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3,090,936

ELECTRICAL CONNECTOR

Filed Dec. 24, 1959

FIG. 1

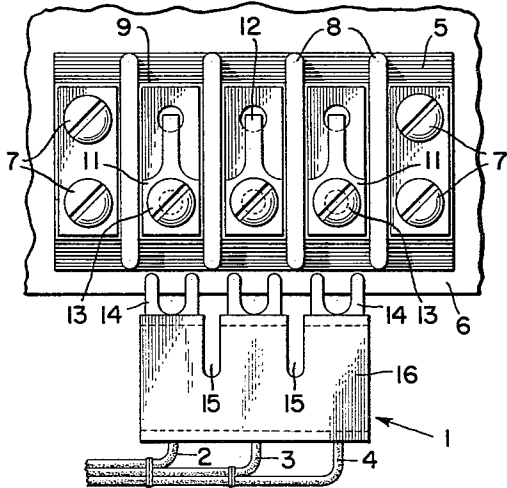


FIG. 2

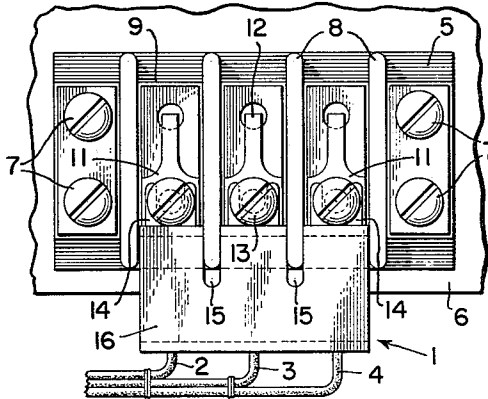


FIG. 4

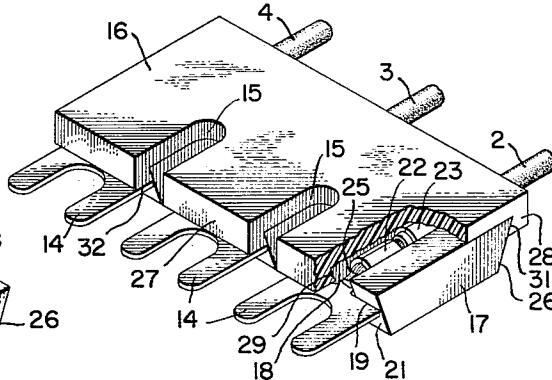


FIG. 3

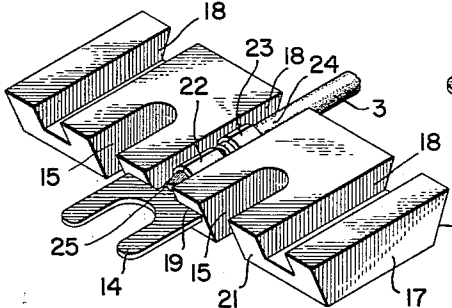
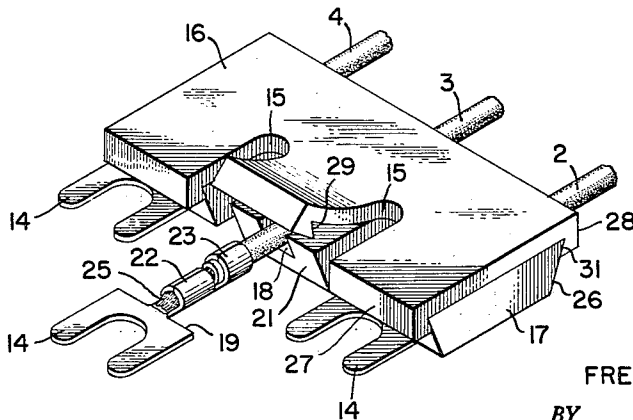


FIG. 5



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ELECTRICAL CONNECTOR

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The present invention generally relates to electrical connectors. More specifically, the present invention is concerned with a type of connector known as a fanning strip for detachably connecting a plurality of electrical conductors to a stationary terminal strip.

A general object of the present invention is to provide a new and improved fanning strip adapted for many uses and characterized by simplicity of design and ease of assembly.

Fanning strips are utilized in electrical equipment to simplify assembly, facilitate servicing, and to insure neat and correct connections where a plurality of conductors are involved. Commercially available fanning strips, however, require the soldering of the individual conductors to the connecting lugs which are an integral part of the strip and thus are not adapted for use with solderless type connecting lugs. Accordingly, such fanning strips can not be employed without sacrificing the advantages of automatic or semi-automatic fastening of the connecting lugs to the conductors.

It is therefore a specific object of the present invention to provide a fanning strip particularly adapted for use with solderless type connecting lugs.

Another object of the present invention is to provide a fanning strip adapted for use with barrier type terminal strips.

A further object of the present invention is to provide a fanning strip which permits the disconnecting of individual conductors from a terminal strip without the necessity of disconnecting all of the conductors connected thereto by the fanning strip.

In accordance with the present invention, there is provided a fanning strip consisting of two pieces, a bottom piece and a cover. The bottom portion comprises an elongated strip of insulating material having a plurality of transverse grooves each adapted to receive an electrical conductor equipped with a connecting lug with the connecting portion of the lug projecting beyond the groove and abutting against the side of the strip. The cover, which may either snap on or slide over the base, has a pair of downwardly extending lips which grip the bottom piece and hold the connecting lugs therein. Both pieces of the fanning strip may be made of either a rigid insulating material such as "Bakelite" or a flexible insulating material such as nylon or polyethylene.

A better understanding of the present invention may be had from the following description when read with reference to the accompanying drawings of which:

FIG. 1 is a plan view of the fanning strip of the present invention disconnected from a barrier terminal strip;

FIG. 2 is a top elevation of the fanning strip of the present invention connected to a barrier terminal strip;

FIG. 3 is a perspective view of the bottom portion of the fanning strip of the present invention;

FIG. 4 is a perspective view, taken in partial section, of the fanning strip of the present invention showing the cover of the fanning strip in place.

FIG. 5 is a perspective view of the fanning strip of the present invention with the top portion of the strip made of a flexible material.

Referring now to FIGS. 1 and 2, the numeral 1 indicates a fanning strip in accordance with the present invention adapted to detachably connect a plurality of conductors 2, 3, and 4 to a terminal strip 5. As shown, the terminal strip 5 is mounted on a chassis 6 by means

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of screws 7. The terminal strip 5 has a plurality of transverse barriers 8 defining between them transverse grooves 9, each accommodating a stationary connecting terminal 11. Each of the terminals 11 is provided with a connecting lug 12 adapted to extend through the terminal strip 5 and the chassis 6 for electrical connection on the reverse side of the chassis 6. As shown, the terminals 11 are adapted to be detachably fastened to the terminal strip 5 by means of the binder screws 13.

The barrier terminal strip 5 may be provided with any number of terminals, but for the purpose of the present disclosure the terminal strip 5 has been shown as having three terminals. Accordingly, the fanning strip 1 has been illustrated as accommodating three conductors. It should be understood, however, that the fanning strip 1 may be made to accommodate any number of conductors and thus insure neat, correct, and dependable electrical connection of such conductors to a terminal strip.

As shown, each of the conductors 2, 3, and 4 is provided with spade-type connecting lugs 14, which may be of the solderless type and adapted for engagement under the heads of the binder screws 13. The forward edge of the fanning strip 1 is provided with plurality of vertical grooves or recesses 15 between each of the projecting spade lugs which are adapted to accommodate the transverse barriers 8 on the terminal strip 5 and permit the positioning of the spade lugs 14 under the heads of the binder screws 13. To complete the connection of the conductors 2, 3 and 4 to the terminal strip 5, the binder screws 13 are screwed down on the spade lugs 14. When it is desired to disconnect the conductors 2, 3, and 4 from the terminal strip 5, it is only necessary to loosen the binder screws 13 after which the fanning strip 1 may be removed therefrom.

Referring now to FIGS. 3 and 4, the fanning strip 1 comprises a cover 16 and a base 17. As shown best in FIG. 3, the base 17 comprises an elongated piece of insulating material having the plurality of transverse grooves 18 in its top surface. The base 17 may be made of either a rigid insulating material, such as Bakelite, or hard rubber; or it may be made of a flexible insulating material, such as nylon or polyethylene. Each of the transverse grooves 18 is adapted to receive an electrical conductor equipped with a connecting lug 14 with the spade portion of the lug projecting beyond the groove 18 with the shoulders 19 of the spade portion abutting against the front edge 21 of the base 17. For clarity, only the conductor 3 has been shown positioned in the base 17.

The spade lugs 14 which have been shown are of the solderless type adapted to be connected to electric conductors by means of an automatic or semi-automatic tool. Such a tool crimps two pairs of upwardly extended flanges 22 and 23 on a spade lug around a conductor with the flange 23 gripping the insulated portion 24 of the conductor and the flanges 22 gripping the strip or uninsulating portions 25 of the conductor. The forward edge 21 and the rear edge 26 of the base 17 taper inward toward the bottom of the base so that the base 17 has a trapezoidal cross-section. As will be explained in more detail hereinafter, this permits the cover 16 of the fanning strip 1 to be attached to the base 17 by means of a dove-tail fit.

Referring now to FIG. 4, the fanning strip 1 is shown with the cover 16 attached to the base 17. As shown, the cover 16 has a pair of downwardly extended lips 27 and 28, the inner edges of which are tapered at 29 and 31 to mate with the tapered edges 21 and 26 of the base 17. Accordingly, if the cover 16 is made of a rigid material, it is adapted to slide over the base 17 from one end thereof; or if it is made of a flexible material, it may

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be snapped onto the base 17. The forward lip 27 of the cover 16, in addition to holding the cover 16 onto the base 17, also retains the lug-equipped conductors in the grooves 18 of the base 17. To this end, the bottom edge 32 of the lip 27 is adapted to abut against the top surface of the spade portion of the connecting lugs 14. When in this position, the lugs 14 are prevented from being moved in the forward direction from the base 17 by either the end of the conductors or the crimped flanges 22 of the lugs abutting against the inner surface 29 of the lip 27. It should also be noted that the lip 27 prevents the lugs 14 from rotating after being placed in the fanning strip. This feature facilitates the aligning of the connecting lugs for insertion under the binder screws of a terminal strip.

Referring now to FIG. 5, there is shown a perspective view of the fanning strip of the present invention which illustrates the advantage of having the cover 16 made of a flexible insulating material. When the cover 16 is made of an insulating material, it is adapted to be snapped over the base 17. Accordingly, the individual forward sections of the cover 16, defined between the vertical recesses 15, are adapted to be individually snapped over the base 17. It is, therefore, possible to release a conductor from the base 17 by unsnapping such individual portions of the cover 16 and pivoting them upward about a hinge formed by the resilient cover between the ends of the recesses 15 so that the forward lip 27 no longer prevents the cable and spade lug from being drawn forward out of its groove in base 17. As will be obvious to those skilled in the art, this is particularly advantageous inasmuch as it permits an individual conductor to be disconnected from a terminal strip without the necessity of removing all the conductors connected thereto by the fanning strip.

By means of the novel construction described hereinbefore, it can be seen that the fanning strip of the present invention is characterized by simplicity of design and can be inexpensively manufactured. In addition, the fanning strip of the present invention is exceptionally easy to assemble for use, requiring only the placing of the individual conductors in the appropriate grooves in the base 17 and the placing of the cover 16 on the base to hold the conductors herein.

Although the fanning strip of the present invention has been described as adapted for use with a barrier-type terminal strip, it should be understood that it may be utilized equally as well with terminal strips not having barriers separating the individual terminals. When used with such a terminal strip it can be seen that there is no necessity for including the vertical recesses 15 in its construction. Still further, while the fanning strip of the present invention has been shown in connection with conductors having spade type connecting lugs it should also be understood that it is equally well adapted for use with conductors having other types of connection lips as for example, a ring type connecting lip. In this respect, the fanning strip of the present invention only requires that the connecting lugs used therewith have connecting portions wider than the transverse grooves 18 in the base 17 and a flange or obstruction on the conductor gripping portion which will prevent it from being withdrawn in the forward direction from the groove 18 when the cover 16 is in place.

Having described the present invention, that which is claimed as new is:

1. A fanning strip comprising an elongated base of insulating material, the forward and rear edges of said base being tapered inward toward the bottom of said base, said base having a plurality of transverse grooves in its top surface each adapted to receive an electrical conductor equipped with a standard connecting lug of the type secured to a conductor by conductor gripping means extending upward from the lug to the rear of the connecting portion with the connecting portion of said lug project-

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ing beyond said groove and with a shoulder on said connecting portion abutting against the side of said base, and a cover of insulating material for said base, said cover having a pair of downwardly extending lips tapered to mate with the tapering edges of said base in a dove-tail fit and holding said cover on said base, the forward lip on said cover being adapted to rest on the connecting portions of the lugs projecting from said base and retaining said lugs in said base.

2. Fanning strip as specified in claim 1 wherein said cover is made of a resilient insulating material.

3. A fanning strip adapted for detachably connecting a plurality of conductors equipped with connecting lugs to a barrier terminal strip comprising, in combination, a base of insulating material having a plurality of transverse grooves in its top surface each adapted to receive an electrical conductor equipped with a standard connecting lug of the type secured to a conductor by conductor gripping means extending upward from the lug to the rear of the connecting portion with the connecting portion of said lug projecting beyond said groove with a shoulder of said connecting portion abutting against the side of said base and a cover of insulating material for said base, said cover having a pair of downwardly extending lips, the inner surfaces of which are tapered to mate with the tapered sides of said base in a dove-tail fit to hold said cover on said base, the forward lip on said cover extending downward to rest on the connecting portions of the lugs projecting from said base and retain said lugs in said base, said base and said cover having vertical recesses in their forward edges between said projecting lugs, said recesses being adapted to accommodate the barriers on said terminal strip.

4. Fanning strip as specified in claim 3 wherein said cover is made of a resilient insulating material.

5. A fanning strip comprising an elongated base of insulating material having a plurality of transverse grooves in the top surface thereof extending from the forward edge to the rear edge thereof, a cover of insulating material overlying said grooves and having means to secure it to said base, said cover and each of said grooves forming means to hold a standard electrical connector of the class including a connecting lug secured to an electrical conductor by conductor gripping means extending upward from the lug to the rear of the connecting portion with the conductor extending out of the rear of the groove and the connecting portion of the lug projecting beyond and abutting against the forward edge of the base, said cover having a downwardly extending longitudinal lip overlying the forward edge of said base member and spaced from the bottom of said grooves a sufficient distance to engage and receive therebetween the connecting portion of a standard electrical connector in abutting relationship therewith, the connector being further engaged in said fanning strip by the engagement of said lip with the lug gripping means.

6. A fanning strip as specified in claim 5 which is adapted for use with a barrier terminal strip, said cover and said base having matching recesses in their forward edges to accommodate the barriers on said terminal strip.

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