

[54] **ELECTRIC WIRE CONNECTING DEVICE**

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[51] Int. Cl. **H01r 9/08**

[58] Field of Search **339/95, 97-99, 339/273**

[56] **References Cited**

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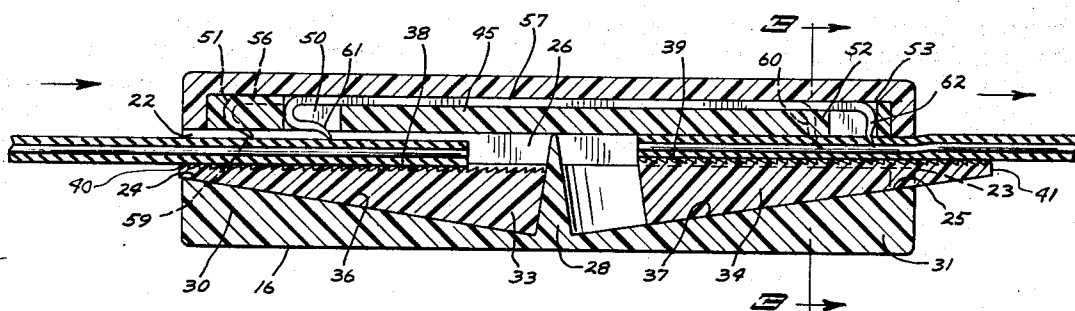
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[57] **ABSTRACT**

An electric wire connecting device formed as an elongated insulating housing comprising a chamber having a conducting bar therein longitudinally thereof carrying conductors having terminal contact portions projecting therethrough and in opposed spaced relation thereto to accommodate an electric wire therebetween is a pair of locking members arranged to have holding engagement with electric wires inserted into said housing whereby upon partial withdrawal of said wires from said housing, said locking members lockingly engage said wires within said housing and urge said wires into electric contact with said projecting terminal contact portions.

3 Claims, 5 Drawing Figures



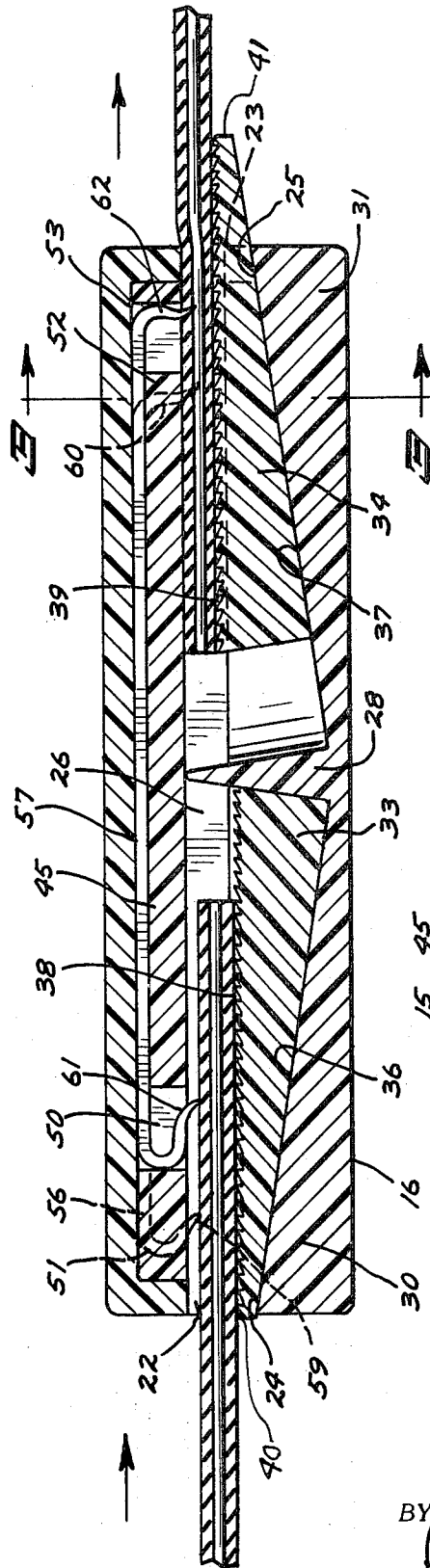
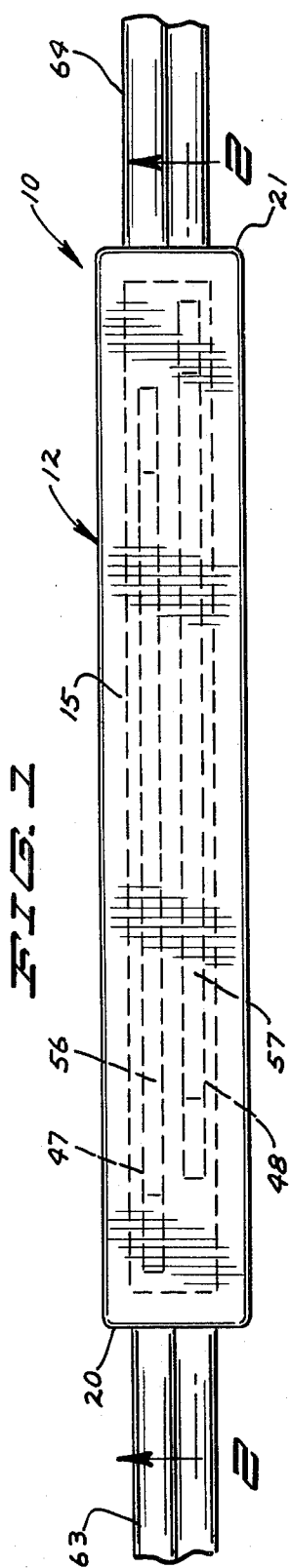


FIG. 2

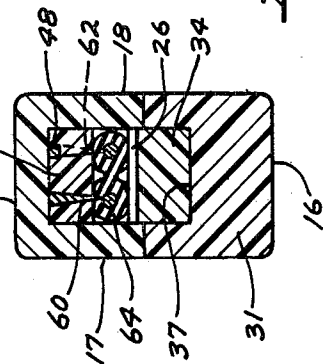


FIG. 3

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FIG. 4

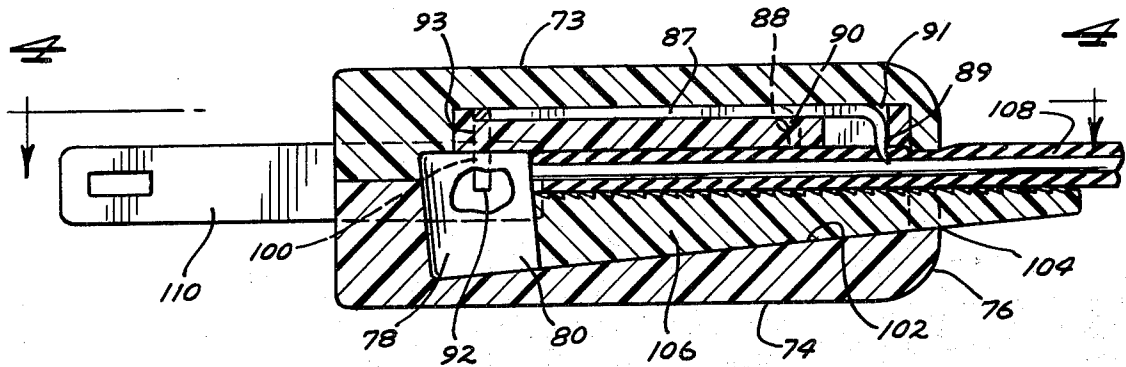
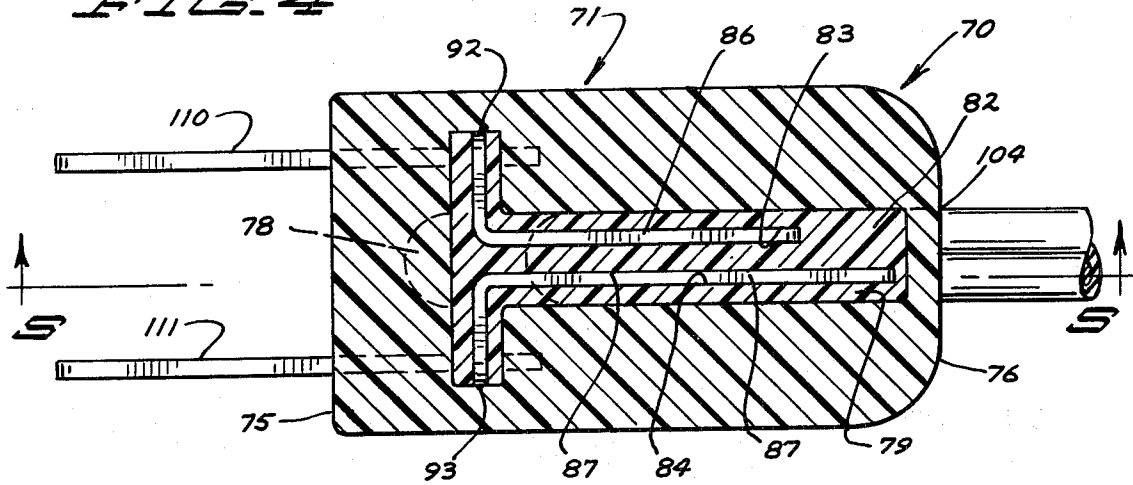


FIG. 5

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ELECTRIC WIRE CONNECTING DEVICE

SUMMARY AND BACKGROUND OF THE INVENTION

This invention relates to an electric wire connecting device comprising a relatively small housing within which a pair of electric wires may be connected without the need either for the use of any tools and or for dismantling any portion of the device.

Devices presently available for connecting lengths of electric wire require the use of a screw driver or a pair of pliers for assembly of the electric wire with the device.

Generally stated the device herein comprises an elongated housing having a conducting bar therein carrying conductors having projecting hook-like terminal portions and in opposed spaced relation thereto and providing a passage therebetween is a pair of wedge-like locking members and said passage receiving electric wires inserted at either end of said housing whereby a partial withdrawal of said wires causes said locking members to wedge and lock said wires against said conducting bar and causes said wires to engage said terminal portions for electric contact.

It is an object of this invention to provide a simply constructed self-securing electric wire connecting device.

It is another object of this invention to provide an electric wire connecting device arranged and constructed to receive an electric wire at either end thereof and to have means therein to lock therein and electrically connect said wires upon a partial withdrawal of said wires from said housing.

It is more specifically an object of this invention to provide an electric wire connecting device arranged and constructed to secure a pair of electric wires therein for electric contact therebetween without having strain placed upon the electric contacting means for holding and securing said wires within said device.

These and other objects and advantages of the invention will be set forth in the following description made in connection with the accompanying drawings in which like reference characters refer to similar parts throughout the several views and in which:

FIG. 1 is a top plan view with portions thereof shown in dotted line and some portions thereof being broken away;

FIG. 2 is a view in longitudinal vertical section taken on line 2—2 of FIG. 1 as indicated;

FIG. 3 is a view in vertical cross section taken on line 3—3 of FIG. 2 as indicated;

FIG. 4 is a view in horizontal section taken on line 4—4 of FIG. 5 as indicated showing a modification; and

FIG. 5 is a view in vertical longitudinal section taken on line 5—5 of FIG. 4 as indicated.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring to the drawings, the device herein comprising an electric wire connector is indicated generally by the reference numeral 10. Forming an insulating enclosure for said connector is a housing 12 which is shown here to be parallelepiped in form and consisting of a top wall 15, a bottom wall 16, side walls 17 and 18 and end walls 20 and 21. Said end walls have aligned rectangular openings 22 and 23 therein. Within said housing is a chamber 26. Said housing may be formed as of suitable plastic material.

Centrally within said chamber 26 and extending thereacross is a stop member 28 shown here in the form of a tapered wall which divides said chamber longitudinally. As viewed in FIG. 2 said stop member 28 extends upwardly of said chamber 26 to the plane of the upper surfaces of said end wall openings 22 and 23.

At the lower portion of said chamber 26 as viewed in FIG. 2 at either side of said stop member 28 the bottom wall portions 30 and 31 of said chamber are inclined upwardly oppositely of each other to the respective end walls 20 and 21 and thus form ramps. Said ramps 30 and 31 respectively extend to the bottom surface portions 24 and 25 of said end wall openings 22 and 23 and said bottom surface portions are inclined upwardly and outwardly to form extensions of said ramps.

Respectively seated upon said ramps 30 and 31 are wedge shaped locking members 33 and 34 having upwardly inclined bottom wall portions 36 and 37 disposed at angles to accommodate the inclination of said ramps and the upper surface portions 38 and 39 of said locking members are disposed in horizontal planes as indicated in FIG. 2. The remote end portions 40 and 41 of said locking members extend to rest upon the lower surface portions 24 and 25 of said end wall openings when said locking portions are fully disposed within said chamber.

Said locking members are formed to have non-smooth upper gripping surface portions. In the present embodiment said upper surface portions are shown to be saw toothed or transversely convoluted.

Said end wall openings 22 and 23 will have sufficient height to accommodate electric wires 63 and 64 such as commonly used lamp wire and to permit limited outward movement of said locking members 33 and 34.

Disposed in the upper portion of said chamber 26 substantially the full length and width thereof and extending downwardly to the plane of the upper surface portions 42 and 43 of said end wall openings 22 and 23 to have its lower surface coplanar therewith is a conducting bar 45. Said conducting bar is shown having a pair of longitudinal transversely spaced grooves 47 and 48 formed in the upper surface portions of said bar in longitudinal off set position with respect to each other. Said grooves 47 and 48 have terminal vertical openings 50—53 at their respective end portions which extend through said conducting bar.

Respectfully disposed within said grooves are conductors 56 and 57 formed of suitable resilient conducting material having terminal depending hook portions 59—62. Said respective hook portions 59—60 and 61—62 normally are inclined in directions toward one another and each projects sufficiently outwardly of said conducting bar to engage, pierce and make electrical contact with an electric wire as will be described. Said hook portions will have sharp ends adapted to readily penetrate electrical wire coating or insulating material. It will be understood that said conductors 56 and 57 may be otherwise disposed and carried within said housing.

Said electric wires 63 and 64 respectively are shown to be disposed through said end wall openings 22 and 23 into said chamber 26 along the upper surface portions of said ramps 30 and 31. Said stop member 28 will limit the inward movement of said electric wires.

OPERATION

Said electric wire connector above described is very

simply put to use. The locking members 33 and 34 will be fully disposed inwardly of the housing to the point of engagement with the stop member 28. An electric wire will be disposed within each of the end wall openings 22 and 23 as indicated in FIG. 2. Again with reference to FIG. 2, the wire 63 at the left hand end of said FIG. as the same is being viewed is being inserted into the housing and will be inserted up to the point of engagement with the stop member 28. At the right hand end of said FIG. 2, the wire 63 having already been fully inserted is shown being partially withdrawn with the locking member being drawn outwardly with it. The hook portions of said conductors 56 and 57 will be sufficiently resilient to yield or flex in permitting the insertion of the electric wires. Upon the withdrawal of wires, the electric locking members move with the wires and are inclined upwardly to press the electric wire against the under surface of the conducting bar 45 for penetration into and through the insulation of the electric wires of the entire projecting portions of the hook portions. Said hook portions are inclined inwardly. As the electric wires are withdrawn said hook portions have penetrated the insulation of said electric wires sufficiently to be drawn outwardly with said wires, and the penetration increases as the hook portions are partially straightened out to the point where said electric wires become so firmly wedged by the upward movement of the locking members that the electric wires cannot be further withdrawn. At this point there is electrical contact between said hook portions and the conducting portions of the electric wires.

It is seen that the locking pressure placed against electric wires by the locking members pressing them against the conducting bar is proportional to the force withdrawing the electric wires and that the strain of securing or locking the electric wires is upon the wedge or locking members and not upon the hook portions. Said hook portions are free from strain and are straightened out sufficiently merely to effect a good solid contact with the conductors within the electric wires and not for holding purposes.

Said housing 12 has been described herein as being unitary in form. For convenience in manufacture and assembly of said wire connector 10, said housing 12 may be formed as by being molded in two separate portions such as of an upper and lower portion. This is well known in the art. Upon assembly said separate portions will be fused together in a conventional manner to form an integral housing as if the same had been unitarily formed in the first instance as above described.

MODIFICATION

A modification of the structure above described is shown in FIGS. 4 and 5 comprising a terminal attachment structure or terminal plug 70 for an electric wire. Although a male terminal is shown, a female terminal is within the same inventive scope.

Said terminal 70 comprises a housing 71 substantially parallelepiped in form including a top wall 73, a bottom wall 74, a rear wall 75, a front wall 76 and a chamber 78 therein.

Said chamber is indicated as having an upper portion 79 T-shaped in plan having disposed therein conforming thereto a T-shaped conducting bar 82. Formed into the upper surface portion of said conducting bar 82 is a pair of transversely spaced L-shaped grooves 83 and

84 with said groove 84 being of somewhat greater length than said groove 83.

Respectively disposed into said grooves and conforming thereto are electric conductors 86 and 87. The rear end portions of said conductors have downwardly and inwardly angled hook portions 88 and 89 which project through accommodating openings 90 and 91 in said conducting bar and extend therebelow.

At the forward end of said conductors 86 and 87 are downwardly disposed plate contact portions 92 and 93 extending into accommodating openings 100 formed in said housing.

Said chamber 78 has a lower portion 80 of somewhat greater length than said upper portion 79 and is shown formed on the order of an elongated slot corresponding to the width of said upper portion 79 and having an upwardly inclined bottom wall portion 102 forming a ramp which extends to the rear wall 76 through which an opening 104 is formed having a bottom surface portion which in effect forms a continuation of said ramp 102.

Disposed in said chamber portion 80 is a wedge 106 which forms a locking member and which is of the same form in structure as the above described wedge members 33 and 34. Said openings in said rear wall will be of a width to pass the adjacent end portion of said locking member 106 and said opening will have sufficient height to accommodate an electric wire 108 such as a lamp cord.

With locking member 106 fully disposed within said chamber 80, there will be sufficient clearance between the upper surface of said locking member and the adjacent surface of said conducting bar 82 to accommodate the passage of said electric wire 108.

Imbedded in a conventional manner into the forward end portion of said housing through said front wall 75 are a pair of transversely spaced jack contacts 110 and 111 which will extend into said housing to engage the contacts 86 and 87 to make electrical contact therewith.

OPERATION

The use of the above described modified form of the structure herein is believed to be quite clear from the description first above given. With the locking member 106 fully disposed within the chamber 80, a lamp wire will be inserted through said opening 104 to the point of engagement with the inner wall with the chamber portion 80.

The conductors 86 and 87 will be formed of suitable material to have said hook portions 89 and 90 thereof sufficiently resilient and yielding to permit the insertion of a lamp wire into the housing as described. The lamp wire will have sufficient frictional engagement with the upper convoluted surface of said locking member 106 whereby a partial withdrawal of said lamp wire will cause a simultaneous partial withdrawal of said locking member. It is seen that as said locking member is partially withdrawn in riding upwardly of said ramp 102 that the lamp wire is wedged upwardly against the adjacent surface of the conducting bar 82. As said hook portions pierce the insulation of said lamp wire, the outward movement of the lamp wire as it is partially withdrawn causes said hook portions to straighten out for penetration through the insulation of the electric wire to make a good effective electric contact with the conductors therein. It only requires a small withdrawal

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of the lamp wire and the locking member 106 to cause a sufficiently tight compression of said lamp wire to effectively lock the same within said housing. Thus it is seen that there is no exertion placed upon the hook portions 89 and 90 to hold the electric wire but instead it is the locking member 106 which securely holds the lamp wire within said housing.

The structure described herein has been successfully subjected to laboratory tests and the lamp wires locked therein were found to hold securely when subjected to as much as a 30 pound pull and this test meets safety standard requirements.

It will be understood of course that various changes may be made in form, details, arrangement and proportions of the parts without departing from the scope of the invention herein which, generally stated, consists in an apparatus capable of carrying out the objects set forth above, in the parts and combinations of parts disclosed and defined in the appended claims.

What is claimed is

1. An electric wire connecting device having in combination
a housing having a chamber therein,
openings at either end of said housing into said chamber,
a pair of insulated conductors disposed in said chamber, said conductors respectively having terminal portions thereof projecting into said chamber,
a pair of wedge shaped locking members in longitudinally opposed spaced relation to said conductors providing a passage therebetween to accommodate an electric wire,
said locking members each being supported on bottom wall surfaces inclined upwardly in the direction of the respective end openings of said housing, said locking members being moveable oppositely one another on said upwardly inclined surfaces and being arranged and adapted to be moved by the

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outward movement of electric wires inserted within said end openings of said housing, and
said terminal portions of said conductors being adapted and arranged to penetrate the insulation of an electric wire, whereby the partial removal of an electric wire from either end opening of said housing moves said locking members to lockingly engage said wires against said conductors and said terminal portions make electric contact with said electric wires.

2. The structure set forth in claim 1, wherein said locking members have non-smooth upper surfaces for frictional engagement by electric wires disposed within said housing.

3. An electric wire connecting device having in combination

a housing having a chamber therein,
an opening at one end of said housing into said chamber,

a pair of insulated conductors disposed in said chamber, said conductors respectively having terminal portions projecting into said chamber,

a wedge shaped locking member in opposed spaced relation to said conductors providing passage therebetween to accommodate an electric wire, said locking member being supported on a bottom wall surface inclined upwardly in the direction of said end opening of said housing,

said locking member having a non-smooth upper surface arranged to have frictional engagement with an electric wire, and

whereby partial removal of an electric wire inserted into said housing causes the simultaneous upward outward movement of said locking member for locking engagement of said electric wire between said locking member and said conductors.

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