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3,074,046

COILED WIRE NUT FASTENER AND CONDUCTOR

Filed Dec. 19, 1960

2 Sheets-Sheet 1

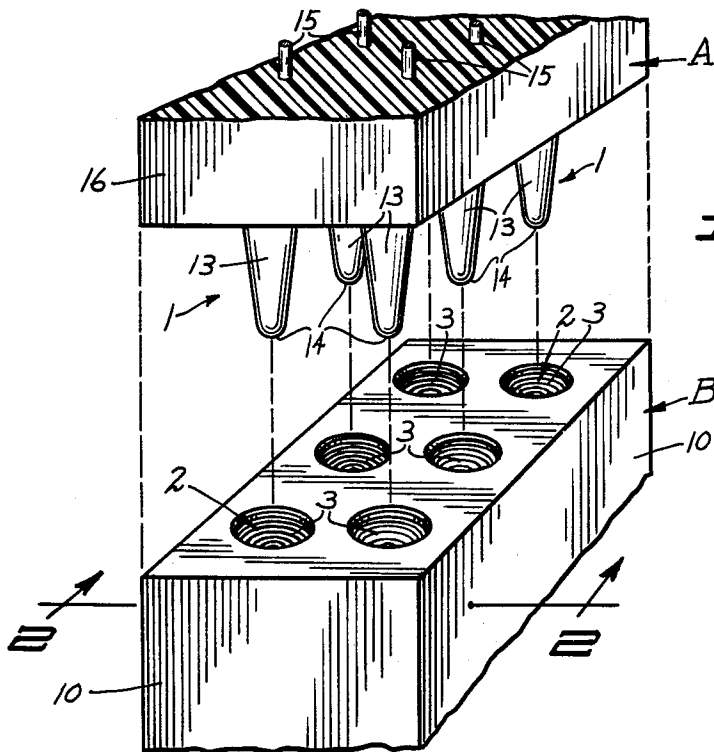


FIG. 1

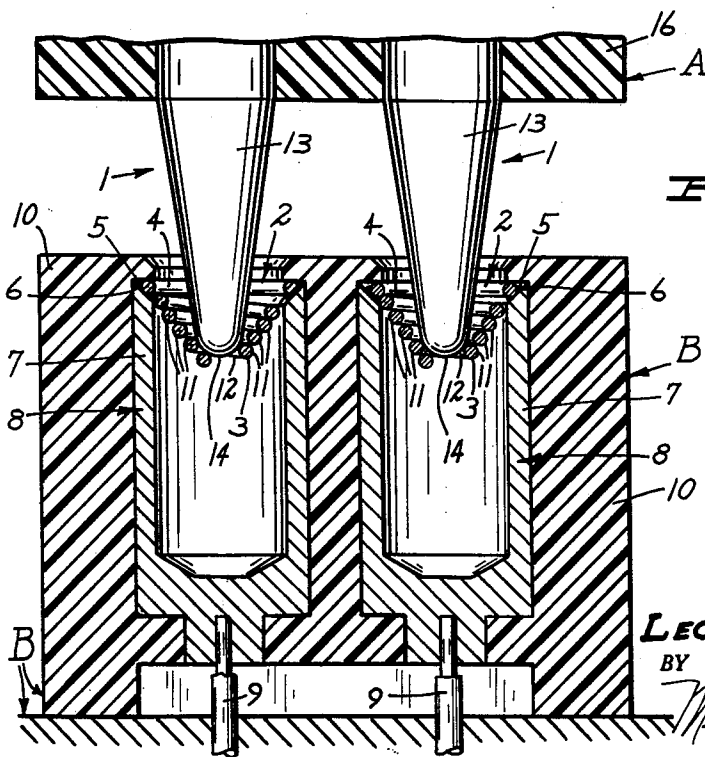


FIG. 2

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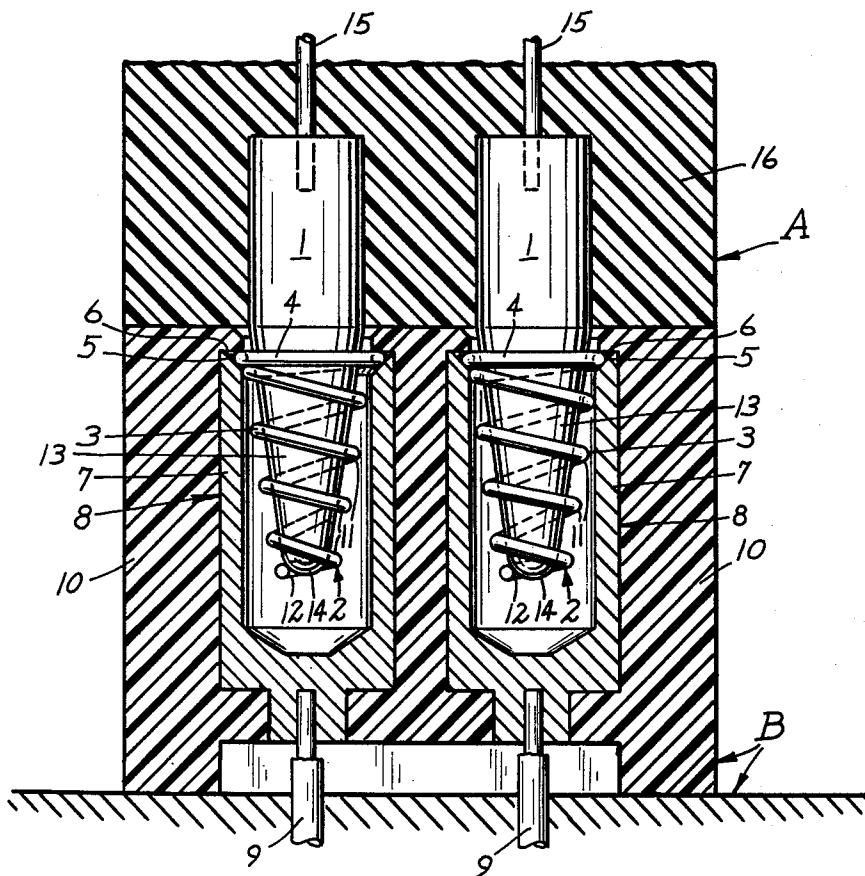
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FIG. 3



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COILED WIRE NUT FASTENER AND CONDUCTOR

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1 Claim. (Cl. 339—256)

My invention relates generally to connectors for electrical conductors and more specifically to mechanical connectors of the type utilizing a coiled wire nut fastener.

The primary object of my invention is the provision of an electrical connector of the type above described which incorporates male and female connector members and in which a satisfactorily electrical connection may be initially achieved by simple axial movements of the male connector member into the female connector member as distinguished from compound axial and rotary movements.

A further object of my invention is the provision of a device of the type immediately above described in which the satisfactory electrical connection initially achieved through simple axial movement of the connector members with respect to each other, may be maintained for any given period of time by merely retaining said connector members in their cooperating positions, with the male connector members received within the female connector members.

A further object of my invention is the provision of an electrical connector of the class above described, the male and female connector member of which are of the size and shape to greatly facilitate entrance of the former into the latter to achieve a positive connection therebetween, without precise axial alignment of said members. Because of this, it is obvious that my novel electric connectors have great use in the electronics and related fields in the detachably connecting together of cooperating units having multiple electrical connections.

A still further object of my invention is the provision of a device of the class above described, which may be mass produced at a minimum of cost.

A still further object of my invention is the provision of a device of the class above described, in which the male and female members may be separated with a minimum of effort and consumption of time.

A still further object of my invention is the provision of a device of the class above described which requires a minimum of service and maintenance.

The above and still further objects of this invention will become apparent from the following detailed specification, appended claim and attached drawings.

Referring to the drawings, wherein like characters indicate like parts throughout the several views;

FIG. 1 is an exploded view in perspective showing cooperating electronic units equipped with electrical connectors in accordance with my invention;

FIG. 2 is an enlarged sectional view taken on the line 2—2 of FIG. 1, illustrating position of the parts prior to connection having been achieved therebetween; and

FIG. 3 is a view corresponding to FIG. 2 by showing a different position of parts thereof.

Referring with greater particularity to the drawings, the letters A and B identify cooperating electronic units which are provided with multiplicity of electrical connectors, constructed in accordance with my invention, unit A being provided with male connector members 1, whereas unit B is provided with a like number of female members 2.

As shown particularly in FIGS. 2 and 3, the female connector members are preferably formed from wire wound to define spiral-helical springs 3 which act as

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sockets for the male connector members 1. The socket-mouth-defining radially outermost convolutions 4 of the springs 3 are rigidly anchored, as at 5, preferably as shown, to the upper edges 6 of the cylindrical walls 7 of the cup-like connector housings 8. Housings 8 are formed from any suitable metal having high electrical conductivity.

It will be noted that the cup-like connector housings 8 are spaced from all other convolutions of their cooperating springs 3, aside from the radially outermost convolution 4 thereof, so as to permit free axial expansion or extension of the coils 3, as well as radial expansion and contraction thereof relative to said outermost convolutions 4, for a purpose which will hereinafter be explained in detail. Lead wires 9 may be connected to the several connector housings 8, as shown. It is obvious however, that the several housings 8 and their enclosed female connector members 2 be suitably insulated from other and adjoining connector housings 8 by insulating material 10 forming the walls of the unit B.

Referring particularly to FIG. 2, it will be noted that the outer diameter of each convolution 11 of the springs 3, intermediate the radially outermost convolution 4 and the innermost convolution 12 thereof, is less than outer diameter of the next preceding convolution but greater than the inner diameter of the next preceding convolution, whereby to cause abutting engagement of said convolutions 4, 11 and 12 when said spring 3 is in its normal unextended position. The importance of this feature will also be stressed immediately hereafter.

With respect to the male connector members 1, associated with the electronic unit A, it will be noted that each thereof includes a tapered tip 13 of the axial dimension of which is greater than the normal contracted axial length of the socket-forming spring 3 with which it is adapted to cooperate and into which it is adapted to be received, see particularly FIG. 2. The extreme tips of the tapered male members 1 are blunted as at 14. However, it will be seen that the diameters of the blunted tips 14 are considerably less than the diameters of the mouth-defining convolutions 4 of the socket-forming springs 3. This arrangement assures that the tips 13 may be readily inserted in and through the socket-forming springs 3, so as to assume the operative position of FIG. 3, irrespective of whether the male connector members 1 are in precise axial alignment with the socket-forming springs 3, or are somewhat axially offset or angularly disposed with respect thereto during initial inserting movements. In other words the male connector members 1 will automatically center themselves during progressive inserting movements of the tips 13 into and through the mouth-defining outermost convolutions 4 of the socket-forming springs 3.

As shown by FIG. 2, initial engagement between the tips 13 of the male members 1 and the socket-forming springs 3, is made by the blunted tips 14 with the innermost convolutions 12 of said springs 3. During extending movements of the springs 3 said innermost convolutions 12 are carried along with the blunted tips 14, the intermediate convolutions 11 being radially expanded by frictional engagement with the outer surface of the tapered tip 13, whereby to cause a frictional bite or grip to be set up between the intermediate convolutions 11, and tapered tips 13 of a type which will positively resist corrosion therebetween. Electrical conductors or leads 15, are obviously connected to the male connectors 1, which in turn are insulated one from the other by the casing 16.

When it is desired to separate and disconnect one or more male members 1 from their cooperating female connector members 2, it is but necessary to cause said male members 1 to be moved axially outwardly with respect to its cooperating socket-forming springs 3, such movement causing the springs 3 to retract to the position of FIG. 2,

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wherein, as above indicated, each convolution thereof is in engagement with the convolution immediately adjacent thereto. Such arrangement obviously precludes any distortion of the springs 3 due to such withdrawal movements.

My invention has been thoroughly tested and found to be completely satisfactory for the accomplishment of the above objects; and while I have shown and described a preferred embodiment thereof, I wish it to be specifically understood that the same may well be modified without departure from the scope and spirit of the appended claim.

What I claim is:

A connector for electrical conductors comprising co-operating male and female members, said female member including a socket forming spirally wound coil spring, means positively anchoring the outermost convolution of said spring, said means being spaced from the other convolutions of said spring and permitting free axial expanding and radial contracting movements thereof relative to said outermost convolution, said male member having a conical tip and being freely axially movable through said outermost convolution, the axial dimension of said conical

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tip being substantially greater than the axial dimension of said socket forming coil spring when said coil spring is in its normal axially contracted condition, the inner end portion of said conical tip being of a diameter greater than the innermost convolution of said spring and being engageable by said tip during inserting movements thereof through said outer convolution, such engagement causing said inner convolution to be moved with said conical tip whereby to axially expand said spring and radially contract the majority of the intermediate convolutions thereof into continuous gripping engagement with the conical surface of said tip.

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