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TERMINATION STRIP FOR ELECTRIC CABLE

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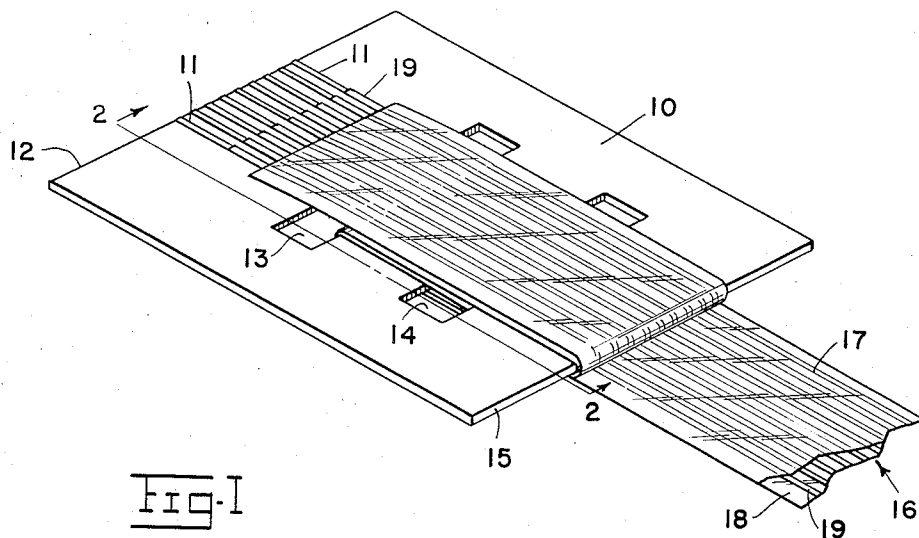


Fig. 1

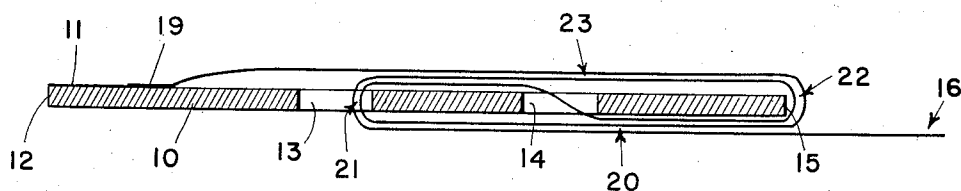


Fig. 2

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TERMINATION STRIP FOR ELECTRIC CABLE

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3 Claims. (Cl. 174—88)

This invention relates to termination devices and more particularly to devices adapted for use with multi-conductor cables in certain electrical and electronic applications. Such termination devices are commonly known as plugs or connectors, and are often further classified as male or female. Pairs of such connectors are usually held together by friction, although positive mechanical locking means are also sometimes provided. One object of the present invention is to provide a termination device or connector of the above character having a more practical and efficient construction and mode of operation.

One of the primary drawbacks of connectors heretofore known and used has been the fact that the connectors often become separated from the cable because of careless or rough use. This problem is particularly acute where the mating connectors are of the friction gripping type, for in such instances the connectors are often separated by a pull on the wires or cable leading to the connector. This method of disconnecting the connectors often separates part or all of the cable from the connector, thereby placing one or more circuits out of operation. Therefore, another object of my invention is to provide a connector in which the cable is so securely fastened to the connector that any longitudinal forces applied to the cable will be absorbed or passed directly to the body of the connector and will not cause a rupturing of the connections between the individual conductors of the cable and the individual conductors on the connector.

It is another object of my invention to provide a connector having stress absorbing means which are so constructed that connectors which are held together solely by friction, may be separated by merely exerting a pull on the cables or wires leading to the connectors.

A further object is to provide a connector of the above nature which may be made from a one-piece member and which is formed with integral stress absorbing means, whereby additional clamping members are unnecessary.

A further object is to provide a device having the above advantages which may be readily assembled and manufactured by known methods and with known machinery.

To these and other ends the invention resides in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Fig. 1 is a perspective view showing a length of cable attached to a connector having integral stress absorbing means embodying the present invention, and

Fig. 2 is a sectional elevation substantially along the lines 2—2 in Fig. 1.

The preferred embodiment of the present invention, herein disclosed by way of illustration, is preferably formed from a one-piece blank or board 10 of dielec-

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tric material, of limited thickness, as for example, $\frac{1}{16}$ of an inch. Material comprising board 10 must have sufficient mechanical strength to withstand normal usage, a low moisture absorption rate and must be capable of withstanding moderate operating temperatures without softening or decomposition. I have found that the blank may be made from epoxy-Fiberglas, silicone-Fiberglas, Teflon-Fiberglas, or alpha cellulose fibers impregnated with phenolic resin, or other known and suitable materials such as those now used in making conventional printed circuit boards.

Connector 10 is preferably formed with a plurality of spaced, metal conductors 11 which are fixed to one or more surfaces thereof in any suitable manner, as for example, by etching, electroplating, or any other means now used in the production of the conventional and known printed circuits. As shown in Fig. 1, conductors 11 extend along the upper surface of the connector from the front edge 12 rearwardly for a suitable distance to provide space for the individual wires or conductors of an electrical cable to be attached thereto, as by soldering or by other suitable known means. Conductors 11 are preferably positioned parallel to one another and are so spaced that the conductors of the cable may be readily aligned therewith for ease in connection.

Although the above connection between the cable and the connector provides good electrical conductivity, this connection has limited mechanical strength and the cable may readily become separated from the connector, particularly when the cable is used as a handle for separating the connector from the mating friction type connector. My combination connector and stress absorbing device is particularly adapted to eliminate this problem. I have found that a strong mechanical connection may be obtained between the cable connector if the connector is provided with a pair of spaced, substantially parallel slots or openings 13 and 14 and the cable is threaded therethrough, as hereafter more fully described. Slots 13 and 14 cooperate with the remaining portions of the connector, including the rear edge 15 thereof to securely fasten the cable to the connector so that the cable and connector will not separate even when the connector is carelessly pulled out of engagement with a mating connector as by a pull applied to the cable.

My connector is particularly well adapted for use with a ribbon-like cable 16 which is substantially rectangular in cross section, as shown in Fig. 1, and which is more fully disclosed and claimed in my copending application, Serial No. 605,628. Cable 16 preferably comprises a pair of transparent insulating members 17 and 18 having a plurality of spaced, parallel metal conductors 19 laminated therebetween. Each of conductors 19 is adapted to be connected to a specific one of fixed conductors 11, as by soldering or other suitable means, as shown in Fig. 1. For this purpose, insulating members 17 and 18 are preferably stripped back for a short distance from the free end of the cable, as shown in Fig. 1.

As described above, termination connector 10 is formed with slots 13 and 14. These slots preferably extend substantially transversely across the connector and are located between the rearward edge of fixed conductors 11 and the rear edge 15 of the connector. Slots 13 and 14 are exaggerated in width for the purposes of illustration. I have found that if cable 16 is fed around the rear edge 15 of connector 10 and through slots 13 and 14, in the following manner, the cable and connector are securely connected together. The above connection has sufficient strength so that the connector and cable remain fastened together under conditions of normal usage, and even when the cable is used as a handle for disconnecting a pair of mating frictionally engaging connectors.

To this end, cable 16 preferably extends rearwardly from its connections to fixed conductors 11 around the rear edge 15 of connector 10, and thence forwardly along the undersurface of the connector 10 and up through opening 13. Thereafter, cable 16 extends rearwardly along the upper surface of the connector to opening 14 from whence it extends downwardly through said opening to the undersurface of said connector, and thence rearwardly to the rear edge 15 of the connector. The cable extends upwardly along edge 15, thence forwardly along the upper surface of the connector and underneath the first described pass of the cable, and thence downwardly through opening 13 from whence it continues for the desired length for connection to a suitable connector or other electrical device. In the present illustration, I have shown the cable as extending rearwardly underneath connector 10 toward the right edge of the drawing after its last described pass through opening 13, but this is not necessary, and the cable may extend in any direction after passing through opening 13.

As a result of the above construction, cable 16 and termination strip 10 are securely bound together, without the use of extra mechanical devices or separate clamping means. Any pull on the right hand end of cable 16 causes the opposing surfaces of the cable to frictionally engage one another, as at points or areas 20, 21, 22 and 23. That is, any movement to the right of the right hand end of cable 16 causes the outer layer of the cable to move to the right at 20 while the inner portion is caused to move to the left. Similarly, at 21 the forward or outer layer of cable 16 is being moved downwardly while the inner layer is being moved upwardly. In like manner, at 22 the inner layer of the cable is being moved upwardly while the outer layer is being moved downwardly, and at 23 the upper or top surface of the cable tends to move to the right while the under layer tends to move to the left. Thus, my device causes the adjacent layers of the cable to move in opposite directions throughout a considerable distance whereby a high degree of frictional resistance is set up between the layers. This frictional resistance resists any action tending to separate the cable from the termination strip and provides a high degree of mechanical strength.

Thus, it will be seen that my invention accomplishes its stated objects and provides a combination termination strip or connector and strain relieving device whereby a multi-conductor cable may be connected to a series of fixed, spaced conductors and whereby the cable is prevented from being accidentally separated from the termination strip. My device provides a mechanical connection having such strength that the connector may be readily disconnected from its mating device by simply exerting a quick sharp pull on cable 16. Since this is the common method for disconnecting some devices, my strain relieving construction insures that such use will not damage the electrical connections between the cable and the connector.

It will be understood that while I have shown all of fixed conductors 11 as being positioned on the upper surface of strip 10, part of the conductors may be placed on the undersurface of the strip and the cable separated at a point adjacent opening 13 and part fed through said opening for connection to conductors on the underside of the strip while the remaining portion of the cable is connected to the conductors on the upper side of the strip. Similarly, while I have shown the termination device as being substantially rectangular, it may be square, round or have any other suitable shape.

It will thus be seen that the invention accomplishes its objects and while it has been herein disclosed by

reference to the details of a preferred embodiment, it is to be understood that such disclosure is intended in an illustrative, rather than a limiting sense, as it is contemplated that various modifications in the construction and arrangement of the parts will readily occur to those skilled in the art, within the spirit of the invention and the scope of the appended claims.

I claim:

1. The combination comprising a multi-conductor cable and a termination strip, a plurality of fixed conductors on said strip extending along one surface thereof, said strip being formed with a plurality of substantially parallel spaced openings said cable being connected at one end thereof to said fixed conductors and extending rearwardly above said first mentioned surface of said termination strip over the rear edge thereof and forwardly below the opposite surface of said termination strip and thence through said opening nearer said fixed conductors and along said first mentioned surface of said termination strip and thence through the other of said openings and along said opposite surface of said strip around the rear edge of said strip underneath said earlier described pass of said cable and thence forwardly above said first mentioned surface of said strip and beneath said first described pass of said cable, and thence through said nearer opening.

2. The combination comprising a multi-conductor cable and a termination strip, a plurality of fixed conductors on said strip extending along one surface thereof, said strip being formed with a plurality of substantially parallel spaced openings extending substantially transversely to the longitudinal axis of said fixed conductors said cable being connected at one end thereof to said fixed conductors and extending rearwardly above said first mentioned surface of said termination strip over the rear edge thereof and forwardly below the opposite surface of said termination strip and thence through said opening nearer said fixed conductors and along said first mentioned surface of said termination strip and thence through the other of said openings and along said opposite surface of said strip around the rear edge of said strip underneath said earlier described pass of said cable and thence forwardly above said first mentioned surface of said strip and beneath said first described pass of said cable, and thence through said nearer opening.

3. The combination of a multi-conductor cable and a termination strip, said strip having a plurality of fixed conductors along one surface extending rearwardly from the front edge thereof, said strip being formed with a pair of substantially parallel spaced openings between the rearward edge of said fixed conductors and the rear edge of said termination strip, said cable being connected at one end thereof to said fixed conductors and extending rearwardly above said first mentioned surface of said termination strip over the rear edge thereof and forwardly below the opposite surface of said termination strip and thence through said opening nearer said fixed conductors and along said first mentioned surface of said termination strip and thence through the other of said openings and along said opposite surface of said strip around the rear edge of said strip underneath said earlier described pass of said cable and thence forwardly above said first mentioned surface of said strip and beneath said first described pass of said cable, and thence through said nearer opening.

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