Nov. 4, 1969 R. E. LAWLOR 3,477,060

ELECTRICAL CONNECTOR OF INTEGRAL SHEET METAL CONSTRUCTION

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Fig. 5

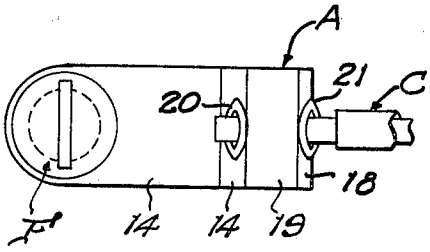


Fig. 6

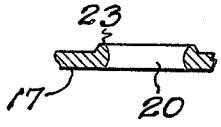


Fig. 3

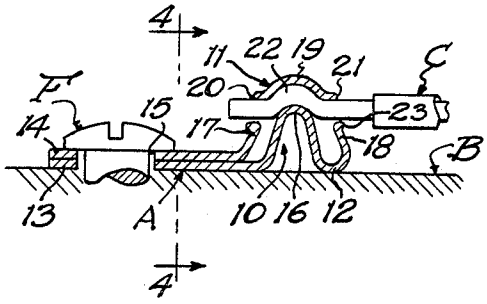


Fig. 4

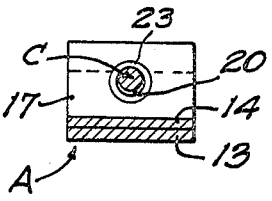


Fig. 1

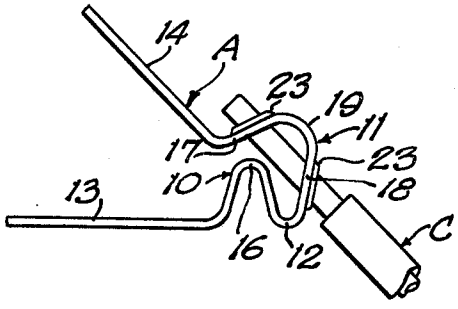
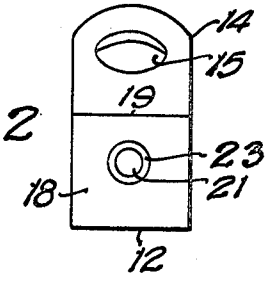


Fig. 2



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ELECTRICAL CONNECTOR OF INTEGRAL SHEET METAL CONSTRUCTION

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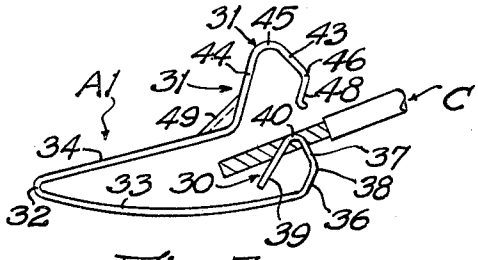


FIG. 7

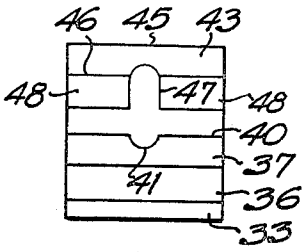


FIG. 8

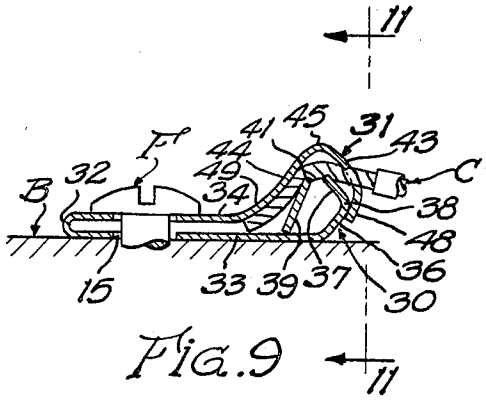


FIG. 9

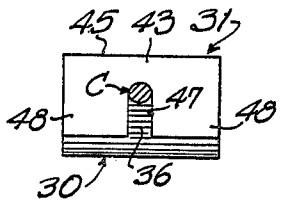
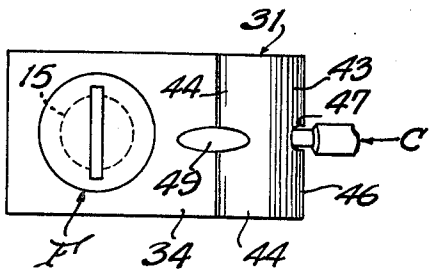


FIG. 11

FIG. 10



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ELECTRICAL CONNECTOR OF INTEGRAL SHEET METAL CONSTRUCTION

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Int. Cl. H01r 7/20, 9/10
U.S. Cl. 339—266 9 Claims

ABSTRACT OF THE DISCLOSURE

Wire clamping electrical connector embodying opposed parts integrally connected by a resilient web functioning as a hinge and having wire-clamping jaws with respective integral tails functioning (1) as lever arms to bring the jaws together in clamping engagement with a wire, and (2) as anchor tabs to be secured to a support and thereby to hold the jaws in the wire-clamping positions.

BACKGROUND OF INVENTION

Electrical connectors embodying separate wire-clamping jaws hinged together and having anchor tails as described above, are known in the art and have been patented in the following U.S. patents: 3,118,720, Jan. 21, 1964, Lawlor; 3,138,422, June 23, 1964, Lawlor; 3,351,889, Nov. 7, 1967, Lawlor and Beaudion.

Such connectors are somewhat expensive in construction, the simplest method of manufacture yet devised being that of slicing narrow sections from extruded strips having the proper cross-section to provide the jaws and tails and also to develop a hinge when coupled together.

With the foregoing in mind, the general object of the present invention is to provide a connector of the general type described above, and which is of inexpensive construction and especially suitable in connectors of small size.

DESCRIPTION

In the drawings:

FIG. 1 is a side elevational view of a connector embodying one form of the invention; shown in its open position;

FIG. 2 is an end view of the same;

FIG. 3 is a sectional view showing the connector in closed position, secured to a support, and with the end of a conductor wire clamped between its jaws;

FIG. 4 is a cross-sectional view of the same on line 4—4 of FIG. 3;

FIG. 5 is a plan view of the same;

FIG. 6 is a fragmentary detail of a jaw window in section on an enlarged scale;

FIG. 7 is a side elevational view of a modified form of the invention, in open position;

FIG. 8 is an end view of the same;

FIG. 9 is a sectional view of the connector wire with a conductor clamped between its jaws;

FIG. 10 is a plan view of the same; and

FIG. 11 is an end view taken on line 11—11 of FIG. 9.

Referring now to FIGS. 1–6 of the drawings, I have shown therein, as an example of one form in which the invention may be embodied, a one-piece connector A of strap metal, adapted to be secured by a fastener F to a support body B and, when thus secured, to hold the end of a conductor wire C with a clamping action.

Connector A comprises a pair of jaws **10** and **11**, integrally connected by a flexible web **12** to provide a bendable hinge and having respective apertures **15** through which fastener F can be inserted into body B. Jaw **10** rises from tail **13** in the form of an arch of inverted dihedral-angular V-form, comprising upwardly converging legs joined by a curved apex bight **16**. Tail **13** is formed as a continuation of one leg, and hinge web **12** is formed as a continuation of the other leg. Jaw **11** comprises respective arms **17** and **18** joined by and diverging from an arched bridge **19** of substantially larger radius than apex bight **16**, the arms subtending a dihedral angle. Arms **17** and **18** are provided with respective jaw windows **20** and **21** having a common axis which crosses well above the apex bight **16** when the connector is in the open position of FIG. 1, whereby the bared wire end of conductor C can be freely inserted through the windows **20, 21**, clearing the apex bight **16**, as illustrated in FIG. 1. In the open position of the connector, leg **18** extends from hinge web **12** in diverging relation to the adjacent leg of jaw **10**, and the bisector axis of arms **17, 18** is tilted at a substantial angle (e.g. 45°) with reference to the bisector axis of the legs of jaw **10**.

In the closed position of the connector, as in FIG. 3, the web **12** is bent into a more fully closed loop, and the jaw **11** straddles the jaw **10** with its arms **17, 18** substantially parallel to the legs of jaw **10**, with its bisector axis substantially coincident with that of jaw **10**, and with its bridge **19** closed down toward apex bight **16** and substantially registering therewith. The bared wire end of conductor C is then deformed between the apex bight **16** below, and the bridge **19** and upper surfaces of windows **20, 21** above. The deformation of the wire produces therein a wave-form kink **22** which locks the conductor C to the connector A so as to secure the conductor against becoming detached.

As shown in FIG. 6, each window **20, 21** is rimmed by a thickened, rounded lip **23**, providing a pressure-applying surface which engages the conductor wire smoothly, cooperating with the rounded, pressure-applying surface of apex bight **16** to apply deforming pressure without cutting into the wire. The deforming pressure, which is maintained in the installed connector by the levering action of the anchored tails **13, 14**, provides good electrical connection between the wire and the connector.

FIGS. 7–10 illustrate a modified form of the invention in which a connector A1 is formed in one piece of strap metal, wherein a pair of jaws **30, 31** are formed integrally on the free ends of tails **33, 34** which at their opposite ends are integrally joined by a hinge web **32**. Tail **33** is bowed away from tail **34** in its intermediate portion, so that its jaw **30** will tend to assume a position above the level of a body B until it is pressed downwardly by mating jaw **31** upon attachment of the connector to body B, and jaw **30** will thereby be spring-loaded upwardly so as to maintain a constant spring pressure upwardly against a bared conductor wire clamped between the jaws.

Jaw **30** is of dihedral trapezoidal form, comprising legs **36** and **37** extending upwardly from base tail **33**, the leg **36** inclined outwardly and the leg **37** inclined inwardly with reference to the open center of the connector, and the two legs joined by a bend and subtending an obtuse dihedral angle to define an outwardly protruding wedge-like shoulder **38**. Jaw **30** further includes a reentrant leg **39** which converges upwardly with reference to leg **37** and is joined thereto by an apex bight **40** in the center of which is an upwardly opening notch **41** adapted to receive the bared wire end of conductor C and to cradle it as the upper jaw **31** is brought down into clamping engagement with the wire. Upper jaw **31** comprises a pair of downwardly diverging, dihedral-angularly related arms **43** and **44**, the latter integrally joined to upper tail **34** and projecting upwardly therefrom, and the two arms **43** and **44** joined by an arched bridge. Joined to outer arm **43** by a bend **46** is an obtuse dihedral-angularly related lip which is divided by a slot **47** in the lip

and in the bend **46** to provide a pair of latching fingers **48**.

As the connector is closed upon the wire end of conductor C, latching fingers **48** of upper jaw **31** will straddle the wire end and will engage the upper legs **37** of lower jaw **30**, being thereby deflected outwardly with a resilient yielding action, and will pass downwardly over shoulder **38** and spring inwardly beneath the shoulder with a latching and camming action which develops a spring-loading of jaws **30, 31** against conductor C, the bared wire end thereof being then engaged between the edges of the jaws at the bottom and top of notch **41** and slot **47** respectively. This spring-loading will augment the spring-loading developed in tails **33, 34** by the action of a fastener F inserted through tail apertures **15** and clamping the tails together against support body B, with lower tail **33** flattened from its unstressed bowed form. In closing the connector, the end of the conductor wire, if extended far enough into the connector, will be engaged by the upper, inner jaw arm **44** on the inner side of lower jaw **30** while the wire end on the outer side of apex bight **40** is engaged by the edge of upper jaw arm **43** at the top of slot **47**, whereby the wire is bent downwardly across apex bight **40** and the tip of the wire is yieldingly pressed between the inner arm **44** and the inner leg **39** of the respective jaws as indicated in FIG. 9. The clamping pressure will tend to bend the lower jaw **30** downwardly (the jaw flexing at shoulder **38** and in legs **36, 37**) and to seat the free end of reentrant leg **39** against base tail **33** so as to stiffen the resistance of the lower jaw. Also, the inner arm **44** of the upper jaw may spring outwardly to a slightly bowed condition (exaggerated in FIG. 9) under the pressure of the wire tip and the latching engagement of fingers **48** beneath shoulders **38**, thus contributing to the spring-loaded clamping action upon the conductor wire.

I claim:

1. An electrical connector of one-piece metal strip construction, comprising:

opposed tails having respective fastener apertures and adapted to be brought together in closed positions and held therein against a support body by a fastener inserted into said body through said apertures, one of said tails being a base tail to be seated against said body, and the other being a movable tail to be closed adjacent to said base tail;

male and female wire-clamping jaws integrally joined to said base tail and movable tail respectively;

said male jaw being of inverted dihedral-angular V-form, comprising legs projecting into the space between the jaws in converging relation and joined by an apex bight, and said female jaw being of arched form projecting from the plane of said movable tail on the side away from said base tail jaw and comprising respective arms joined by an arched bridge and diverging toward said male jaw in positions such as to embrace the same in the closed position of the connector;

said female jaw having an opening to receive a conductor wire and having pressure-applying surfaces disposed on opposite sides of said apex bight in the closed position of the connector, operable to apply pressure to the conductor wire on opposite sides of said bight so as to press the wire firmly against said bight and to deform the wire sufficiently to anchor the conductor to the connector;

each of said tails and its respective jaw constituting a respective half of the connector;

and a looped web integrally joining said halves and flexible so as to operate as a hinge whereby said halves may be pressed together so as to close said jaws upon a conductor wire while holding said jaws in positions for mating said male jaw into said female jaw.

2. A connector as defined in claim **1**, wherein said looped hinge web is joined directly to said jaws.

3. A connector as defined in claim **2**, wherein said female jaw has a closed window in both of its said arms, said windows having a common axis extending transversely of the bisector axis of said jaw.

4. A connector as defined in claim **3**, wherein said female jaw arms have respective raised lips of rounded cross-section rimming the respective windows and defining said pressure-applying surfaces of said female jaw.

5. A connector as defined in claim **1**, wherein said looped hinge web is joined directly to the arms of said jaws remote from the free ends of said tails and is disposed substantially in the plane of said base tail, said remote jaw arms subtending a dihedral angle diverging from said hinge web in the open position of the connector, and being closely adjacent and substantially parallel to one another in the closed position.

6. A connector as defined in claim **1**, wherein said looped hinge web is joined directly to said tails;

7. A connector as defined in claim **1**, wherein said looped hinge web is joined directly to said tails and wherein said female jaw opening is an open slot in the arm remote from said looped web.

8. A connector as defined in claim **1**, wherein said looped hinge web is joined directly to said tails;

and wherein said male jaw has a notch traversing said apex bight in a direction parallel to the major longitudinal axis of the connector and adapted to receive and cradle a conductor wire in position for clamping between said jaws.

9. A connector as defined in claim **1**, wherein said looped hinge web is joined directly to said tails and said jaws are joined to respective free ends of said tails;

and wherein said jaws are of trapezoidal configuration in side elevation, said male jaw having an obtuse dihedral angular shoulder projecting as a free extremity of the respective half of the connector;

and wherein the female jaw has a pair of terminal fingers that are laterally spaced so as to define said jaw opening in the form of an open slot to receive a conductor wire fulcrumed across said male jaw, said fingers being reentrant into the space between the jaws and positioned to latch around and beneath said shoulder in the closed position of the connector;

said apex bight having a notch traversing said apex bight in a direction parallel to the major longitudinal axis of the connector and adapted to receive and cradle a conductor wire in position for clamping between said jaws.

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U. S. Cl. X.R.

24—73, 125; 339—274