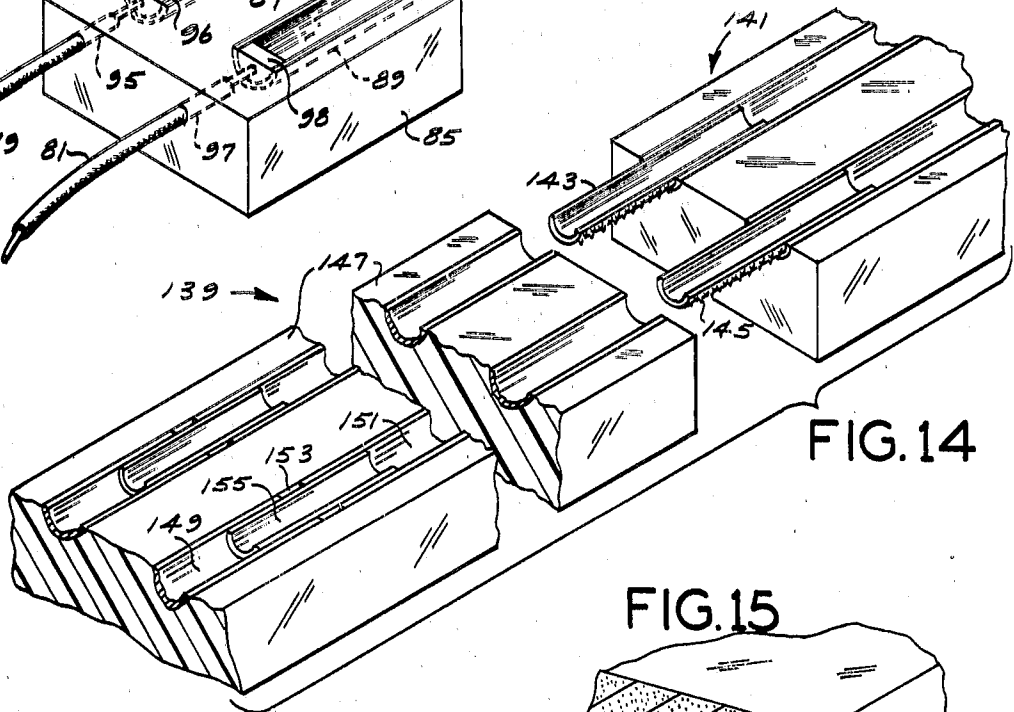


FIG. 15

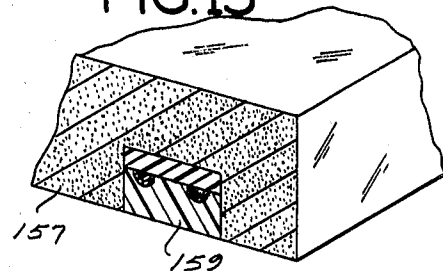


FIG. 16

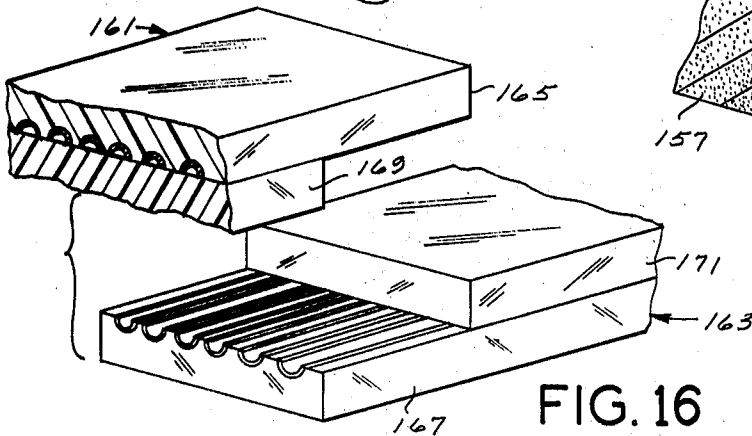
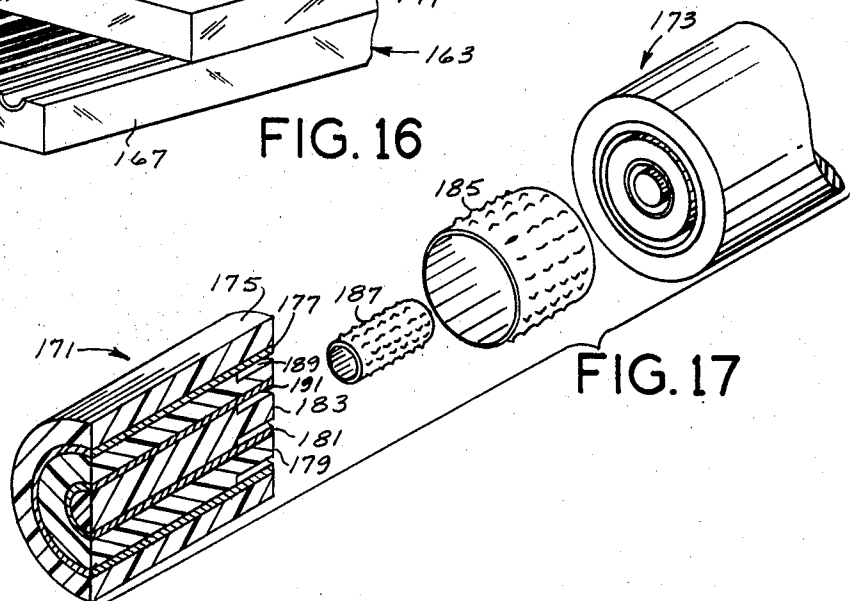


FIG. 17



MODULAR CONDUCTOR SYSTEM

BACKGROUND OF THE INVENTION

This invention relates to electrical circuit wiring systems, and more particularly to a modular conductor system.

For the use of protected electrical circuit wiring, wiring has typically been heretofore carried out by employing metal conduit, armored or sheathed cable, or by enclosing wire conductors in metal molding which may be fastened to a wall or the like with clips, etc. Disadvantages of these wiring materials are that they may be quite heavy, expensive, cumbersome, and time consuming to install and connect. Furthermore, armored or sheathed cable is not self-supporting, and thus requires the use of regularly spaced supports such as staples when running lengths of the cable. Much of the difficulty in using wiring of this type is that the individual wires which are common to each of these approaches must be individually cut to length, bared or stripped of its insulation, and then individually connected, all of which is quite time consuming and thus expensive.

SUMMARY OF THE INVENTION

Among the several objects of the present invention may be noted the provision of a modular conductor system for electrical circuit wiring employing composite self-supported insulated conductor assemblies; the provision of such a system wherein the insulated conductor assemblies are quickly and easily installed and connected; and the provision of such a system wherein a conductor assembly is light in weight, and is easily and inexpensively constructed. Other objects and features will be in part apparent and in part pointed out hereinafter.

Briefly, the invention contemplates a modular conductor system for electrical circuit wiring utilizing assemblies each constituted by a composite insulated conductor. Such an insulated conductor assembly comprises a first elongate member of substantially homogeneous electrically nonconductive material having substantially uniform transverse dimensions and substantially planar ends. A plurality of spaced-apart channels each extending lengthwise of the member are provided in a surface thereof. A plurality of electrically conductive members, each having a relatively thin, substantially uniform cross section, fit snugly lengthwise into corresponding ones of the channels, each conforming to the surface of its corresponding channel. Each of the conductive members has side edges substantially flush with the surface in which the channel extends. A second elongate member, also of substantially homogeneous electrically nonconductive material, extends the length of the first elongate member and also has substantially planar ends coinciding with the ends of the first elongate member. A surface in this second member is secured, as by bonding, to the surface of the first member in which the channels extend, thus confining the conductive members in the channels. Thus there is a space between each of the conductive members and the overlying surface of the second elongate member. This space defines openings at the ends of the composite conductor. A plurality of relatively short electrically conductive connector pins are receivable in the openings for joining together a plurality of the composite conductors in electrically conductive relationship. These pins each have a cross section conforming to the cross section of the openings and have rough surfaces so that they are tightly gripped in the openings. The invention further contemplates a plurality of modules which may be electrically interconnected by means of the composite conductor assemblies or to which power may be provided by the assemblies. Such modules may include a switch module, receptacle modules, connector modules, and a wiring adaptor module for interconnecting the system with conventional electrical wire conductors of a power distribution system.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded perspective view of a composite conductor assembly of the modular conductor system of the invention;

FIG. 2 is a perspective of an electrically conductive member which is part of the insulated conductor assembly of FIG. 1;

FIG. 3 is a perspective of portions of a pair of individual composite conductor assemblies and electrically conductive connector pins receivable in openings of the assemblies for joining the assemblies together in electrically conductive relationship;

FIGS. 4-7 are perspectives of a switch module, a plug receptacle, a screw-type receptacle, and a wiring adaptor module, respectively, of the modular conductor system of this invention;

FIGS. 8-10 are respective perspectives of three types of connector modules of the invention;

FIG. 11 is a perspective of a second type of composite conductor assembly utilized in a system of the invention;

FIG. 12 is a transverse section of the conductor assembly of FIG. 11, taken along line 12-12;

FIG. 13 is a perspective of a portion of the wiring adaptor of FIG. 7;

FIG. 14 is a perspective of portions of two composite conductor assemblies, one of the assemblies being provided with certain thermal expansion compensating structure for thermal expansion, the conductor assemblies being shown with a second type of electrically conductive connector pins for electrically interconnecting the assemblies;

FIG. 15 is a section, in perspective, illustrating the provision of a composite conductor assembly of the invention within a piece of composite flooring material;

FIG. 16 is an exploded perspective of end portions of a pair of composite conductor assemblies of the invention which are adapted for being connected together in lap joint configuration; and

FIG. 17 is an exploded assembly of end portions of two coaxial cable assemblies utilizing principles of the present invention, one of the assemblies being shown in section, and illustrating connector sleeves for electrically interconnecting the conductor assemblies.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, and more particularly, to FIGS. 1-3, illustrated generally at 21 is a self-supporting insulated composite conductor of the present invention which is depicted as an exploded assembly. The conductor assembly is constituted by elongate lower and upper electrically nonconductive members designated generally 23 and 25, respectively. As may be seen, members 23 and 25 are of rectangular cross section, although other types of cross sections may be used. Members 23 and 25 have substantially parallel planar ends, the ends of the two members being coincident and perpendicular to the longitudinal axis of the assembly. This construction permits a plurality of the conductor assemblies to be connected in end-to-end relationship and also permits interconnection of one of the assemblies with certain modules of the system which are described hereinbelow.

Preferably, nonconductive members 23 and 25 are of a substantially homogeneous, substantially nonrigid synthetic resin material. For example, a semiflexible material such as polystyrene may be utilized, or a more flexible material such as polyethylene may be employed. Lower member 23 includes a plurality of spaced-apart channels of arcuate form in a surface 27 thereof, each extending lengthwise of member 23. Two such channels 29 and 31, of generally semicircular form, are illustrated.

Electrically conductive members or strips 33 and 35, preferably of aluminum, a highly ductile metal, or a suitable alloy thereof, fit snugly lengthwise into corresponding ones of

channels 29 and 31. While aluminum is preferred, other ductile metals having high electrical conductivity, such as copper or alloys thereof may be employed. To facilitate construction, aluminum may be extruded into the channels, for example. Conductive members 33 and 35 have a relatively thin substantially uniform arcuate cross section conforming to that of the channels and have side edges substantially flush with surface 27. As is apparent the conductive members 33 and 35 are of the same cross-sectional shape throughout the length of the channels. A length of conductive member 35 is shown in FIG. 2.

In the assembled form of conductor assembly 21, upper nonconductive member 25 has its bottom surface secured to surface 27 of member 23, such as by bonding with epoxy, providing a secure face-to-face relationship which confines conductive members 33 and 35 in channels 29 and 31, respectively. This assembled condition is depicted in FIG. 3 wherein it may be observed that, because of the arcuate form of conductive members 33 and 35, there is a space between each of these conductive members and the bottom surface of overlying nonconductive member 25. The resultant spaces define openings such as designated at 37 and 39 at the ends of the composite conductor assembly.

End portions of two identical assemblies are depicted in FIG. 3, the assembly viewed to the left side being designated 21'. Each of openings 37 and 39 at the end of assembly 21 has a straight side defined by the bottom surface of member 25 and an arcuate side defined by the interior surface of the respective conductive member 33 or 35. Since these openings permit conductive members or strips 33 and 35 to be exposed to air, these members are preferably coated with a suitable non-petroleum antioxidant to prevent corrosion or the like.

The composite conductor assembly thus described may be of a suitable length such as 2, 4 and 8 feet, etc., in order to facilitate electrical circuit wiring by means of convenient lengths. Such lengths or other specific lengths of the composite assembly may be provided by sawing, noting that the preferred plastic and aluminum construction readily facilitates sawing. While the use of a substantially non-rigid material for the upper and lower non-conductive members permits the bending or similar deformation, the assembly is substantially self-supporting in the sense that reasonable lengths thereof do not sag or droop appreciably and thus, like conventional conduit, the lengths need only be supported at relatively distant intervals, e.g., up to several feet. Nonetheless, the lengths can be used in non-linear installations such as on curving walls.

To permit joining together of a plurality of the composite conductors, relatively short (e.g., of the order of an inch or two in length) electrically conductive connector pins, such as indicated at 41 and 43, are provided, which are receivable in the openings (such as openings 37 and 39) at the ends of the composite conductors. For this purpose, the connector pins have a semicircular cross section substantially identical with, and thus conforming to, the cross section of the openings. In addition, the pins are provided with rough surfaces to cause the pins to be tightly gripped in contact with the conductive members in the openings. The rough surfaces of the connector pins may be provided by knurling or scoring.

To join together a pair of the composite conductors, the connector pins may be inserted in the openings in one of the composite conductors to a distance of about half the length of the pins, and then the other composite conductor may be forced onto the pins. To insure centering of the pins with respect to a pair of composite conductors, i.e., so that equal length portions of the pins extend into the openings at the ends of the composite conductors, the connector pins may have a slightly greater thickness at their midpoints than at their ends, providing a slight taper from the middle portion of the pins toward their ends.

Thus, lengths of composite conductors may be joined together as depicted in FIG. 3 to provide an electrical circuit wiring system in residences and other structures. In such a system, the invention contemplates the use of various modules

which may be electrically interconnected by means of the conductor assemblies or to which power may be supplied by the assemblies.

FIG. 4 illustrates a switch module which may be used in a system of the present invention, designated generally 45. Module 45 includes simply a switch 47 in a suitable enclosure indicated generally 49. This enclosure may, if desired, be constructed of synthetic resin upper and lower members, such as employed for the composite conductor assemblies. Whatever construction is employed, enclosure 49 includes at least one planar surface 51 having a pair of openings 53 and 55 aligned with corresponding openings, such as 37 and 39 in FIG. 3, at the end of the composite conductor assembly, these openings 53 and 55 being adapted to receive the above described connector pins for joining the switch module to a composite conductor in electrically conductive relationship. For this purpose, the cross section of openings 53 and 55 is preferably the same as that of the openings at the ends of a composite conductor. It should be understood that switch 47 may be constituted by a circuit breaker. Of course, further openings besides openings 53 and 55 may be provided in enclosure 49 if desired to permit composite conductors to be connected from opposite sides of the switch enclosure, for example.

Similar modules are illustrated in FIGS. 5 and 6. FIG. 5 depicts a plug receptacle module, designated generally 57, and FIG. 6 shows a screw-type receptacle module, designated generally 59. The construction of these modules may be like that of switch module 45. For example, the same type of construction may be used as for the composite conductor assemblies. Each of modules 57 and 59 has a receptacle within an enclosure including at least one planar surface of electrically nonconductive material such as shown at 61 and 63, respectively, having openings aligned with corresponding openings of a composite conductor. These openings are adapted to receive the previously described connector pins and thus preferably have a cross section identical with that of the openings at the end of the composite conductor.

Module 59 (which may receive a fuse or a light bulb, etc.) includes a pair of such openings 65 and 67 identical with openings in surface 63 for joining the module to a composite conductor in electrically conductive relationship. Similarly, module 57 includes a pair of such openings 69 and 71 and in addition includes a third opening 73 for connecting a ground conductor, noting that module 57 is shown as being of the type for receiving a grounded plug. It should be here understood that a composite conductor of the invention may have three conductive members (or more), two outer ones being used for a circuit connection and a middle or inner one being used to provide a circuit ground, such as has typically been used in residential wiring in recent years.

FIG. 7 illustrates a wiring adapter module, indicated generally 75. Module 75 includes an enclosure indicated generally 77, including means, such as a pair of leads 79 and 81, for providing interconnection with the usual wire conductors of a power distribution system. Enclosure 77 is of any suitable construction but in any case, includes at least one planar surface 79 of electrically nonconductive material having a pair of openings 81 and 83 identical with those of the previously described modules and which align with corresponding openings at one end of a composite conductor so as to receive connector pins for electrically connecting the conductive members of a composite conductor to the wire conductors of a power distribution system.

One preferred construction of wiring adapter module 75 is illustrated in FIG. 13. Enclosure 75 (FIG. 7) is shown in FIG. 13 as having a lower member 85, of synthetic resin material there being an upper member not shown in FIG. 13 which also is preferably synthetic resin material and has a rectangular cross section, the upper member being otherwise identical to a length of an upper member of a composite conductor of the invention. Member 85 also is substantially identical with a length of a lower member of a composite conductor. Member 85 is provided with a pair of spaced-apart channels 87 and 89

extending lengthwise of the member but terminating short of one end of the member, unlike the composite conductor construction. A pair of electrically conductive strip members 91 and 93 like those described previously fit snugly into channels 87 and 89 respectively. The pair of leads 79 and 81 extend through respective holes 95 and 97 at the latter end of member 85 and terminate in suitable conductive fittings 96 and 98 respectively, which are secured in electrically conductive relationship as by soldering, etc. to members 91 and 93. As in the construction of a composite conductor of the invention the upper member corresponding to lower member 85 is suitably bonded or secured to the latter to securely retain strip members 91 and 93 in the channels.

The invention contemplates the use of various connector modules such as illustrated in FIGS. 8-10 for the purpose of connecting together a plurality of composite conductors and for providing for the installation of lengths of the composite conductors at various angles with respect to the different lengths, as may be required for corners and irregular shapes.

FIG. 8 depicts a connector module, indicated generally at 101, for providing a four-way junction of composite conductors, there being four planar surfaces such as surface 103 which are of electrically nonconductive material each having openings such as 105 and 107 aligned with openings of a composite conductor to permit the receiving of the conductor pins to provide for joining a plurality of composite conductors in electrically conductive relationship. The construction used for module 101 is preferably similar to that employed for the composite conductors.

In the use of a junction connector such as that represented by module 101, it will be seen that, if a construction is used which is like that of the composite conductors, the conductive members which extend to the edges of openings such as 105 and 107 will be exposed, providing a potential shock hazard if a composite conductor is not connected at that location. To prevent this shock hazard, a plug 109 of electrically nonconducting material, e.g., polystyrene, may be employed if a composite conductor is not to be connected at openings 105 and 107. Plug 109 has integral pins or prongs 111 and 113 which fit into the exposed openings, e.g., openings 105 and 107, thereby preventing inadvertent touching of any exposed electrically live members.

Connector modules for providing for joining composite conductors at 90° and 45° angles, for example, are the subjects of FIGS. 9 and 10, and are designated generally 115 and 117, respectively. Preferably their construction is similar to module 101 and to the composite conductors. Other types of modules for different angles, for providing offsets, etc. are also possible and the constructions shown in FIGS. 8-10 are shown merely by way of example.

FIGS. 11 and 12 are illustrative of another embodiment of a composite conductor assembly of the invention and one which is particularly useful for being used along walls or the like similar to conventional quarter-round molding. The assembly, designated generally 119, includes upper and lower members 121 and 123, respectively, of substantially homogeneous electrically nonconductive material, e.g., polystyrene or polyethylene, having substantially uniform transverse dimensions. While only a portion of the length of such a composite conductor is shown, it will be seen that, as in the previously described form, members 121 and 123 have substantially parallel planar ends. Suitable lengths, e.g., 2, 4 or 8 feet, etc. may be constructed in this form.

Member 121 includes a pair of spaced-apart arcuate channels 125 and 127 extending lengthwise of the member in which extend electrically conductive members 129 and 131, respectively. The latter are preferably of aluminum and are otherwise substantially identical with their counterparts employed in the previously described composite conductor embodiment. These conductive members are fitted snugly into their respective channels with their side edges substantially flush with the interior surface of member 121 and are thus securely held in position by member 123 when the latter is secured to member 121.

Composite conductor 119 is shown including a plug receptacle 133 which may be molded into member 121 to provide a pair of openings 135 and 137 for receiving the prongs of a conventional plug. As illustrated in FIG. 12, openings 131 and 133 extend in parallel relationship through member 121 to permit prongs of a plug to engage conductive members 129 and 131.

Lengths of the above-described composite conductor may be joined together by means of connector pins such as those previously described by inserting the pins into the openings, such as openings 139 and 141, at the ends of the composite conductor.

FIG. 14 illustrates additional features of the invention in depicting two lengths of composite conductors designated generally 139 and 141. The upper nonconductive members of assemblies 139 and 141 are not shown but are identical with corresponding parts shown in FIGS. 1 and 3. The left side assembly 139 (shown in broken section) is viewed as in position for being joined to assembly 141 by means of connector pins of a form different from that previously described. As may be seen, the connector pins, designated 143 and 145, are of relatively thin substantially uniform cross section and are arcuate in form, as compared with the semicylindrical cross section of the corresponding pins 41 and 43 of FIG. 3. However, like the latter, pins 143 and 145 have a cross section corresponding to the cross section of the openings at the ends of a composite conductor so as to be received and tightly gripped by these openings. Aside from their thin cross section, pins 143 and 145 are substantially identical with the connector pins 41 and 43 of FIG. 3.

The left-most section of assembly 139 includes a thermal expansion feature of the invention which may be desired if long lengths of composite conductors are employed in a location where extremes in temperature may cause significant changes in the length of the conductive members of a composite conductor. This particular section of assembly 139 has a lower member 147 in which conductive members such as those designated 149 and 151 are disposed end-to-end within the channels to provide expansion gaps, such as gap 153, between the adjacent ends of the conductive members. Each pair of the adjacent ends is bridged by a further conductive member, such as member 155, overlapping a marginal portion of each of the adjacent ends. Member 155 has a relatively thin uniform cross section and fits snugly lengthwise into the space between the conductive members 149 and 151 and the flat surface of the upper member (not shown). As is apparent, the side edges of member 155 are substantially flush with those of members 149 and 151 and thus also with the channeled surface of nonconductive lower member 147. The expansion gap allows for any changes in length of the principal conductive members so that they do not cause undue thermal stress in the composite conductor.

FIG. 15 illustrates an advantage of the invention in showing in section a piece of composition flooring material 157 having a channel of rectangular cross section in the underside thereof of depth and width substantially the same as those of a composite conductor of the invention. A composite conductor 159 is shown fitted into the channel. In this way lengths of the composite conductors are conveniently installed beneath a floor.

FIG. 16 depicts composite conductors of the invention, designated 161 and 163 generally, providing a half-lap configuration for joining the composite conductors together. Each of the composite conductors 161 and 163 is seen to have a respective first half member 165, 167 with planar ends and having six conductive members or strips (such as previously described) positioned in arcuate channels in a surface thereof. Each composite conductor has a respective second half member 169, 171 which overlies the conductive members and is joined to the first half member but which terminates short of the end of the respective first half member 165, 167 to provide exposed terminal portions of the conductive members. As is apparent, the composite conductors 161 and 163 are oppositely oriented so that when placed together, the exposed

portions of conductive members of composite conductor 161 come into electrical contact with the exposed portions of corresponding ones of the conductive members of composite conductor 163. The composite conductors may then be suitably clamped, etc., to provide a strong half-lap connection having good electrical characteristics.

The principles of the invention may be applied in the manufacture composite coaxial conductor assemblies configured as shown in FIG. 17. Terminal portions of lengths of such coaxial assemblies are indicated generally 171 and 173. Portion 171 is shown in section and includes an electrically nonconductive cylindrical outer shell 175 of a suitable synthetic resin material which may be semiflexible and, as in the previously described embodiment, is a substantially homogeneous material. Positioned snugly within outer shell 175 is a first relatively thin tubular outer conductor 177 of electrically conductive material (which may be of aluminum or an alloy thereof, for example). A cylindrical inner shell 179 is positioned within conductor 177 and is preferably of the same nonconductive material as shell 175. A thin tubular inner conductor 181 is snugly positioned within inner shell 179. Conductor 181 may also be of aluminum, for example. Snugly positioned within conductor 181 and fitting the bore thereof, is a core 184 also preferably of the same nonconductive material as shell 175.

The lengths of coaxial conductor assembly are joined together in electrically conductive relationship by a pair of thin conductive connector sleeves 185 and 187, each having a rough outer surface, as illustrated, such as may be provided by burring, scoring or knurling, et cetera. Connector sleeves 185 and 187 may be of the same type of metal or conductive material as conductors 177 and 181. To permit electrical interconnection of the latter conductors of the lengths of coaxial assemblies, the inner sleeve and the core each has a recess of a depth sufficient to permit receiving at least half the length of a respective one of the conductor sleeves so that the sleeve is in electrical contact with the respective conductor of the coaxial assembly. For example, in assembly 171 inner shell 179 includes a concentric recess 189 adjacent conductor 177 for receiving connector sleeve 185 and core 183 includes a concentric recess 191 adjacent conductor 181 for receiving sleeve 185. Identical recesses are provided at the opposite end of assembly 171 corresponding with the illustrated end of assembly 173. The corresponding recesses and sleeves are of substantially identical cross-section as is apparent.

There are identical recesses in assembly 173, as shown, and thus the two lengths of coaxial conductor assembly are readily interconnected in electrically conductive relationship by means of the sleeves, the respective diameters of the latter being such as to cause their rough outer surfaces to be tightly received in these recesses. To minimize deleterious effects of the sleeves upon the transmission characteristics of the coaxial assembly at radio frequencies the sleeves may be quite thin, or their length and thickness may be taken into account using conventional transmission line considerations. By utilizing a substantially nonrigid material for outer shell 175, inner shell 179, and core 183, limited bending of the composite assembly is advantageously permitted yet the assembly is substantially self-supporting.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. In a modular conductor system for electrical circuit wiring, an assembly constituting a composite insulated conductor comprising:

a first elongate member of substantially homogeneous electrically nonconductive material, said member having sub-

stantially uniform transverse dimensions and substantially planar ends, said member having a plurality of spaced-apart channels of arcuate form each extending lengthwise of said member in a surface thereof;

a plurality of electrically conductive members, each having a relatively thin substantially uniform cross section of arcuate form, each fitting snugly lengthwise into a corresponding one of said channels and conforming to the surface of the corresponding channel, said conductive members being of the same cross-sectional shape throughout the length of said channels and having side edges substantially flush with the surface of said elongate member in which surface said channels extend, said conductive members extending substantially to the ends of said first elongate member;

a second elongate member of substantially homogeneous electrically nonconductive material extending the length of said first elongate member and having substantially planar ends coinciding with the ends of said first elongate member and a surface secured to the surface of said first elongate member in which said channels extend for confining said conductive members in said channels, there being a space between each of said conductive members and said surface of said second elongate member which space defines openings at the ends of said composite conductor, said openings each having a straight side and an arcuate side; and

a plurality of relatively short electrically conductive connector pins receivable in said openings for joining together a plurality of composite conductors in electrically conductive relationship, said pins each having a cross section conforming to the cross section of each of said openings, said pins each having rough surfaces to be tightly gripped in contact with said conductive members in said openings.

2. In a modular conductor system as set forth in claim 1, said conductive members comprising a ductile metal.

3. In a modular conductive system as set forth in claim 2, said conductive members comprising aluminum.

4. In a modular conductor system as set forth in claim 1, the cross section of each of said pins being substantially identical with the cross section of each of said openings.

5. In a modular conductor system as set forth in claim 1, the cross section of said pins being relatively thin and substantially uniform.

6. In a modular conductor system as set forth in claim 1, said first and second elongate members comprising a substantially nonrigid material.

7. In a modular conductor system as set forth in claim 1, there being a plurality of said conductive members disposed end-to-end in each of said channels providing an expansion gap between adjacent ends of said conductive members in each channel, each pair of said adjacent ends being bridged by a further conductive member overlapping a marginal portion of each of said adjacent ends, having a relatively thin substantially uniform cross section of arcuate form, and fitting snugly lengthwise into the space between the first said conductive members and the flat surface of said second elongate member, the side edges of said further member being substantially flush with said surface in which said channels extend, whereby thermal expansion of the first said conductive members does not cause undue thermal stress in said composite conductor.

8. In a modular conductor system as set forth in claim 1, a switch module comprising electrical switch means in an enclosure, said enclosure having at least one planar surface of electrically nonconductive material, said surface having a plurality of openings aligned with corresponding openings at one end of said composite conductor and adapted to receive said pins for joining said switch module to said composite conductor in electrically conductive relationship.

9. In a modular conductor system as set forth in claim 1, a receptacle module comprising a receptacle in an enclosure, said enclosure having at least one planar surface of electrically

nonconductive material, said surface having a plurality of openings which align with corresponding openings at one end of said composite conductor and which receive said pins for joining said receptacle module to said composite conductor in electrically conductive relationship.

10. In a modular conductor system as set forth in claim 1, a connector module for connecting together a plurality of the composite conductors, said module having a plurality of planar surfaces each of which includes a plurality of openings which align with corresponding ones of openings at an end of one of the plurality of composite conductors and which receive said pins for joining the plurality of composite conductors in electrically conductive relationship.

11. In a modular conductor system as set forth in claim 1, a wiring adapter module comprising an enclosure including means for providing interconnection with wire conductors of a power distribution system, said enclosure having at least one planar surface of electrically nonconductive material, said surface having a plurality of openings which align with corresponding openings at one end of said composite conductor and which receive said pins for electrically connecting said conductive member to the last-said means which said conductive members are electrically interconnected with said wire conductors of a power distribution system.

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