Jan. 14, 1969 W. D. THOMSON 3,422,391

DEVICE FOR SPLICING ELECTRICAL WIRES

Filed April 7, 1967

FIG. 1.

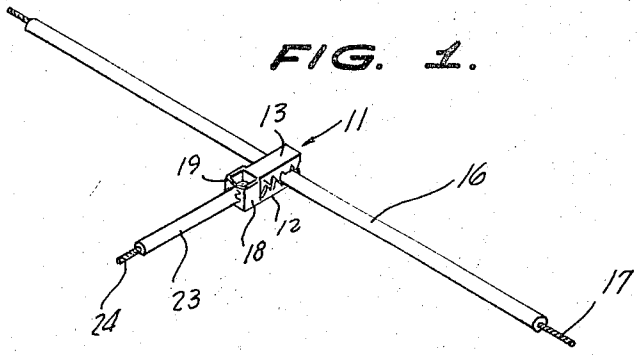


FIG. 2.

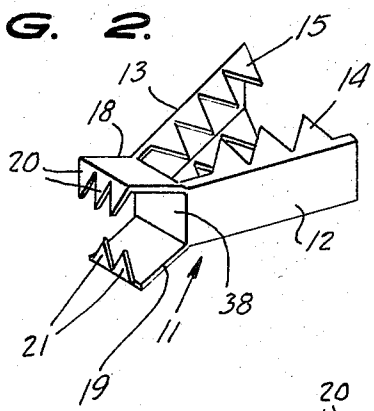


FIG. 3.

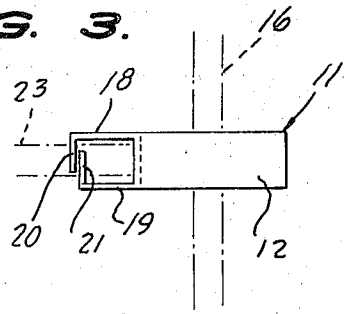


FIG. 4.

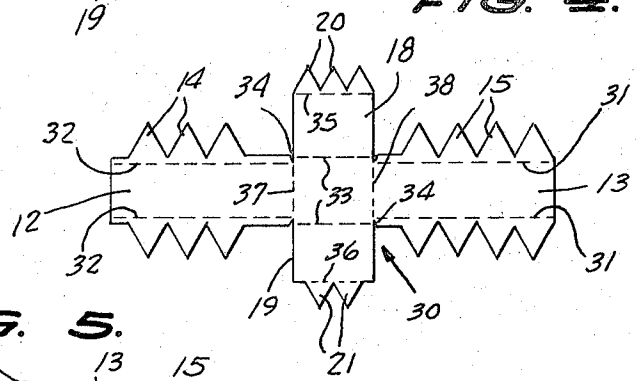
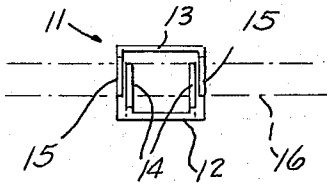


FIG. 5.



INVENTOR.
WARREN D. THOMSON,

BY

Berman, Davidson & Berman
ATTORNEYS.

United States Patent Office

3,422,391

Patented Jan. 14, 1969

3,422,391

DEVICE FOR SPLICING ELECTRICAL WIRES

Warren D. Thomson, Dayton, Wash.
(1124 Benjamin Ave., Clarkston, Wash. 99403)

Filed Apr. 7, 1967, Ser. No. 629,257
U.S. Cl. 339—97 6 Claims
Int. Cl. H01r *11/20;* A44b *21/00;* H02b *3/00*

ABSTRACT OF THE DISCLOSURE

A wire connector consisting of a cruciform body of bendable sheet metal bent to define two opposite pairs of opposing jaws. One pair of jaws has opposed inwardly-extending teeth at its transverse end edges. The other pair of jaws has opposed teeth extending inwardly from the side edges thereof.

This invention relates to wire connectors, and more particularly to devices for connecting insulated wires together electrically without the necessity of making soldered connections or of stripping the insulation from the wires.

A main object of the invention is to provide a novel and improved connector for insulated wires of the type having prongs which pierce the insulation of the wires to be electrically connected together while, at the same time, mechanically-clamping the wires in connected relationship, the device being simple in construction, being easy to install, and forming a secure and reliable electrical connection as well as a firm mechanical connection between the wires with which the device is employed.

A further object of the invention is to provide an improved wire connector of the insulation-piercing type, the connector being inexpensive to manufacture, being durable in construction, being compact in size, and being applicable to the wires to be connected in a manner permitting its use in relatively constricted spaces as well as in locations where ample space for installation is available.

A still further object of the invention is to provide an improved electrical connector for use with insulated wires, as well as with wires of the non-insulated type, the device being of inexpensive, one-piece construction, being easy to fabricate, and being arranged so that it can be installed by means of very simple squeezing operations which can be performed, using simple tools.

Further objects and advantages of the invention will become apparent form the following description and claims, and from the accompanying drawing, wherein:

FIGURE 1 is a perspective view showing the manner of use of a typical connector constructed in accordance with the present invention, employed to connect one insulated wire to another insulated wire.

FIGURE 2 is an enlarged perspective view of the connector employed in FIGURE 1 with the jaws thereof separated preparatory to use.

FIGURE 3 is a side elevational view of the wire connector of FIGURE 2 showing the jaws thereof in wire-contacting and gripping positions.

FIGURE 4 is a plan view of a sheet metal blank employed to form a wire connector such as is illustrated in FIGURES 1, 2 and 3.

FIGURE 5 is a rear end elevational view of the wire connector of FIGURE 2 with the jaws thereof shown in closed, wire-gripping positions.

Referring to the drawing, **11** generally designates an improved device for connecting insulated wires, constructed in accordance with the present invention. The device **11** comprises a body of sheet metal formed with a relatively long first pair of opposing bendable jaws **12** and **13**, the side edges of the respective jaws being provided with inwardly-directed rows of pointed spurs shown at **14** and **15**. The spurs on the side edges of one of the jaws are longitudinally-staggered with respect to the spurs on the side edges of the other jaw. Thus, in the typical example shown, the side edges of the jaw **12** have three uniformly-spaced spurs **14** and the side edges of the jaw **13** have four uniformly-spaced spurs **15**, the spurs **14** and **15** being substantially identical in size and shape, but the spurs **14** being staggered relative to the spurs **15** with respect to the longitudinal direction of the body of the connector. Furthermore, the spurs on one of the jaws are offset inwardly relative to the spurs on the other jaw, for example, the planes of the spurs **14** are parallel to, but are spaced inwardly from the planes of the spurs **15**, as shown in FIGURE 5. It will thus be readily apparent that the arrangement of the jaws **12** and **13** and their associated spurs **14** and **15** is such that the jaws may be squeezed together transversely on a first insulated electrical conductor **16** in the manner shown in FIGURE 1, and as a result of the squeezing pressure applied to urge the opposing jaws **12** and **13** inwardly, the spurs **14** and **15** will penetrate the insulation of the conductor and will engage the central conductor **17**, making electrical contact therewith. At the same time, due to the inwardly-offset relationship of the spurs **14** relative to the spurs **15**, the spurs will not interfere with each other and are free to exert tight gripping action on the central conductor **17**. Also, the staggered relationship of the spurs **15** with respect to the spurs **14** insures that effective tight electrical contact will be made with the center conductor wire **17** as a result of the application of a squeezing force to the opposing jaws **12** and **13**, as above-described.

The opposite end of the body of the conductor is formed with another pair of opposing bendable jaws **18** and **19** whose central longitudinal plane is perpendicular to the central longitudinal plane of the first-described jaws **12** and **13**. The transverse end edges of the jaws **18** and **19** are likewise provided with inwardly-directed, staggered pointed spurs shown at **20** and **21**. Thus, as shown in FIGURE 2, the top jaw **18** is provided with three uniformly-spaced, transversely-arranged pointed spurs **20** and the bottom jaw **19** is provided with two uniformly spaced, transversely-arranged spurs **21** staggered relative to the spurs **20** in a transverse direction. However, the lower set of spurs **21** is inwardly-offset relative to the upper set of spurs **20**, as shown in FIGURE 3, to provide mutual clearance for the spurs when they are squeezed together on an insulated wire **23** to make an electrical and mechanical connection thereto. Thus, in connecting one insulated wire **23** to another insulated wide **16**, the insulated wire **16** may first be placed between the jaws **12** and **13** in a transversely-extending relationship relative thereto, as shown in FIGURE 1, and squeezing pressure may be applied to the jaws **12** and **13**, for example, by the use of a pair of ordinary pliers, with the squeezing force exerted vertically, as viewed in FIGURE 1. The second insulated wire **23** may then have its end inserted between the jaws **18** and **19** and squeezing force may then be applied to the jaws **18** and **19** by means of the pair of pliers, with the squeezing force exerted horizontally, as viewed in FIGURE 1. In the case of the first wire **16**, the spurs **14** and **15** are forced into electrical contact therewith, after penetrating through the insulation of the wire. In the case of the second wire **23**, spurs **20** and **21** on the jaws **18** and **19** are similarly forced through the insulation of the wire and are forced into electrical and mechanical contact with the central conductor **24** of the insulated wire **23**. In both cases the wires **16** and **23** are firmly and securely gripped by the respective sets of jaws **12, 13** and **18, 19**, and are also electrically-connected together because of the electrical contact made by the

respective sets of spurs **14**, **15** and **20**, **21** with the conductors **17** and **24**.

The device **11** is preferably made from a single piece of bendable sheet metal, such as a generally cruciform-shaped blank **30**, shown in FIGURE 4. The blank **30** is shaped with the two opposing jaws **12** and **13** extending longitudinally thereof, the side edges of the jaws being formed with the spurs **14** and **15**, as above-described, the side marginal portions of the jaws being bendable along longitudinal fold lines shown at **31** and **32**. The blank also includes transversely-extending jaw elements **18** and **19** formed at their ends with the sets of pointed spurs **20** and **21**, above-described, the jaws **18** and **19** being bendable along longitudinal fold lines **33**, **33**, as shown. The fold lines **31** and **32** are offset inwardly slightly relative to the fold lines **33**, and short slits **34** are provided to facilitate the folding of the serrated side portions of the jaws **12** and **13** on the fold lines **31** and **32**. The slits **34** extend to said fold lines **31** and **32**, as shown. The serrated end portions of the jaw elements **18** and **19** are foldable inwardly on fold lines **35** and **36**, as shown. Jaws **12** and **13** are foldable on transverse fold lines **37** and **38'**, so that the jaws **12** and **13** may be folded to the opposing configuration of FIGURE 2, whereas, the jaws **18** and **19** may be similarly folded to the opposing configuration, also shown in FIGURE 2. After folding, a generally rectangular transversely-extending center portion **38** is thus defined between the two sets of opposing jaws.

The connector device is preferably coated with copper or other suitable non-corrosive metal, to prevent corrosion of the connector and to allow it to be satisfactorily employed even in relatively adverse environments. If so desired, the exterior surfaces of the connector may be coated with suitable insulating material.

The size of the pointed spurs **14**, **15**, **20** and **21** may vary in accordance with the specific requirements of use of the connector, for example, may be approximately ⅛ inch long for large-sized clamps, and may be as small as 1/16 of an inch in length for smaller-sized clamps.

The connectors are especially suitable for direct current applications, such as with automotive equipment. The thickness of sheet metal employed to fabricate the connectors may be approximately **24** gauge.

In the specific embodiment illustrated in the drawing, the jaws **12**, and **13**, respectively, have three and four pointed spurs at their side edges, and the jaws **18** and **19**, respectively, have three and two pointed spurs at their transverse end edges. Obviously, the number of spurs employed may be varied in accordance with the specific requirements for which the connectors are designed.

While a specific embodiment of an improved device for connecting insulated wires has been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. A device for attachment to wires to establish electrical connections therebetween comprising a body of conductive metal formed with a first pair of bendable jaws having opposed pointed spurs at their side edges to penetrate the insulation of and make contact with the conductor of an insulated wire clampingly-received transversely therebetween when the jaws are squeezed together, said body being formed with a second pair of bendable jaws opposite said first pair having transverse end edges and having opposed pointed spurs at their transverse end edges to penetrate the insulation of and make contact with the conductor of another insulated wire clampingly-received therebetween perpendicular to the first-named insulated wire when said second pair of bendable jaws are squeezed together, whereby to electrically connect the two insulated wires, wherein the spurs at the side edges of one of the jaws of the first pair are offset inwardly relative to the spurs at the side edges of the other jaw of said first pair, wherein the opposing spurs at the transverse end edges at the second pair of jaws are offset relative to each other, and wherein the spurs at the side edges of one of the jaws of the first pair are staggered longitudinally relative to the spurs at the side edges of the opposing jaw of said first pair.

2. The attachment device of claim **1**, and wherein the opposing spurs at the transverse end edges of the second pair of jaws are longitudinally staggered relative to each other.

3. The attachment device of claim **2**, and wherein said body is formed from a single piece of sheet metal.

4. The attachment device of claim **3**, and wherein said body is originally of substantially cruciform shape, said respective sets of jaws being formed from opposing arms of the cruciform sheet metal body.

5. The attachment device of claim **2**, and wherein the median longitudinal planes of the respective pairs of bendable jaws are perpendicular to each other.

6. The attachment device of claim **5**, and wherein said body of conductive metal includes a generally rectangular transversely-extending center portion, said first pair of bendable jaws extending from the opposite side edges of said generally rectangular portion and said second pair of jaws extending from the top and bottom edges of said generally rectangular portion.

References Cited

UNITED STATES PATENTS

963,425	7/1910	Dusinberre	339—255
1,508,475	9/1924	Pons	339—255
1,543,524	6/1925	Sherman	339—261
1,779,442	10/1930	Mueller	339—255
2,444,229	6/1948	Johnson	339—255
2,534,881	12/1950	Schroeder	174—84

FOREIGN PATENTS

109,050	11/1939	Australia.

MARVIN A. CHAMPION, *Primary Examiner.*

JOSEPH H. McGLYNN, *Assistant Examiner.*

U.S. Cl. X.R.

24—81; 174—71