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[54] **CONNECTOR**  
**9 Claims, 7 Drawing Figs.**

[52] U.S. Cl. .... **339/221,**  
**339/97, 339/198, 339/242**  
 [51] Int. Cl. .... **H01r 9/08,**  
**H01r 9/17**  
 [50] Field of Search ..... **339/95,**  
**221, 96, 97, 98, 99, 198, 242**

**ABSTRACT:** A solderless wire-connector comprises a slotted thin resilient metal plate supported against a correspondingly slotted rigid base having a wire cutoff anvil surface.

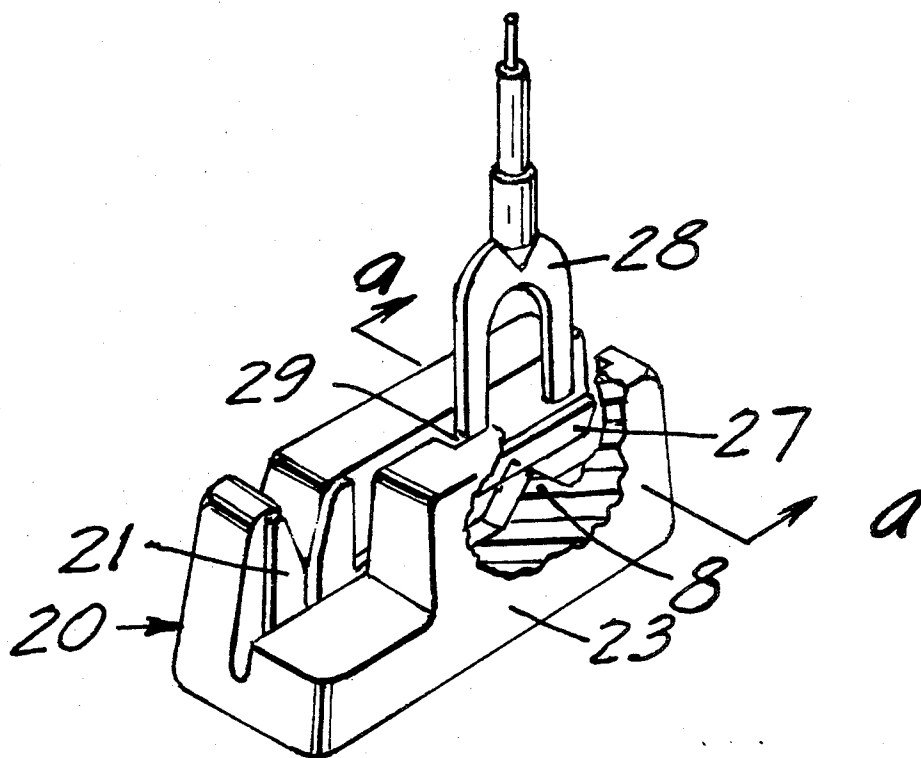


FIG. 1

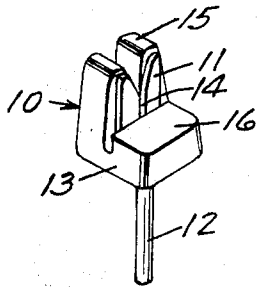


FIG. 2

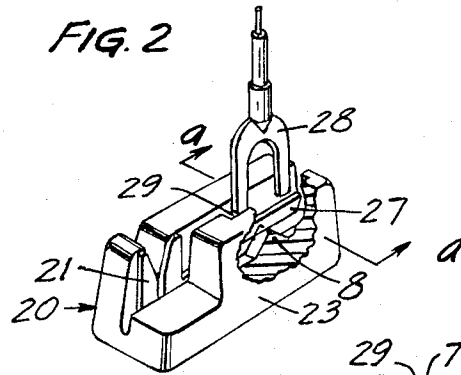


FIG. 3

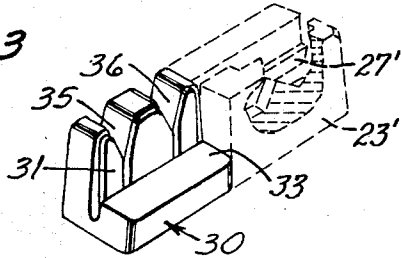


FIG. 4

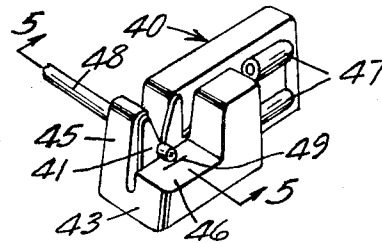


FIG. 2a

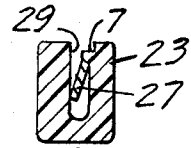


FIG. 6

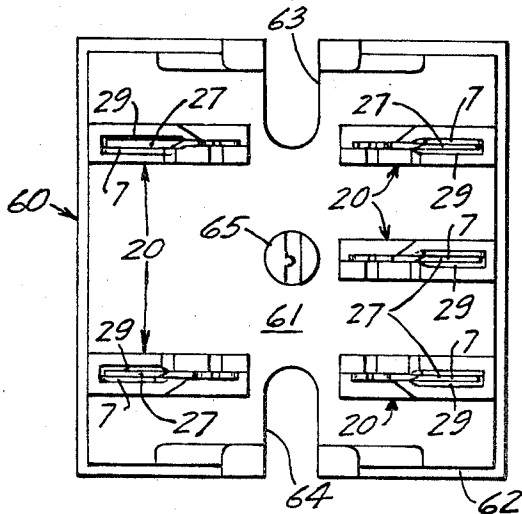
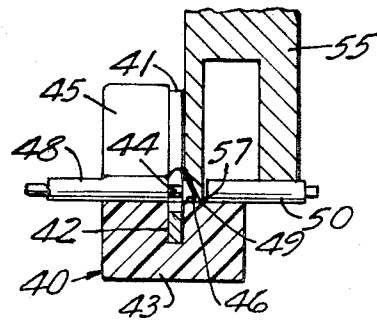


FIG. 5



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## CONNECTOR

This invention relates to electrical connectors, and in particular to solderless connectors for insulated small wires.

In one important aspect of the invention there is provided a solderless wire-connector useful as a component of telephone terminal connectors for making connection between two or more insulated wires or with another wire carrying a fork or plug-type terminal. A number of connector elements may be incorporated in a single terminal for making connection with other wires within the circuitry or with leads from external instruments or appliances. An example is a telephone connecting block wherein is provided five spade or fork sockets each with one or more solderless wire-connectors forming a part thereof, for facilitating the installation of telephone outlets.

The invention employs thin resilient slotted plate contact members similar in many respects to those described for example in U.S. Pat. Nos. 3,012,219 and 3,202,957 but possessing a number of additional advantages. The connector typically need consist only of a supporting base and a contact element. The connection, once formed, remains in full view. The contact member may be easily extended and formed into contact elements of other desired configuration.

The connectors of the present invention additionally provide means for the ready removal of excess wire in forming a terminal connection, as well as providing desirable strain relief in the completed connection.

In the drawing,

FIG. 1 is a view in perspective of a wire-connector designed to make connection between a wire-end and a contact post;

FIG. 2 illustrates in perspective, with portions cut away to show interior structure, a wire-connector for making contact between a wire-end and a fork-type terminal;

FIG. 2a, is a partial sectional view taken approximately at section a-a of FIG. 2;

FIG. 3 is a view in perspective of a wire-connector for connecting together two wire-ends and including in phantom an optional extension similar to that of FIG. 2;

FIG. 4 is a view in perspective of a connector with an inserted wire-end and suitable for making contact with plug-type terminals;

FIG. 5 is a partial view taken approximately at section 5-5 of FIG. 4, showing the application of a wire-end to a wire-connector by means of an applicator and cutoff tool; and

FIG. 6 is a plan view showing the assembly of five wire-connector and fork socket terminals in a telephone connecting block.

In each instance the solderless wire-connector will be seen to comprise a thin resilient contact plate and a rigid block or backup member. The contact plate is bifurcate, being deeply narrowly slotted from one edge to form a wire-accepting open-mouthed slot. The block has a short leg and a parallel extended leg, the two defining a narrow transverse groove therebetween, the contact plate fitting tightly therein. The extended leg is bifurcate and defines a longitudinal slot in line with the slot of the contact plate, and has a flat surface with which the contact plate is in close proximity or actual contact. The shorter leg of the block has a flat terminal surface which is generally perpendicular to both the extended leg and the slot therein and serves as a platform or anvil for subsequent cutting of the wire-end thereagainst if desired. The contact plate is retained within the groove in the base, and may be extended in any desired direction to provide for connection with additional contact members as desired.

In FIG. 1 is shown wire-connector 10 having a contact plate 11 extended to form a contact post 12 and supported within a laterally grooved block 13 which is additionally centrally perforated to permit passage of the post 12. The plate 11 is deeply slotted from the outer end to form two opposing legs defining an open-mouthed wire-accepting slot 14, and is disposed in snug face-to-face contact with the flat inner face of the bifurcate leg 15, the narrow slot of the plate 11 and the somewhat wider slot of the leg 15 being in alignment. The short leg of the

block 13 terminates in a flat platform surface 16 at or slightly above the base of the slot 14 in the plate 11 and perpendicular to the contact element 11 and the leg 15.

Closely similar structure is shown at the left-hand portion of the connector 20 as illustrated in FIGS. 2 and 2a. In this modification the block 23 is extended laterally to provide an enclosure for a lateral extension 27 of the contact plate 21, and is laterally grooved to form a groove 29 of extended width for entry of a fork terminal 28. The extension 27 is at an acute angle with the plane of the plate 21 and the inner surface of the block to provide for easy insertion of a terminal 28 as indicated, and is protected and held in place by an inner ledge 7 which may be formed by upsetting the edge of the block 23 as shown in FIG. 2a. The bottom of the groove 29 is centrally extended in an inverted V-shaped portion 8 for centering the inserted fork terminal 28.

In the connector 30 of FIG. 3, a double contact plate element 31 is supported within a double block member 33 to provide for connecting together two wire-ends, thereby providing two bifurcate contact elements having one leg in common. It will be appreciated that the two bifurcate contact elements may alternatively be independent but interconnected.

The connector 40 of FIGS. 4 and 5 comprises a laterally extended bifurcate deeply slotted contact plate 41 retained within a transversely grooved block 43 having a correspondingly slotted and laterally extended longer leg 45 and a shorter leg having a cutoff face 46. In this modification the extended portion of the plate 41 is formed into two parallel resilient tubelike receptacles 47 for plug-type terminals. FIGS. 4 and 5 additionally show an insulated wire-end 48 disposed within the slotted contact plate and making electrical connection therewith. A line 49 represents the slight depression left by the cutoff tool in applying and severing the wire.

The introduction of the wire-end into the connector, and the removal of unnecessary portions of said wire-end, are shown in more detail in FIG. 5. The plate 41 is seated in the transverse groove 42 of the base 43. The end of the slot in the plate 41 is slightly below the upper level of the terminal surface 46 of the shorter leg of the block 43. The wire-end 48 is forced into the narrow slot in the plate 41 by means of the wedge-shaped blade 57 of a hollow-ended special tool 55 available from telephone installation supply sources. Alternatively, the wire may be forced into the slotted plate using an ordinary screwdriver and if desired may then be cut against the anvil surface by means of a knife or chisel.

The force required to insert the wire-end into the slotted plate against the resiliency of the spring brass or other metal of which the plate is constructed would normally have a tendency to cause undue deformation or buckling of the unsupported plate element. In the device of the present invention, however, the plate is supported and reinforced at the one face by the leg 45 of the rigid block and from the opposing face by the presence of the tool 55, so that the contact element is prevented from buckling or folding and is therefore retained in planar configuration and capable of providing permanent resilient or spring compression reserve contact between the slot-defining edges of the plate and the metallic conductor of the wire 48, as illustrated by the contact area 44. The sharpened extended blade 57 of the tool 55 pressing toward the flat surface 46 acts effectively to shear the wire at a plane slightly removed from the plate 41, so that the excess end portion 50 may be removed and so that there is no subsequent possibility of tension being applied to the wire in a direction tending to remove the plate from face-to-face contact with the leg 45. Any tension applied to the wire 48 serves only to force the plate 41 more firmly against the leg 45, which thus provides strain relief to the connection.

In a specific example and as illustrated in FIG. 2, a solderless connector made in accordance with the principles of the invention and to a size suitable for handling telephone switchboard or connector block connections employs a bifurcate or U-shaped contact element 21 made from 24 to 28 gage cartridge brass plate and having a width of 0.16 inch, the

remaining dimensions being proportionate. The bifurcate longer leg of the block 23 is 0.125 inch in thickness and has a total length of 0.30 inch; the shorter leg has a total length of 0.11 inch. The block is ordinarily formed of hard thermoplastic polymer, such as medium or high impact acrylonitrile-butadiene-styrene terpolymer, by injection molding procedures but may alternatively be made in other ways and of other thermoplastic or thermosetting materials having good insulating and heat-resistance properties, such for example as a phenolic resin or a polycarbonate plastic, or even of metal when only structural rather than electrical connections are involved.

FIG. 6 illustrates an application wherein a number of the connectors 20 of FIG. 2 are combined in a single terminal box or block, in this instance a telephone connecting block 60. The base 61 of the block, molded in a single piece with the blocks of the connectors, has a narrow recessed margin 62 to receive a cover, not shown. Wire or cable entry ports 63, 64 are provided at opposite sides and a central guide and strain relief post 65 provides means for positioning and holding the wires. Loose wire-ends from a telephone dropline are attached to the slotted contact plates, and excess lengths of wire are removed, by the procedures described in connection with FIGS. 4 and 5. Fork terminals attached to the telephone cord are inserted into the grooves 29 and against the resilient contact plate extensions 27 of the connectors 20 as described in connection with FIGS. 2 and 2a. Twin wire-contacts as described in connection with FIG. 3 may be used in place of the single contact of FIG. 2 where additional connections are desired, as shown in phantom in FIG. 3 by block extension 23' and flat plate extension 27' of contact element 31; and other combinations and modifications may be provided. The base 61 is provided on its flat outer surface with a resiliently compressible pressure-sensitive adhesive bonding layer for convenience in applying to desk, wall, or other surfaces.

What we claim is as follows:

1. A solderless connector for supporting and making electrical contact with an insulated wire, comprising: a rigid block having a short leg and a parallel extended leg defining a narrow groove therebetween, said short leg having a flat fully exposed terminal surface generally perpendicular to said extended leg, and said extended leg being bifurcate and defining a narrow wire-accepting slot; and a thin bifurcate conductive resilient contact plate fitting tightly within said groove and substantially against said extended leg and defining a deep narrow slot in line with said slot in said leg, for receiving and making resilient permanent spring compression reserve contact with a wire forcefully inserted into said slots and against said terminal surface.

2. Connector of claim 1 wherein said block is of rigid electrical insulation material.

3. Connector of claim 2 wherein said contact plate is extended from the bifurcate wire-contacting portion to form at least one additional contact member.

4. Connector of claim 3 wherein a said additional contact member is in the form of a contact post.

5. Connector of claim 3 wherein a said additional contact member includes at least one additional bifurcate wire-contacting portion.

6. Connector of claim 3 wherein a said additional contact member is in the form of a flat plate spring contact.

7. Connector of claim 3 wherein a said additional contact member is in the form of at least one resilient tubular contact member.

8. Connector of claim 3 wherein one said additional contact member is a second thin bifurcate contact plate and another said additional contact member is in the form of a flat plate spring contact.

9. A telephone connecting block including a flat base for attachment to a supporting structure, and integral therewith, a plurality of solderless connectors as defined in claim 6.

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