Jan. 14, 1969 H. F. FISHER 3,422,395

EMBOSSED MALE TAB FOR USE WITH QUICK CONNECT TERMINALS

Filed Oct. 17, 1966 Sheet 1 of 2

Fig. 1

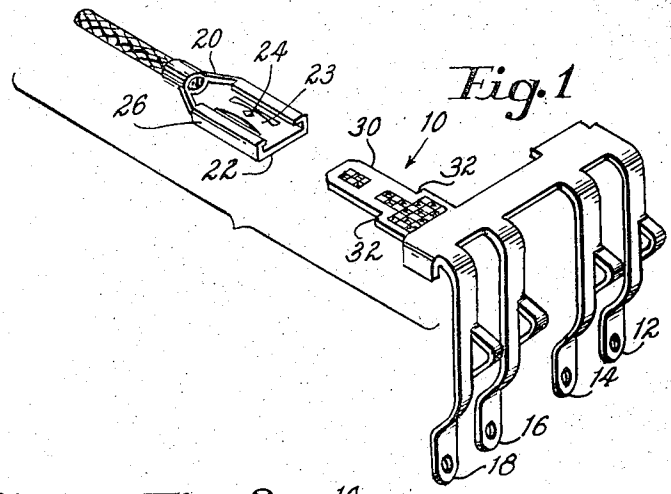


Fig. 2

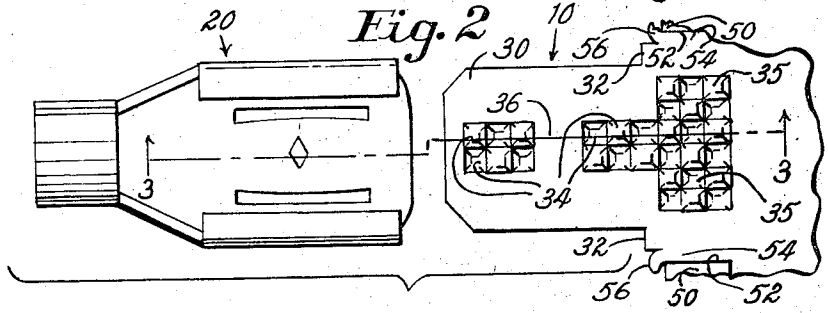


Fig. 3

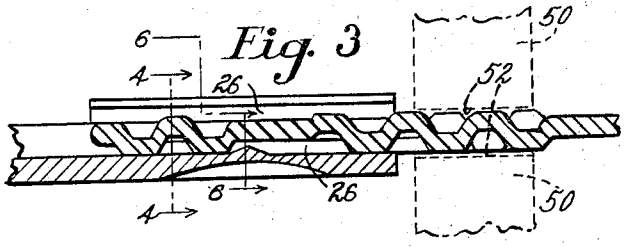
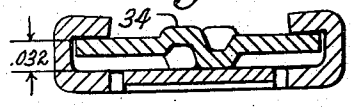


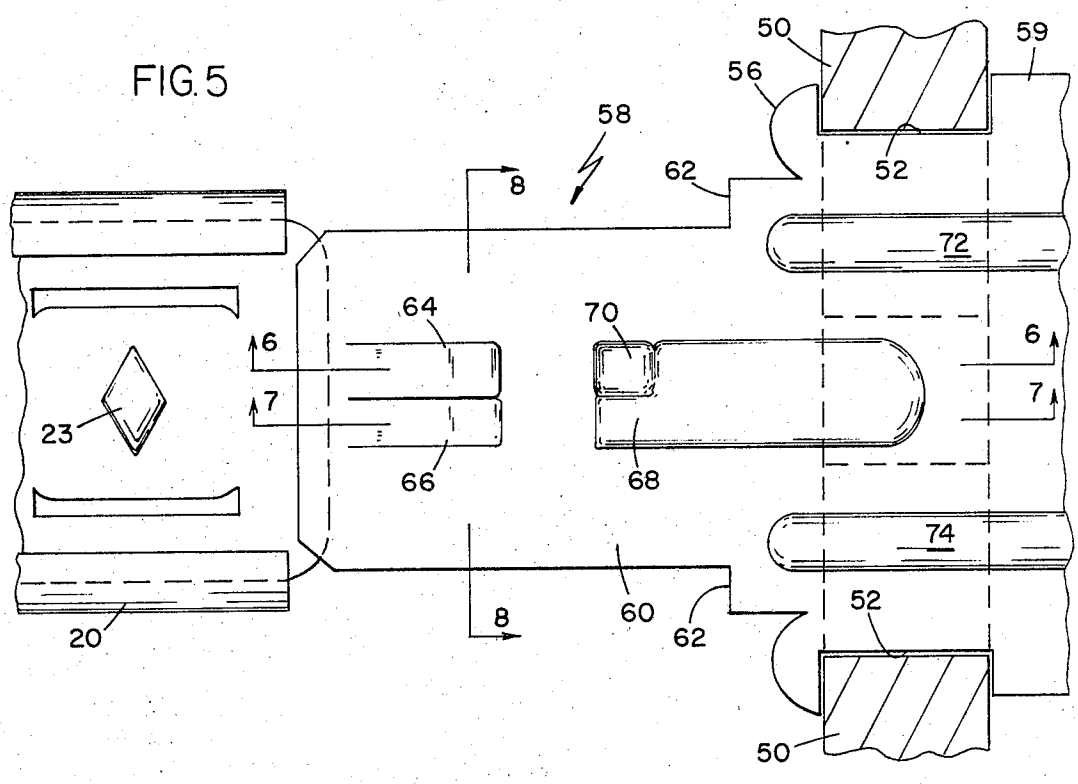
Fig. 4



EMBOSSED MALE TAB FOR USE WITH QUICK CONNECT TERMINALS

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FIG. 5



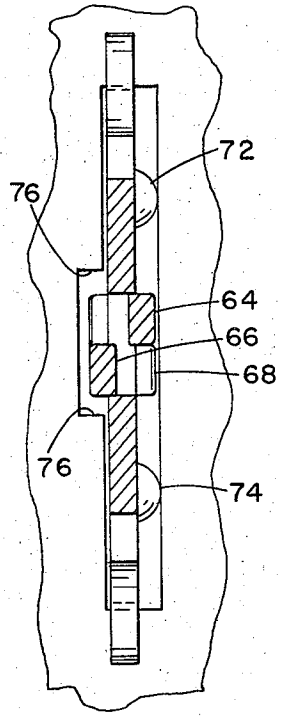


FIG. 8

FIG. 6

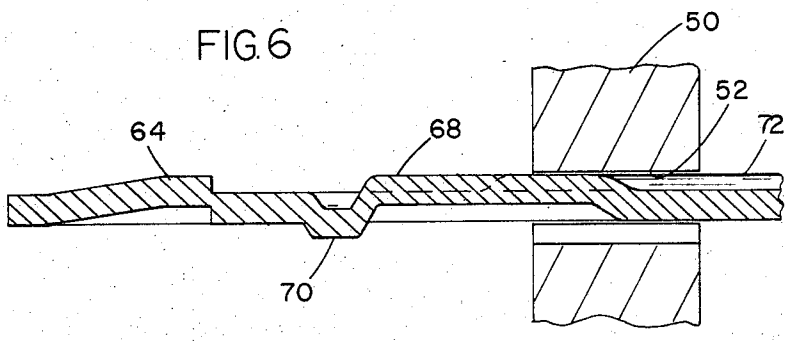
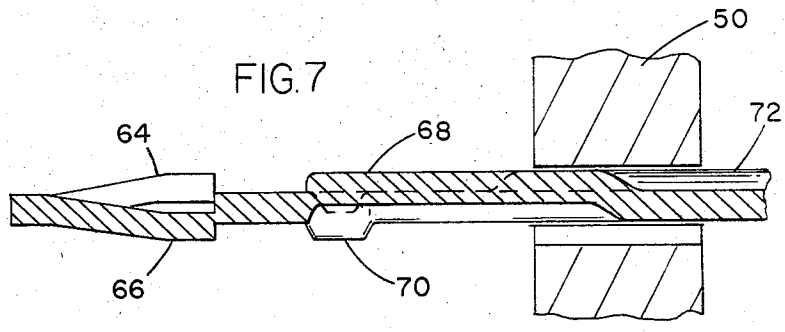


FIG. 7



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3,422,395

EMBOSSED MALE TAB FOR USE WITH QUICK CONNECT TERMINALS

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Continuation-in-part of application Ser. No. 524,704, Feb. 3, 1966. This application Oct. 17, 1966, Ser. No. 587,212

U.S. Cl. 339—258 4 Claims

Int. Cl. H01r *13/24;* H01r *11/08;* H01r *3/00*

ABSTRACT OF THE DISCLOSURE

A universal, reversible male tab for use with any conventional female terminal. The tab includes a centrally embossed strip area located on each side of the tab tongue and plain strip area on each side of the embossed strip areas.

This application is a continuation-in-part of my pending application Ser. No. 524,704, filed February 3, 1966, and now abandoned, for Embossed Male Tab For Use With Quick Connect Terminals.

The present invention relates to an improved electrical connection, and more particularly to an improved male tab for use with quick connect terminals.

It is a principal object of the invention to provide a novel and improved male tab and resilient switch arm unit which is made up in one piece to be accepted by any conventional female quick connect terminal.

More specifically, it is an object of the invention to provide a novel and improved male tab for use with a female terminal, said tab being made up of stock substantially thinner than the receiving aperture of the female terminal, and expanded by embossing the female terminal contact areas of said tab to cooperate in a satisfactory manner with the female terminal.

It is a further object of the invention to provide an improved male tab of this general description of thin stock having embossed areas to provide a male tab unit of the described thickness to be accepted by any conventional female quick connect terminal, in which the embossed areas are constructed and arranged to provide one or more strengthening ribs substantially increasing the rigidity and strength of the male tab.

With the above and other objects in view as may hereinafter appear, a feature of the invention consists in the provision of a male tab of resilient material of substantially less thickness than the aperture of the female terminal into which it is fitted, said male tab having the opposed faces thereof embossed to the requisite thickness to cooperate with said female terminal.

The several features of the invention and the advantages thereof will be readily appreciated by one skilled in the art from the following description taken in connection with the drawings, in which:

FIG. 1 is an exploded perspective view of a female terminal and a male tab and resilient switch arm unit, illustrating in a presently preferred form features of the invention;

FIG. 2 is a somewhat fragmentary plan view of the female terminal and male tab illustrated in FIG. 1;

FIG. 3 is a sectional view in side elevation taken on a line 3—3 of FIG. 2, the holder and tab being here shown in assembled position;

FIG. 4 is a section taken on a line 4—4 of FIG. 3 illustrating one way in which the male tab is built up to the required thickness for engagement with the female terminal;

FIG. 5 is a somewhat fragmentary plan view of the female terminal and of a modified form of male tab in whirh a simplified form of embossing is employed which includes strengthening ribs;

FIG. 6 is a sectional view in side elevation of the male tab taken on a line 6—6 of FIG. 5;

FIG. 7 is a sectional view in side elevation of the male tab taken on a line 7—7 of FIG. 5; and

FIG. 8 is a cross-sectional view of the male tab taken on a line 8—8 of FIG. 5.

The manufacture of combined male tab and contact spring units for use in electrical circuits has presented some problems for the reason that the resilient switch arm, or contact spring is made up of a relatively thin gage spring material to obtain the desired degree of resiliency, whereas the female terminal entering tongue of the male tab is normally required to be substantially thicker. The standard gage of a ¼ inch male tab, for example, is .032 inch, whereas the switch arm will have a gage of .020 inch or less. Such combined male tab and contact spring units are normally made up of separate component parts including a heavy gage brass tab and a relatively thin contact spring, which may be made of bronze, beryllium copper, or other similar material having the required characteristics of resiliency, electrical conductivity and durability. These parts are normally fastened together, as for example by riveting. Alternatively, it has been proposed to manufacture a tab having a laminated tongue produced by folding over a thinner material to produce a tongue of the required thickness. Such a technique has the disadvantage that a number of shaping, folding and fastening operations may be required, and further that it involves extensive and wasteful use of the high cost resilient spring material.

FIGS. 1 to 4 inclusive illustrate a presently preferred form of the invention in a male tab **10** having four individual switch arms **12**, **14**, **16** and **18** formed integrally therewith. The male tab is adapted to be joined with a female terminal **20** which may be of ordinary construction consisting of a base element **22** having a centrally disposed upwardly bowed control spring element **23** provided with a detent **24**, and side walls **26** bent inwardly to overlie edge portions of the top face of the inserted male tab **10**.

The male tab **10** comprises a strip of bronze material having the desired qualities of electrical conductivity, strength, resiliency, and the like, which may be .020 inch in thickness. It will be understood that other suitable materials, of which beryllium copper is an example, are available, and that the gage may be as little as .014 inch or even less if so desired. The tongue portion **30** of the male tab **10**, shown on an enlarged scale in FIG. 2, is assembled to be ¼ inch wide in order to fit exactly within the female terminal **20**, and is formed with two shoulders **32** which engage against the side walls **26** of said holder. Two rows of bosses **34** extend down the middle of the tongue providing a series of raised bosses on both sides. It will be understood that the male tab may be made in other widths, for example ⅛" or 3/16" to fit correspondingly dimensioned female terminals.

The embossing is continued onto the widened base of the tongue and is there extended laterally by two additional rows of bosses **35** at each side thereof. It will be noted that the two centrally disposed rows of bosses **34** on each side of the tongue are interrupted intermediate their length to provide a detent receiving well **36** on each side of the tongue. When the tongue **30** is now pushed into the female terminal **20** either side up, the bosses **34** formed on the downwardly facing side of the tongue will be engaged against the base **22** including the spring element **23**, and the detent **24** will be engaged within the detent receiving well **36**. The bent over

portions of side walls **26** of the holder extend over the upper face of the tongue **30** a sufficient distance only to engage portions of the upper face of the tongue, but not the bosses thereon. In this form of the invention the height of the bosses on both sides of the tongue is gaged so that the height of the bosses above one side only of the tongue **30**, added to the .020 inch gage thickness of the tongue, will equal the .032 inch deep aperture of the holder as indicated in FIG. 4. The detent **24** interlocks with adjacent bosses to hold the tab **10** in place as specifically shown in FIG. 3. Since the two sides of the tongue **30** are substantially symmetrical, the tab **10** is reversible and may be inserted in the female terminal either side up.

Referring to FIGS. 2 and 3 of the drawing, a housing wall is indicated at **50** having formed therein a slot **52** of a width to receive a widened base section **54** of the male tab **10**, and also of the correct depth to receive the male tab **10**. In order to permit the male tab to be mounted through the slot **52**, the depth of the slot **52** should equal the sum of the heights of the bosses on both sides of the tongue added to the thickness of the metallic material from which the tongue is made. The tongue **30** and a widened base section **54** of the male tab having been inserted through the slot **52**, the male tab is locked in position by staking at **56** as shown in FIG. 2.

FIGS. 5, 6, 7 and 8 illustrate a further modification of the invention in which the embossing has been simplified, and in which ribs have been formed in the base portion of the male tab to prevent bending of this relatively thin element. The female terminal **20** into which the male tab is fitted is shown in alignment with the male tab in position to be connected thereto. In the embodiment of FIGS. 7 to 10 inclusive, since the male tab is formed with a narrow embossed area disposed entirely between the inner edges of the inwardly bent side walls **26** of the female terminal, the height of the bosses on one side only of the tongue added to the thickness of the tongue, will equal the depth of the aperture of the holder. In this respect the arrangement is similar to that illustrated in FIG. 4 of the drawings.

Referring to FIG. 5, the male tab **58** is formed with a widened base portion **59** generally similar to that shown at **54** in FIG. 2, which is adapted to be fitted into a slot **52** of a housing wall **50** and to be held in position by staking **56**. The male tab **58** is assumed to be .020 inch in thickness, and the tongue portion **60** to be ¼ inch wide in order to fit exactly within the female terminal **20**. The male tab is formed with a base portion having two shoulders **62** which engage against the side walls **26** of the holder. The bosses formed on each side of the male tab are .012 inch in height, so that regardless of which side up the male tab is thrust into the female terminal **20** the male tab will be held firmly in the manner shown in FIG. 4. It will be noted further that in the embodiment of FIGS. 5 to 8 inclusive a groove **63** is formed in the lower surface of the slot **52** through the housing wall **50** to receive the bosses formed in the under side of the male tab **58**.

In the form of the invention illustrated in FIGS. 5 to 8 the construction and arrangement of the bosses has been simplified and improved to provide a male tab of greater strength and rigidity. The bosses provided toward the outer end of the tab comprise two offsets **64**, **66** in side-by-side relation, the offset **64** sloping gradually upward from the end of the tab and terminating in a flat, sharply squared-off end offset from the upper surface of the tab, the other offset sloping gradually downwardly from the other side of the tab and terminating similarly in a flat, squared-off end offset from the under surface of the tab. The relatively great length of the two bosses **64**, **66** causes these elements to act as ribs substantially increasing the strength and rigidity of the tip portion of the male tab.

The bosses provided toward the base end of the tab comprise also only two offset bosses **68** and **70** having squared-off ends in side-by-side relation, one boss being offset to the upper side of the male tab, while the other is offset to the under side of the tab. One of these offset bosses **68** constitutes a strengthening rib of substantial length extending from adjacent the central portion of the tab onto the base portion **59**. The other boss **70**, offset from the opposite surface of the male tab, is no more than a square dot with an offset flat surface having a sharply squared-off end surface for engagement with the spring detent surface **23** of the female terminal **20**. Except for the very limited area covered by the boss **70**, the boss or rib **68** is of a width equal to the sum of both bosses.

The base portion **59** of the male tab is further strengthened by two offset ribs **72** and **74** which extend longitudinally of the upper side of said base portion, one at each side of the rib **68**. The ribs **72** and **74**, in addition to strengthening the base portion, provide contact surfaces which engage against the upper wall of the slot **52** formed in the housing wall **50**, the opposite wall being engaged by the under side of the base portion **59** of the male tab **58**. The bosses **66** and **70**, which project from the under side of the male tab **58**, are received through the housing wall **50** in a recess **76** formed in the under side of the slot **52**, when the parts are assembled by the projection of the tip end of the male tab **58** into its operative position through the housing wall **50**.

The embossed male tab herein disclosed has been found to cooperate in a most effective manner with commercially available female holders in that the bosses employed to add to the thickness of a thin gage material form a tongue of the desired thickness which is of rigid construction, providing hard electrically efficient contact surfaces, and is particularly well adapted for use in a male tab and spring connector unit which is of a simple low-cost one-piece construction, and is available in any desired form for use in a variety of electrical circuits.

The invention having been described, what is claimed is:

1. A reversible male tab for use with female terminals of the type having a tab receiving aperture formed of a bottom face including a spring mounted detent adapted for engaging against one side of said male tab, and guides having longitudinally-extending, transversely-spaced surfaces adapted for engaging the opposite side of said tab, said male tab comprising:

a flat aperture-entering tongue formed from an electically conducting material of a thickness adapted to be substantially less than the depth of said aperture between said bottom face including said spring mounted detent and said opposite side engaging surfaces,

said tongue being formed with bosses defining a centrally-located embossed strip area extending longitudinally along each of said sides of the tongue, and a plain, longitudinally-extending strip area of substantial width extending between each side of each said centrally-located embossed strip area and the adjacent edge of the tongue,

said bosses being raised from the surface of the tongue by an amount which, added to the thickness of said electrically conducting material, provides an aperture-entering tongue of a thickness suitable to be accepted by said female terminal with the embossed strip area on one side of said tab engaging said bottom face and the plain strip areas on the other side of said tab engaging said guide surfaces,

said male tab having a base portion formed as a continuation of said tongue, one of said bosses being longer than the other bosses, said longer boss extending longitudinally into said base providing a strengthening rib, and said tongue having engagement

means to hold the spring mounted detent of the female terminal.

2. The combination of claim 1, in which said bosses include toward the tongue tip of said tab two bosses in side-by-side relation, said bosses being offset to opposite sides of said tab with long tapers extending toward the tip of said tab

and at their base ends sharply contoured spring-mounted detent engaging surfaces,

and toward the base of said tongue two bosses in side-by-side relation offset to opposite sides of said tab having sharply contoured spring-mounted detent engaging surfaces, one of said latter bosses providing said strengthening rib.

3. An embossed male tab according to claim 1 adapted to be supported through an aperture formed in a supporting wall in which the base portion of the male tab has formed in the upper face thereof parallel strengthening ribs, one located toward each side edge of said base portion, of a height to be received with said base portion through said aperture, said aperture having formed in the underside thereof a narrow recess adapted to receive the underside embossing of said male tab.

4. A reversible male tab for use with female terminals of the type having a tab receiving aperture formed of a bottom face including a spring mounted detent adapted for engaging against one side of said male tab, and guides having longitudinally-extending, transversely-spaced surfaces adapted for engaging the opposite side of said tab, said male tab comprising:

a flat aperture-entering tongue formed from an electrically conducting material of a thickness adapted to be substantially less than the depth of said aperture between said bottom face including said spring mounted detent and said opposite side engaging surfaces; and

a base portion formed as a continuation of said tongue,

said tongue including toward the tip thereof a first substantially non-resilient embossed portion comprising bosses connected together in side-by-side relation offset to opposite sides of said tongue and having

sharply contoured spring-mounted detent engaging surfaces toward said base portion,

toward the base portion of said tab a second substantially non-resilient embossed portion comprising bosses connected together in side-by-side relation offset to opposite sides of said tongue and having sharply contoured spring-mounted detent engaging surfaces toward the tongue tip, and

a plain detent engaging surface intermediate said first and second embossed portions,

said bosses defining centrally-located embossed strip areas extending longitudinally along each of said sides of said tongue and a longitudinally-extending plain strip area of substantial width extending between each side of each of said centrally-located strip areas and the adjacent edge of the tongue,

said bosses being raised from the surface of the tongue by an amount which, added to the thickness of said electrically conducting material, provides an aperture-entering tongue of a thickness suitable to be accepted by said female terminal with embossed strip area on one side of said tab engaging said bottom face and the plain strip areas on the other side of said tab engaging said guide surfaces.

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U.S. Cl. X.R.

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