United States Patent

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[54] HERMAPHRODITIC TERMINAL

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[73] Assignee: **General Motors Corporation**, Detroit, Mich.

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[52] **U.S. Cl.** .....**339/47 R**, 339/32 R, 339/256 SP, 339/258 S

[51] **Int. Cl.** **H01r 13/28**

[58] **Field of Search** .....339/47, 48, 49, 258 S, 256 SP, 339/205, 217 S, 176 R, 176 M, 223, 213 T, 95 R, 95 D, 32 R, 276 F

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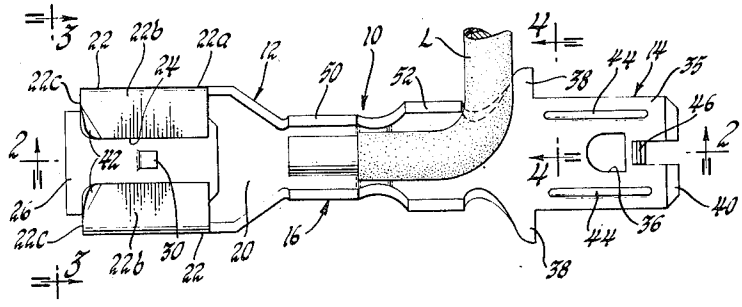
[57] **ABSTRACT**

In a preferred form, this disclosure relates to a hermaphroditic electrical connector comprising a one-piece member made from thin gauge sheet stock having a female terminal at one end portion, a male terminal at its other end portion and an intermediate portion which is adapted to be connected to an electrical lead. The female terminal has a base, a pair of upwardly extending wings at the sides of the base and with the wings having sections which are bent over toward each other to define a slot therebetween and a deflectable tongue integral with the base and which is self-biased into engagement with the bent over sections of the wings. The male terminal comprises a flat blade having upstanding ribs for strengthening same and an upstanding tang. The male terminal is adapted to be connected to a mating female terminal of another connector by inserting the same between the deflectable tongue and the wings and with the tang being received within the slot. The tang insures that the male terminal is inserted right side up so that the ribs are on the side opposite the tongue and so that a nib on the tongue will be received within an opening in the male terminal to lock the two terminals together.

3 Claims, 4 Drawing Figures



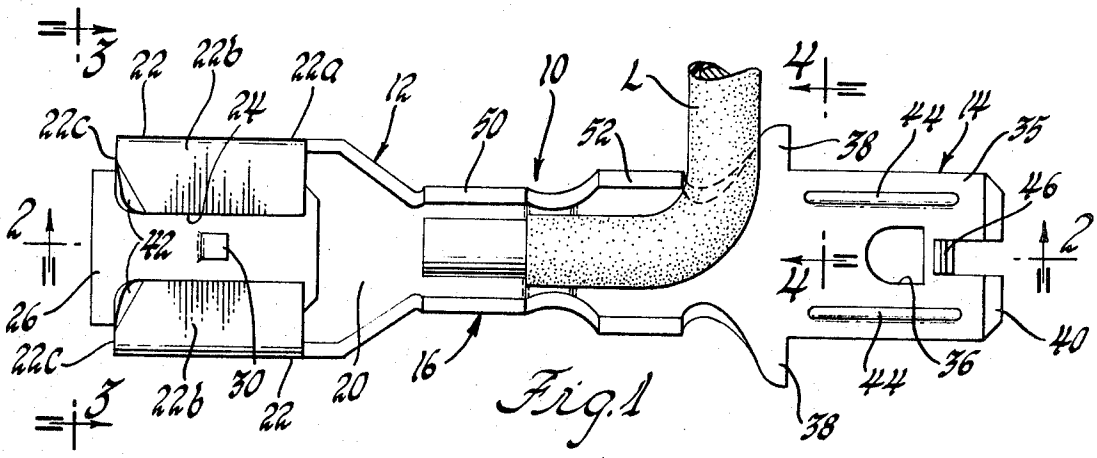


Fig. 1

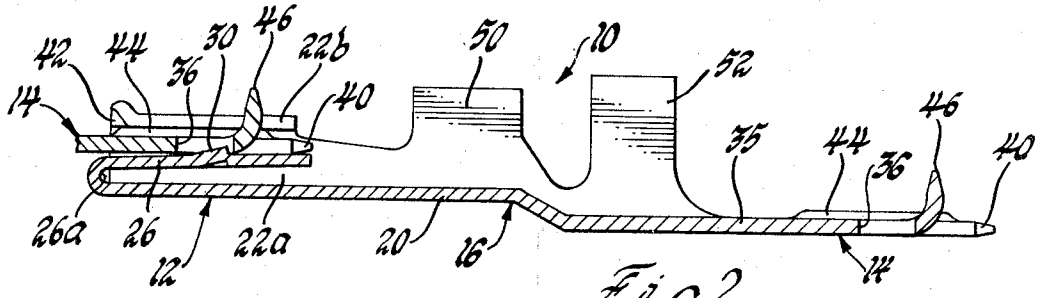


Fig. 2

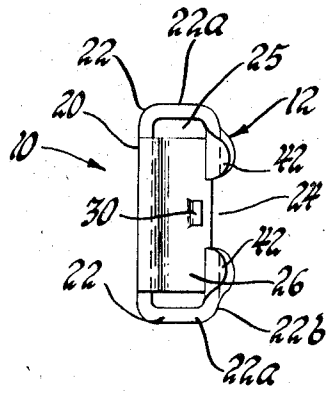


Fig. 3

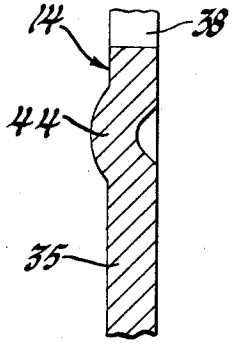


Fig. 4

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HERMAPHRODITIC TERMINAL

The present invention relates to an electrical connector, and in particular to a hermaphroditic electrical connector.

Hermaphroditic electrical connectors are connectors which have both a male and female terminal. This enables the connector to be used either way and eliminates the need for two separate terminals.

A commonly used type of electrical connection is a male spade terminal which is readily connectable to the separate female terminal having a base, a pair of upwardly extending bent over wings integral with the sides of the base and a rearwardly extending deflectable tongue integral with the base and which is self-biased into engagement with the undersides of the bent over wings. The male terminal has an opening for receiving a nib on the tongue of the female terminal and is connected to the female terminal by inserting the same between the tongue and the wings in opposition to the biasing force of the tongue until the nib is received within the opening, at which time the terminals are locked together.

The making of a hermaphroditic electrical connector having both a female and male terminal of the type noted above has presented difficulties. Due to both economical considerations and the bending operations needed to be performed to make the female terminal it has been necessary to make the female terminal of relatively thin gauge sheet stock, usually stock which is 0.018 of an inch in thickness or less. A plain flat male spade terminal of this thickness, however, is readily bendable and is not of a sufficient structural rigidity to enable it to be readily connected to this type of female terminal. As far as is known, this has necessitated that the terminals either be separately made and then butt welded together or has necessitated the use of sheet stock of varying thickness. Both of these latter methods are rather uneconomical.

In accordance with the provisions of the present invention the above-noted difficulties have been overcome. The connector of the present invention is made completely from thin gauge sheet stock and the male terminal provided with strengthening ribs to give it the requisite strength and resistance bending movement and is provided with an orientation tang so that it can be connected to the female terminal only by having its nonribbed side in engagement with the tongue to insure that the nib on the tongue of the female terminal will be received within the opening of the male terminal to lock the two terminals in place.

Accordingly, it is an important object of the present invention to provide a new and improved hemaphroditic electrical connector of the type noted above which can be made from thin gauge sheet stock, preferably 0.018 of an inch or less, and in which the male terminal is provided with strengthening ribs to strengthen same against bending movement and an orientation means so that it can only be connected to the female terminal by having its nonribbed side in engagement with the tongue of the female terminal so that the opening therein will receive the nib on the tongue of the female terminal.

A further object of the present invention is to provide a new and improved hermaphroditic electrical connector of the type noted above which can be made from thin gauge sheet stock and in which the male terminal is provided with a plurality of indented upstanding strengthening ribs extending longitudinally thereof and is provided with an upstanding tang which is received within the slot between the wings of the female terminal so that the male terminal can only be connected to the female terminal with its nonribbed side in engagement with the tongue of the female terminal to insure that the nib on the tongue will be received within the opening in the male terminal to securely lock the two terminals in place.

A still further object of the present invention is to provide a new and improved electrical connector having a male spade terminal made of thin gauge sheet stock, preferably 0.018 of an inch or less, and which is adapted to be connected to a female terminal of the type noted above, and wherein the male blade terminal is provided with a plurality of indented upstanding strengthening ribs extending longitudinally thereof to strengthen the same against bending movement upon engaging the female terminal and is provided with an upstanding tang which is received within the slot between the wings of the female terminal to insure that the nonribbed side of the male terminal engages the tongue of the female terminal so that the nib of the female terminal will be received within the opening within the male terminal to securely retain the two terminals in place.

The present invention further resides in various novel constructions and arrangement of parts, and further objects, novel characteristics and advantages of the present invention will be apparent to those skilled in the art to which it relates and from the following detailed description of the illustrated embodiment thereof made with reference to the accompanying drawings forming a part of this specification and in which similar reference numerals or characters are employed to designate corresponding parts throughout the several views, and in which:

FIG. 1 is a plan view of the novel hermaphroditic electrical connector of the present invention;

FIG. 2 is a cross-sectional view taken approximately along line 2—2 of FIG. 1 and showing a male terminal of a connector connected to a mating female terminal of another connector;

FIG. 3 is an end elevational view of the electrical connector shown in FIG. 1; and

FIG. 4 is an enlarged cross-sectional view taken approximately along line 4—4 of FIG. 1.

As representing a preferred embodiment of the present invention, the drawing shows a hermaphroditic electrical connector **10**. The electrical connector **10** is a one piece member which is made from thin gauge sheet stock, preferably 0.018 of an inch or less. The connector **10** is stamped from sheet stock and bent to the configuration shown in FIG. 1 by a suitable punch and die apparatus, and in a manner well known to those skilled in the art.

Electrical connector **10** broadly comprises the female terminal **12** at one end portion, a male terminal **14** at its other end portion and an intermediate portion **16** which is adapted to be connected to an electrical lead L.

The female terminal **12** has a flat base **20** and a pair of upstanding wings or rails **22** integral with the base at its opposite side edges. The wings **22** each includes an upstanding section **22***a* perpendicular to the base **20** and a bent over section **20***b* which is perpendicular to the upstanding section **22***a* at the upper end of the latter. The bent over sections **22***b* extend toward each other and define a longitudinally extending slot **24** therebetween. The base **20** and the wings **22** define a generally rectangularly shaped opening **25**. The female terminal **12** further includes a tongue **26** which is integral with the base **20** at the forward end of the latter and which is reversely bent to extend rearwardly of the base **20**. The tongue is bent so as to define a bight portion **26***a* at the forward end of the base and is deflectable about the bight portion **26***a* toward and from the base **20**. The tongue **26** extends rearwardly of the base **20** beneath the bent over sections **22***a* of the wings **22** and is self-biased into engagement with the underside of the wing sections **22***b*. The tongue intermediate its ends also have a pressed up nib **30**.

The male terminal **14** is in the form of a spade or flat blade **35** having a central opening **36** intermediate its ends. The male terminal **14** is adapted to be connected to the mating female terminal by inserting the same in the opening **25** between the tongue **26** and bent over wing section **22***b* of the female terminal **12**. As the male terminal **14** is inserted therein it will engage the tongue **26** to cause the latter to be deflected downwardly in opposition to its self-biasing forces, until the opening **36** in the male terminal **14** receives the nib **30** on the tongue **26**. The self-biasing forces of the tongue **26** will urge the male blade terminal **14** into frictional engagement with the underside of the wing sections **22***b* and the nib **30** will prevent the male terminal **14** from being removed from the female terminal. To prevent over-insertion of the male terminal **14**, the latter is provided with a pair of flat, laterally extending flanges

or portions 38 which will abuttingly engage the forward edges 22*c* of the wings 22 upon being inserted all the way into the female terminal 12.

To facilitate insertion of the male terminal 14 within the female terminal 12, the male terminal at its forward end is tapered, as shown at 40, and the upper or bent over sections 22*b* of the wings 22 at their forward ends are bent upwardly in the curved fashion, as shown at 42. The engagement between the tapered end 40 of the male terminal and the curved ends 42 of the upper sections 22*b* guide the male blade terminals 14 downwardly into the opening 25 and in engagement with the tongue 26.

In accordance with the provisions of the present invention, the male terminal 14 is provided with a pair of spaced longitudinally extending strengthening ribs 44 to increase the bending strength thereof and is provided with an orientation tang 46 to prevent the same from being improperly connected to a female terminal 10. Since the male terminal is made from thin gauge sheet stock, preferably 0.018 of an inch or less, it could be easily bent out of shape during storage or when attempting to insert it into the female terminal 12 if it were a plain flat blade. By providing the ribs 44, however, the bending or buckling strength of the male blade terminal 14 is significantly increased so that it is of a sufficient strength to enable it to be readily connected to the female terminal 10 without bending or buckling. The ribs 44 are indented or pressed up from the underside of the male blade terminal 14 and they extend over a substantial portion of the length of the male blade terminal. The height of the ribs 44 can be varied to suit the particular application. For example, if the female terminal design would normally receive a nonribbed male blade 0.020 of an inch thick and if the sheet thickness of the male blade were only 0.016 of an inch, the height of the ribs would be 0.004 of an inch. Likewise, if the female terminal were designed to normally accept a nonribbed male blade of 0.032 of an inch thickness and if the sheet thickness of the male blade was only 0.018 of an inch, the height of the ribs would be 0.014 of an inch.

To prevent the ribbed side of the male blade terminal 14 from engaging the tongue 26 on connecting the male terminal 14 to the female terminal 12, the orientation lug 46 is provided. If the ribbed side were in engagement with the tongue 26 the nib 30 on the tongue 26 may not be of a sufficient height to be received within the opening 36 whereby the terminals could readily disconnect. That is, the forward edge 36*a* defining the opening 36 of the male terminal 14 may or would not engage the nib 30 to prevent reverse movement. The orientation tang 46 is lanced from the forward end of the male terminal 14 and bent so as to be upstanding on the ribbed side of the terminal 14. When the male terminal 14 is connected to the female terminal 12 the orientation lug 46 is received within the slot 24. This provision of the tang 46 prevents the male terminal 14 from being inserted upside down, since it would not fit within the space between the wing section 22*b* and the tongue 26.

The intermediate portion 16 of the connector includes spaced pairs of crimping flanges 50 and 52 which are adapted to be crimped onto the bare end and adjacent insulated portion of an electrical lead L. The lead would be bent at right angles to the connector and extend outwardly through the space between the flanges 38 of the male terminal and the crimping flange 52.

Although the preferred embodiment hereof has been described in great detail, it should be apparent that certain modifications, changes, and adaptions may be made in the preferred embodiment, and that it is hereby intended to cover all such modifications, changes, and adaptions which come within the spirit of the present invention.

I claim:

1. A hermaphroditic electrical connector comprising a one piece member made from thin gauge sheet stock, said connector having a female terminal at one end portion, a male terminal at its other end portion and an intermediate portion which is adapted to be connected to an electrical lead, said female terminal having a base, a pair of wings integral with the base at its sides and with the wings having sections which are bent toward each other to define a slot therebetween which extends longitudinally of the female terminal and a deflectable tongue integral with the base at its forward end and which extends rearwardly of the base and is self-biased toward engagement with the bent over sections of the wings, said male terminal comprising a flat blade having upstanding rib means extending longitudinally thereof for strengthening the blade against bending movement and a tang extending upwardly from the side containing the rib means, one of said blade and tongue having a nib intermediate its ends and the other of said blade and tongue having an aperture intermediate its ends, said male and female terminals being adapted to be connected to a mating terminal, said male terminal being connectable with a mating female terminal by inserting the same between the deflectable tongue and the wing sections and with the tang being received within said slot, said tang insuring that the male terminal is inserted into the female terminal right side up so that the rib means is on the side opposite the tongue whereby the nib will be received in the opening to lock the terminals together.

2. A hermaphroditic electrical connector comprising a one piece member made of thin gauge sheet stock, said electrical connector having a female terminal at one end portion, a male terminal at its other end portion and an intermediate portion which is adapted to be connected to an electrical lead, said female terminal having a base, a pair of wings having upstanding sections integral with the opposite sides of the base and bent over sections which are bent toward each other to define a slot therebetween which extends longitudinally of the female terminal, and a reversely bent deflectable tongue integral with the base at its forward end and which extends rearwardly of the base and is self-biased toward engagement with the bent over sections of the wings, said tongue being deflectable about its bight portion at the forward end of the base and having an upstruck nib intermediate its ends, said male terminal comprising a flat blade having a pair of indented upstanding spaced ribs extending longitudinally thereof for strengthening the blade against bending movements, an aperture intermediate its ends, laterally extending flanges at its rearward end and a tang adjacent its forward end and extending upwardly from the side of the blade having said ribs, said male and female terminals being adapted to be connected to a mating terminal, said male terminal being connectable with a mating female terminal by inserting the same between the deflectable tongue and the bent over sections of the wing and with the tang being received within said slot, said bent over sections of said wings at their forward ends being upwardly bent to facilitate insertion of the male blade terminal, said tang insuring that the male terminal is inserted right side up so that the ribs are on the side opposite the tongue and whereby the nib on the tongue will be received within the opening to lock the terminals together.

3. An electrical connector comprising a male terminal which is a one piece member made of thin gauge sheet stock and which is adapted to be connected to a female terminal having a base, a pair of wings having upstanding sections integral with the opposite sides of the base and bent over sections which are bent toward each other to define a slot therebetween which extends longitudinally of the female terminal and a reversely bent deflectable tongue integral with the base at its forward end and self-biased toward engagement with the bent over sections of the wings and which has an upstruck nib intermediate its ends, said male terminal comprising a flat blade having a pair of indented upstanding spaced ribs extending longitudinally thereof for strengthening the blade against bending movements, an aperture intermediate its ends, laterally extending flanges at its rearward end and a tang adjacent its forward end and extending upwardly from the side of the blade having said ribs, said male terminal being adapted to be connected with a mating female terminal by in-

serting the same between the deflectable tongue and the bent over sections of the wing and with the tang being received within said slot, said tang insuring that the male terminal will be inserted right side up so that the ribs are on the side opposite the tongue whereby the nib on the tongue of the mating female terminal will be received within the opening of the male terminal to lock the terminals together when the male terminal is connected to the female terminal.

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