United States Patent

[11] 3,605,072

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[54] SOLDERLESS WIRE CONNECTOR
5 Claims, 5 Drawing Figs.

[52] U.S. Cl. 339/98
[51] Int. Cl. H01r 11/20
[50] Field of Search 339/97–99

[56] References Cited

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3,027,536	3/1962	Pasternak	339/97
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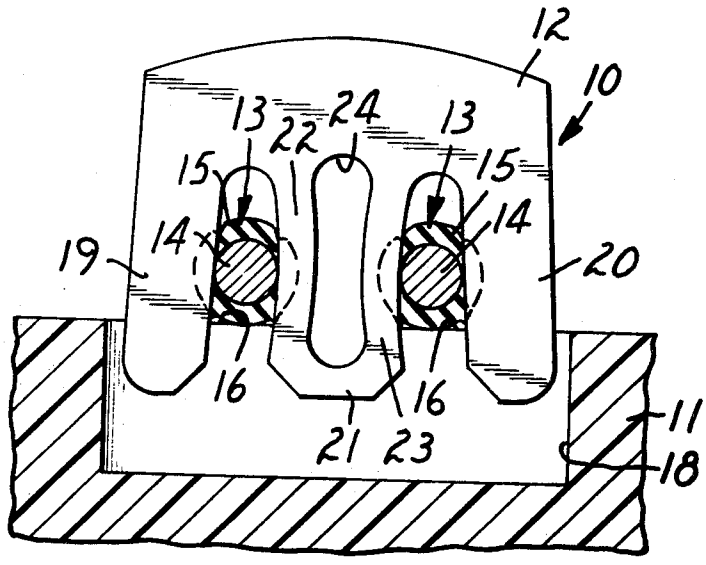
ABSTRACT: A solderless wire connector comprising a thin resilient flat plate contact element with parallel extended legs fitting into a grooved wire-supporting base and defining open-ended wire-receiving slots, wherein said legs are internally perforated to provide stress relief along wire-contacting edges.



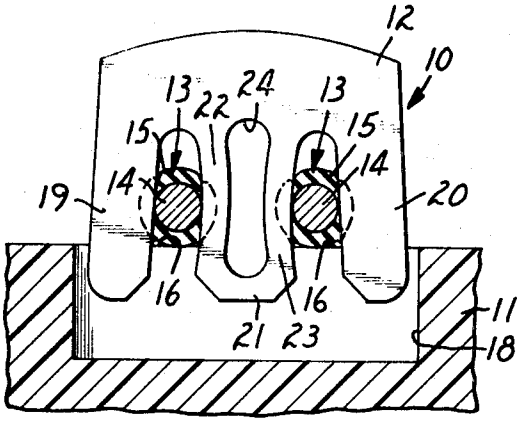


FIG. 1

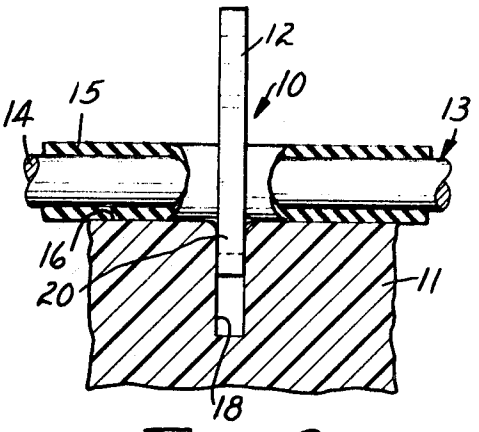


FIG. 2

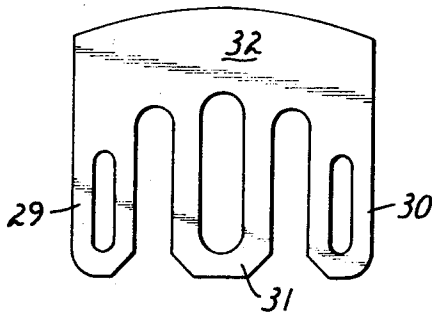


FIG. 3

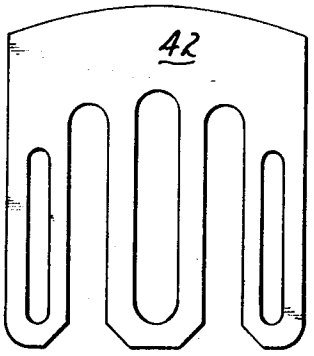


FIG. 4

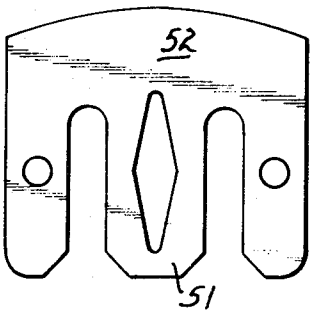


FIG. 5

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SOLDERLESS WIRE CONNECTOR

This invention relates to solderless wire connectors for making electrical connections to insulated wires. The contact element consists essentially of a thin resilient flat metal plate having parallel extended legs defining open-ended wire-receiving slots. Connectors of this type have previously been described, for example in Levin et al. U.S. Pat. No. 3,012,219 and in Elm U.S. Pat. Nos. 3,258,733 and 3,388,370. They provide excellent electrical contact with insulated wires of appropriate diameter but require surprisingly high application forces, particularly for larger wire sizes or for simultaneous connection to a number of wires.

The present invention makes possible a significant reduction in the force required for insertion of the wires, and at the same time improves the wire-retaining ability of connectors of the type described. As a result, connection to wires of relatively large diameter, or to flat cables containing many parallel smaller wires, is facilitated. Connectors made in accordance with the invention are found to be particularly effective on aluminum wires, which normally tend to undergo cold flow deformation under continued severe stress.

These and other advantages are obtained by providing means for relieving a portion of the stress applied along the edges for the extended legs of the contact element. In a preferred embodiment, some or all of the extended legs are perforated to provide an open interior stress-relief area. The remaining edge strips are thus enabled to be resiliently deformed as the element is forced onto a wire, thereby reducing the degree of resilient deformation required in the area of the plate connecting the two wire-contacting legs. The slight deformation at the contacting edge results in an increase in the ability of the connector to retain the wire against forces tending to loosen or remove the same.

Illustrative embodiments of the invention will now be further described in connection with the appended drawing, wherein

FIG. 1 is a front elevation, and FIG. 2 a side elevation, of a portion of a connector shown partly in section and as applied to two insulated wires, and

FIGS. 3–5 are front elevations showing alternative contact member configurations.

The connector **10** of FIGS. 1 and 2 will be seen to comprise a base **11** and a contact element **12** having narrow outer legs **19, 20** and a wider centrally perforated central leg **21**. Wires **13**, consisting of copper conductor **14** and insulating covering **15**, are supported on wire-supporting surfaces **16** of the base **11** and lie across a narrow groove **18** designed to receive the element **12**, the wires being supported in alignment with the open-ended slots defined by adjacent legs of the contact element. Forcing the element **12** into the grooved base forces the wires into the slots and causes resilient spreading of the outer legs **19, 20**. The slot-defining edges of the legs displace the insulation **15** and make electrically conductive contact with the wire **14**. The width of the inner leg is greater than that of the outer legs in these contact elements to provide space for the thickness of insulation on the wires.

The central leg **21** of contact member **12** is longitudinally perforated at perforation **24**, as shown in FIG. **1**, leaving two narrow terminally interconnected edge strips **22, 23**. Under the forces imparted on entry of the wire **14**, these strips are resiliently bowed inwardly, thereby decreasing the force required to make the connection and at the same time providing a more secure grip on the wire than would be possible without the stress-relief opening.

FIG. 3 illustrates an alternative contact element **32** wherein the outer legs **29, 30** as well as the inner leg **31** are perforated, thereby still further reducing the force required to effect the contact and also further improving the angle of contact.

The elongated contact element **42** of FIG. 4 is capable of making effective contact with more than one wire in each open-ended slot. The narrow edge strips of the several legs of the element maintain substantially equal pressure against each of the wires inserted, so that good contact is provided with each wire.

FIG. 5 illustrates another variation wherein the central leg **51** of the contact element **52** is provided with a generally diamond-shaped perforation whereas the outer legs **49, 50** each have a circular perforation in line with the widest portion of the diamond, thereby providing a centering action to position the wires between the legs of the contact element.

It will be appreciated that the same principles may be applied to connectors wherein the contact element may have two, three, or any larger number of legs defining any desired number of wire-receiving open-ended slots, and with various specific configurations or combinations of perforations forming stress-relief openings in some or all of said legs.

In a specific illustrative but nonlimiting example of a connector as shown in FIGS. 1 and 2 and designed for connecting together two No. 10 plastic insulated copper wires, the contact element **12** is made of 35 mil tin-plated spring-temper brass plate. The overall dimensions are 0.415×0.365 inch. The length of the center leg is 0.230 inch. The stress-relief opening in the center leg is 0.062 inch wide and 0.217 inch long, the edge strips therefore being 0.038 inch in width. As compared with an otherwise identical contact element but having no stress-relief opening, the wire insertion force is reduced by about one-tenth, while the force required to remove the element from the wires is increased by about the same amount. After 2,000 cycles on a test rack, each cycle representing 45 minutes on voltage followed by connector is measurably less than that at the conventional connector.

What is claimed is as follows:

1. A contact member for a solderless connector, comprising a thin resilient flat plate having at least one pair of parallel extended legs defining an open-ended wire-receiving slot, at lest one of said legs having a perforation laterally spaced from the wire-receiving slot for partial relief of stress at the wire-contacting edge during forceful insertion of a wire into said wire-receiving slot.

2. The contact member of claim 1 having three extended legs defining two wire-receiving slots and wherein the central leg is perforated for stress relief.

3. The contact member of claim 1 wherein each of said legs is perforated for stress relief.

4. The contact member of claim 1 wherein said legs extend a distance sufficient to permit insertion of at least two wires into said wire-receiving slot.

5. A wire connector comprising the contact member of claim 1 cooperatively associated with a transversely grooved base having a wire-supporting surface, said contact member being disposed for entry of said legs into said groove and with said wire-receiving slot in line with said wire-supporting surface.

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,605,072 Dated September 14, 1971

Inventor(s) Aelred Daniel Driscoll

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, line 39, following "by" insert 15 minutes off voltage, the resistance at the stress relief

Column 2, line 44, after "at" delete "lest" and insert --least--

Signed and sealed this 14th day of March 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

FORM PO-1050 (10-69)

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