Nov. 28, 1967 E. A. BIBA 3,355,701

TERMINAL

Filed July 13, 1965 3 Sheets-Sheet 1

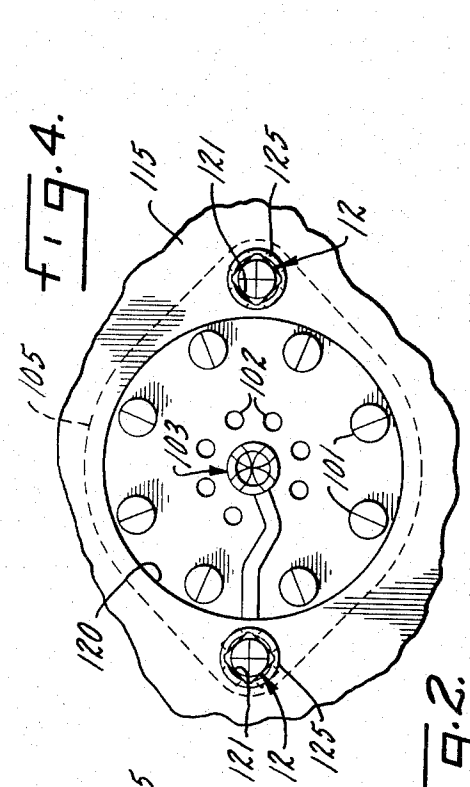


FIG. 4.

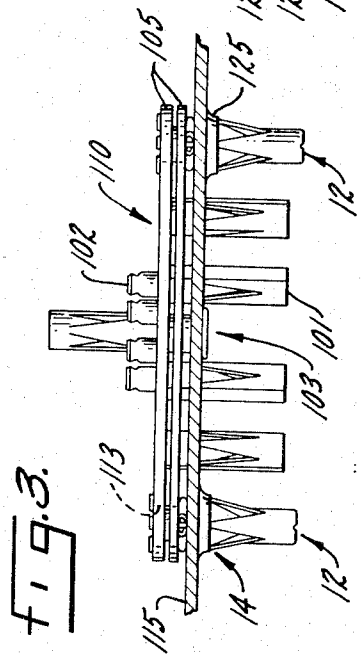


FIG. 3.

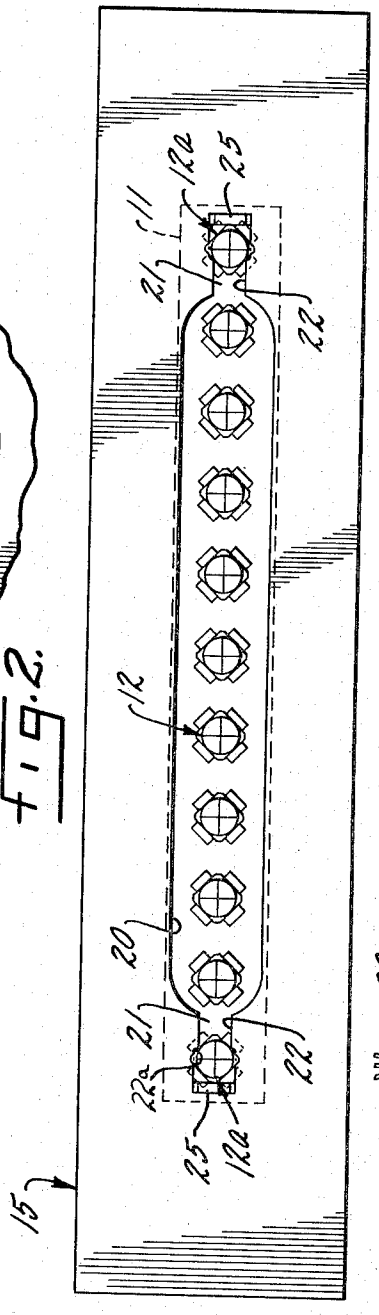


FIG. 2.

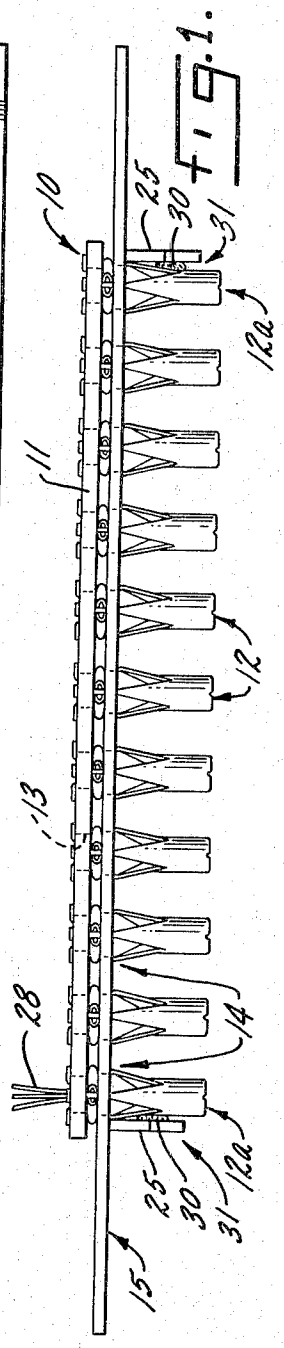


FIG. 1.

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Fig. 5.

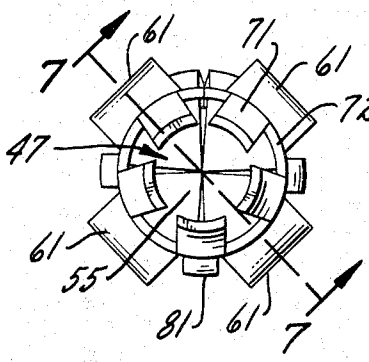
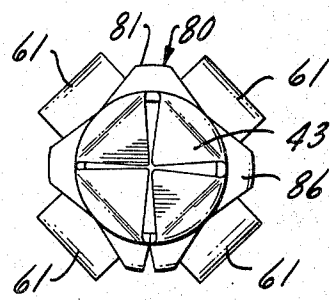


Fig. 6.



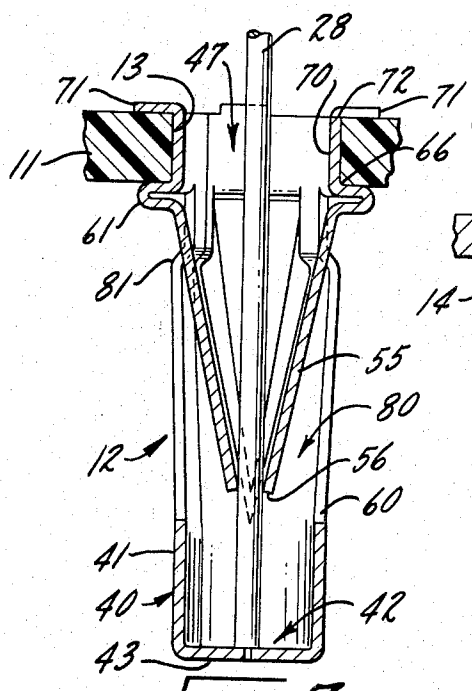


Fig. 7.

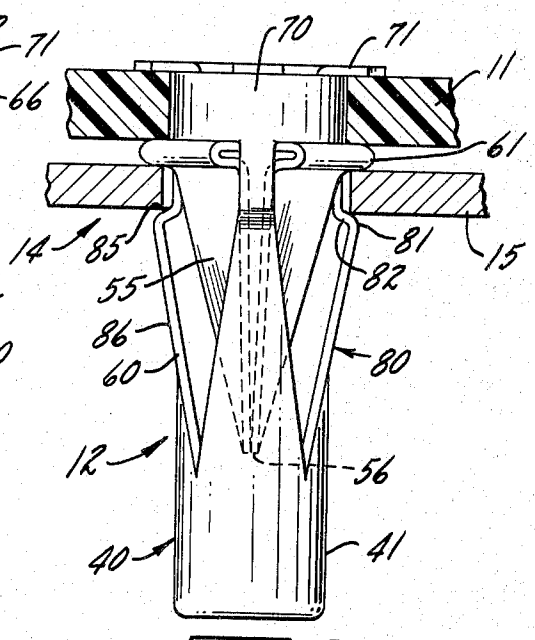


Fig. 8.

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Fig. 9.

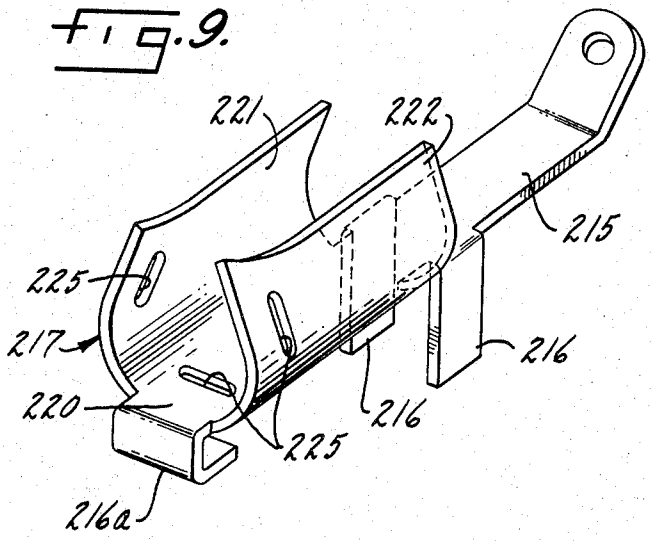
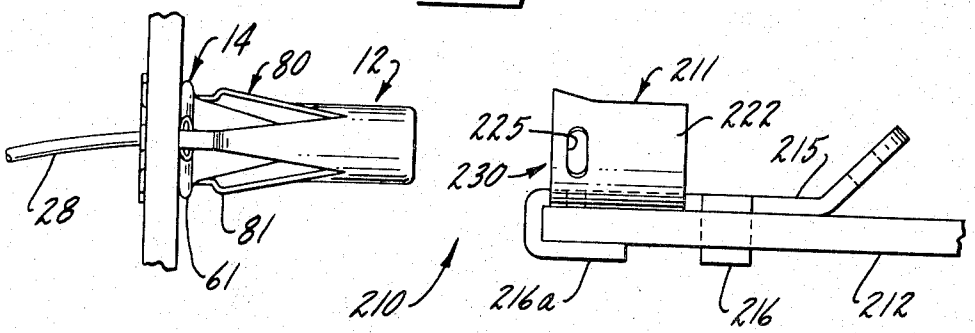


Fig. 10.



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United States Patent Office 3,355,701
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3,355,701

TERMINAL

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Filed July 13, 1965, Ser. No. 471,622
16 Claims. (Cl. 339—126)

ABSTRACT OF THE DISCLOSURE

The invention relates primarily to a solder well terminal comprising a tubular member closed at the bottom and spaced a distance from the top, a plurality of triangular fingers (four being illustrated) are lanced out of the wall to retain a wire or wires prior to solder dipping. The fingers are bent outwardly at the base portion to form a discontinuous bead abutting the under side of the board in which the terminals are to be mounted. This also serves to shorten the fingers, thus insuring that they clear the sides of the wall from which they are lanced. A plurality of tabs at the top of the terminal are provided which are bent over the top of the board in the staking process. The wall portions remaining between the fingers are bent outward at a point spaced below the bead to form detents which will abut the bottom of an opening in a second board in which the terminal is detachably mounted. Thus, a plurality of the solder well terminals may be mounted in a board of insulating material and the board may be detachably secured to a metal chassis by providing one or more openings in the chassis which receive the latching detents of at least one terminal. An enlarged opening or slot is provided in the chassis to clear the terminals which are not intended to be used as fasteners.

This invention relates in general to electrical terminal connectors. It deals more particularly with solder well terminal connectors of the type illustrated in the Maximoff et al. Patent No. 3,156,517.

Solder well terminal connectors are now used extensively in the assembly of electrical apparatus such as television sets and the like. In one aspect of present practice, series of the solder well terminal connectors are seated in phenolic insulating strip of board members and the assemblies are mounted on chassis elements, while in another aspect, the connectors form components of tube socket assemblies which are mounted on chassis elements. Sometimes individual connectors are utilized. Regardless, the connectors or assemblies are usually conventionally fastened to a corresponding receiving element before wire leads are inserted and soldered.

It is an object of the present invention to provide an improved solder well terminal connector construction incorporating a fastener arrangement for fastening the connector assembly and/or connector to a receiving element.

It is another object to provide a self-contained fastener arrangement for temporarily fastening solder well terminal connectors or the like to a chassis element in a television set or the like during assembly of the set.

It is still another object to provide a solder well terminal connector construction incorporating a fastener arrangement fabricated from the structure of the connector.

It is still a further object to provide a new and improved male-female connector assembly.

It is yet a further object to provide a mounting arrangement which facilitates the simple and expeditious establishment and removal of a semi-permanent connection between the terminal connectors and a chassis element.

The foregoing and other objects are realized in accord with the present invention by providing a solder well terminal connector wherein means for temporarily fastening

the terminal connector or an assembly of the connectors is formed from the body of a solder well terminal connector itself. More specifically, in the extremely successful form of the solder well terminal connector, wherein triangular wire lead gripping fingers are sheared from the side wall of the connector body and bent inwardly therefrom in cantilever relationship so that their free ends terminate immediately adjacent each other at a point spaced a predetermined distance from a closed bottom on the body, those segments of the wall which remain between the sheared out fingers are formed outwardly to a crown. Accordingly, when pressed into an aperture or slot in the chassis of a television set, for example, wherein the width of the slot or aperture is substantially equal to the normal diameter of the solder well body, the outwardly formed segments are compressed and then expand after passage through the slot or aperture to fasten the connector to the chassis.

The solder well terminal connector incorporating a fastener arrangement embodying features of the present invention is thus literally "snapped" into a mounting slot or aperture. The spring lock which results develops sufficient restraining force to prevent inadvertent removal of the connectors, in strip, board, or socket assembly form, for example, except by a positive lifting of the assembly to remove them.

An additional aspect of the present invention resides in the mounting method and arrangement for semi-permanently securing the "snapped" in terminals in place in a television chassis, for example. In this light, a tab or bead is formed from the chassis element surrounding the aforedescribed slot or aperture so that it extends down alongside a seated connector. When the connectors are soldered to fix wire lead connections, the corresponding connector or connectors are also securely fixed in the slots or apertures. This solder connection can readily be melted to facilitate removal of the connector or assembly when such is desirable.

Still another aspect of the invention resides in the use of these "snap-in" connectors as male terminals in a male-female connector assembly. A suitably formed female incorporates means for receiving the expanded crowns of wall segments and retaining them when the male is inserted.

The invention, both as to its organization and method of operation, taken with further objects and advantages thereof, will best be understood by reference to the following description taken in connection with the accompanying drawings, in which:

FIGURE 1 is a side elevational view of a solder well terminal connector strip assembly fastened to a chassis element in a television set or the like according to the present invention;

FIGURE 2 is a bottom plan view of the connector assembly and chassis element illustrated in FIGURE 1;

FIGURE 3 is a side elevational view of a solder well terminal connector tube socket assembly fastened to a chassis element (only partially shown) in a television set or the like according to the present invention;

FIGURE 4 is a bottom plan view of the tube socket assembly and chassis element illustrated in FIGURE 3;

FIGURE 5 is a top plan view of a solder well terminal connector incorporating a fastener arrangement embodying features of the present invention;

FIGURE 6 is a bottom plan view of the terminal connector illustrated in FIGURE 5;

FIGURE 7 is a sectional view taken along line 7—7 of FIGURE 5, illustrating the terminal connector seated in a terminal strip and having a wire lead inserted in the connector;

FIGURE 8 is an enlarged side elevational view, partially in section, of a single solder well terminal con-

nector embodying features of the present invention in assembly with a terminal connector strip and fastened to a chassis element of a television set or the like;

FIGURE 9 is a perspective view of a female connector for a male-female connector assembly according to the present invention; and

FIGURE 10 is an exploded side elevational view of the connector assembly of FIGURE 9.

Referring now to the drawings, and particularly to FIGURES 1 and 2, a solder well terminal connector assembly is illustrated generally at **10**. The assembly **10** includes an elongated phenolic insulation strip **11** having a series of solder well terminal connectors **12** staked in apertures **13** through the strip **11**. Each of the terminal connectors **12** is modified according to the present invention to form a fastener arrangement **14** for temporarily retaining the connector and, accordingly, the assembly **10** on the chassis member **15** of a conventional television set (not shown) or the like.

The chassis member **15**, which might be fabricated of light sheet steel, has an elongated cutout **20** punched in it for receiving the connectors **12**. The cutouts **20** terminate short of the outermost connector **12***a* on each end of the assembly **10**, however, and narrow slots **21** having stepped side edges **22** are formed by shearing corresponding tabs **25** downwardly from the steel sheet. The stepped portions **22***a* of the side edges **22** are inclined so as to be substantially tangent to corresponding connectors **12***a*. The slots **21** are adapted to receive the end connectors **12***a* and their edges **22**, **22***a* cooperate with the fastener arrangements **14** to temporarily retain the connectors **12***a* and, accordingly, the assembly **10** on the chassis member **15**.

The fastener arrangement **14** of each end connector **12***a* is designed to temporarily affix the assembly **10** to the chassis element **15** during assembly, including wiring, of a television set, for example. The width of each slot **21** in its widest portion adacent its outer end is substantially equal to the normal diameter of a corresponding connector **12***a*. The fastener arrangements **14** enlarge the diameters on these connectors, however. Accordingly, when the connectors **12***a* are pressed through corresponding slots **21**, the fastener arrangements **14** are first compressed and then snap outwardly below the chassis element **1**. As a result, the assembly **10** is fixed against being jolted off or inadvertently removed from the chassis element during set construction.

Once wiring has been completed, a more permanent mounting of the assembly **10** on the chassis element **15** is desirable. A semipermanent mounting is achieved during pot soldering of the leads **28** in the end connectors **12***a* by simultaneously completing a solder connection **30** between these connectors and corresponding tabs **25** to form a semipermanent mounting arrangement **31**. To make the mounting arrangement **31** even more attractive, merely touching the solder connections **30** with a hot soldering iron is sufficient to release the assembly **10** for removal from the chassis element **15** by snapping it out of the slots **21**.

Turning to FIGURES 3 and 4, terminal connectors **12** embodying features of the present invention are illustrated in a wafer tube socket assembly **110**. The tube socket assembly **110** includes a series of eight standard solder well terminal connectors **101** and pin contacts **102** in subassemblies **103** and mounted in a well-known manner on roughly diamond shaped phenolic wafers **105**. The wafers **105** sandwich the strips (not shown) which join the connectors **101** and the contacts **102** in a well-known manner.

A terminal connector **12** embodying features of the present invention is mounted on each end of the assembly **110** through corresponding apertures **113** punched in the phenolic wafers **105**. A fastener arrangement **14** on each connector **12** temporarily affixes the tube socket assembly **110** of a chassis element **115** in a manner similar to

that in which the strip assembly **10** was described as being affixed to the chassis element **15**.

A generally circular cutout **120** is formed in the chassis element **115** for receiving the connectors **101**. The connectors **12**, on the other hand, snap through apertures **121** formed on the opposite sides of the circle **120**. The apertures **121** have downwardly extending beads **125** around them. The beads **125** are semipermanently secured to corresponding connectors **12** when wire leads (not shown) are soldered in the connectors **101** and **12** by pot soldering, forestalling compression of the fastener arrangements **14**.

Turning to FIGURES 5–8, one of these terminal connectors **12** is illustrated in detail. The terminal connector **12** illustrated in FIGURES 5–8 comprises a generally circular cylindrical body **40** fabricated from one piece of plated (or unplated) brass or the like. The body **40** includes a side wall **41** having a closed bottom **42** thereon. The closed bottom **42** is formed of four generally triangular tabs **43** bent inwardly from the lower edge of the side wall **41**. In practice, a "wire lip" is usually formed from the lower edge of the side wall **41** and bent over the closed bottom **42** for retaining a separate wire lead, but it is not illustrated here since it forms no part of the present invention. In this light, the number and arrangement of tabs forming the closed bottom **42** of the solder well body **40** might vary considerably in practice.

The upper end of the side wall **41** is open, as at **47**, to permit the insertion of one or more of the wire leads **28**. The wire leads **28** are properly positioned in the body **40** of the connector **12** by abutting against the closed bottom **42** of the body. The leads **28** are retained in the body **40** prior to pot soldering or the like by spring fingers **55** sheared inwardly from the side wall **41** of the body.

There are preferably four of these fingers **55** and they are generally triangular in shape. The fingers **55** are sheared from the wall **41** so that their free ends **56** form the apices of the triangles. The fingers **55** are cantilevered inwardly of the connector body wall **41** so that their free ends **56** terminate immediately adjacent each other. Accordingly, the wire leads **28** inserted into the connector body **40** from the open end **47** thereof are snugly retained in the body by the friction of the fingers **55** bearing against them, as illustrated in FIGURE 7.

To provide more effective resiliency to the spring fingers **55**; to shorten them so they will not interfere with the triangular cutouts **60** which remain in the connector wall **41** when the fingers **55** are sheared inwardly (when the insertion of wire leads **28** causes the fingers to flex outwardly); and to act as a stop for positioning the terminal connector body **40** in a connector strip **11**, for example, spring curls **61** are formed in the fingers **55** immediately adjacent their juncture **66** with the side wall **41** of the body **40**. These spring curls **61** are formed by bending a portion of a loop in the spring fingers **55** adjacent the juncture **66**.

Referring specifically to FIGURE 7, a connector **12** is shown seated in a strip **11**. The connector **12** is initially seated in a corresponding aperture **13** by inserting the circular cylindrical upper wall portion **70** of the body **40** through a corresponding aperture until the spring curls **61** engage the strip. A plurality of tabs **71** (five are illustrated here), formed upwardly from the upper edge **72** of the side wall portion **70**, are then bent outwardly over the phenolic strip **11** to grip the strip **11** tightly between these tabs **71** and the spring curls **61**. Each terminal connector **12** is accordingly solidly staked in the phenolic strip **11**.

The fastener arrangement **14** which retains the strip assembly **10**, for example, temporarily affixed to the chassis element **15** before soldering of the wire leads **28**, is formed from the wall segments **80** of the terminal connector side wall **41** which remain between the cutouts **60** left by the formation of the spring fingers **55**. Each of the four segments **80** is bowed outwardly of the normal diameter of the solder well terminal connector body **40**, during

die forming of the connector **12**, to form a crown **81**. Short upper sections **82** of the segments **80** converge inwardly from corresponding crowns **81** to the side wall **41** to form lips **85** spaced a predetermined distance from the spring curls **61**. This predetermined distance is dictated by the thickness of the chassis element **15** in which the connector **12** is to be seated. Long lower sections **86** of the segments **80** converge inwardly from the crown to the side wall **41** of the connector.

When a television set, for example, is being assembled, suitable cutouts **20** and **120** are formed in the chassis elements **15** and **115**, respectively, to receive corresponding assemblies **10** and **110**. Referring specifically to a strip assembly **10**, the slots **21** are then formed in the chassis element **15** by shearing tabs **25** therefrom and bending them downwardly into perpendicular relationship with the body of the element. The tabs **25** are formed of a predetermined width determined by the normal diameter of the solder terminal connectors **12**, as has been pointed out. Their stepped side edges **22** are formed so that adjacent the outer ends of the slots **21** they are spaced the diameter of the solder well body **40**.

The assembly **10** is then fastened to the chassis element **15** by pressing the end terminal connectors **12***a* through corresponding slots **21**. The lower sections **86** of the outwardly bowed wall segments **80** of the connector **12** are compressed by the side edges **22** of the slots **21** as they are forced through the slot. In this light, it should be noted that the terminal connectors **12** are oriented in the strips **11** so that one pair of oppositely disposed wall segments **80** is aligned with the longitudinal axis of the receiving slots **21** and the oppositely disposed pair is disposed directly perpendicular to the longitudinal axis of the slots.

This orientation is established to assure that the maximum amount of total lip **85** area on the segments **80** will underlie the chassis element **15** when the connector **12** has been pressed through a corresponding slot **21**, of course.

When a terminal connector **12***a* has been pressed through a corresponding slot **21** to the point where the crowns **81** of the corresponding segments **80** have passed through the slot, the compressed segments **80** immediately "snap" outwardly. The lips **85** of the now bowed segments **80** thus underlie the edges **22** of corresponding slots **21** and retain the terminal connector in "snapped in" relationship on the chassis element **15**. The thickness of the chassis element **15** is such that it is retained snugly between the spring curls **61** and the lips **85** as illustrated in FIGURE 8.

Where apertures **121** are formed with beads **125** depending therefrom, as illustrated in FIGURES 3 and 4, for example, the wall segments **80** of the connectors **12** are formed outwardly so that their crowns **81** and retaining lips **85** are spaced a greater distance from the spring curls **61**. This greater spacing is to accommodate the length of the bead **125**, of course, under which the lips **85** are retained. When a connector **12** containing a lead **28** is seated in an aperture **121** and solder introduced to the connector, the outwardly bowed segments **80** are fixed in their distended relationship by the hardened solder and the connector cannot be withdrawn from the aperture **121** until this solder is melted. Melting the solder facilitates easy removal of the connector **12** from the aperture **121**, however.

According to the present invention the terminal connector **12** has other applications and, in fact, readily forms the male component of a male-female connector assembly **210** illustrated in FIGURES 9 and 10. In an assembly **210** a solder well terminal connector **12** of the type hereinbefore described in substantial detail is received in a female receptacle **211** mounted on an insulator strip **212** or the like and the fastener arrangement **14** on the connector **12** retains the male connector in the female receptacle **211** before solder is introduced to the connector **12**. In this way, a solder well terminal connector **12** can readily be utilized as a male connector for one or mor leads **28**.

The female receptacle **211** is formed of sheet met and comprises a stem section **215** mounted on the insul tor strip **212** by folding cleats **216** and a lip **216***a*. A char nel section **217** for receiving the connector **12** extend longitudinally from the section **215**. The channel sectio **217** includes a floor **220** and upstanding, slightly converg ing side walls **221** and **222**. The floor **220** and each of th side walls **221** and **222** have transversely extending slot **225** formed therein adjacent the open mouth **230** of th section **217** for receiving and retaining the crowns **8** of the solder well connector **12** when it is inserted in th receptacle **211**.

The connector **12** usually has one or more wires **2** soldered in it before insertion in the receptacle **211**, how ever. Accordingly, it is the walls **221** and **222** of th channel section **211** which expand to permit passage o the semipermanently rigidified wall segments **80** an crowns **81** of the fastener arrangement **14**.

The terminal connectors **12** have been described i assembly with strips **11**, wafers **105** and female terminal **211**. It will be recognized, however, that they might b incorporated in other assemblies for fastening to a sup port element or the like. Furthermore, although th spring curls **61** act as limit stops for chassis elemen penetration in certain of the assemblies described, the might be eliminated and other stop means provided.

What is claimed is:

1. In a solder well terminal connector including a elongated hollow body having a side wall, a closed bottom, an open top, and a plurality of wire lead gripping fingers formed inwardly from the wall leaving cutouts in the wall separated by wall segments, the improvement comprising: a fastener arrangement for retaining the connector in a mounting aperture, said fastener arrangement including at least one of said wall segments formed outwardly of the normal transverse dimensions of the body, whereby said at least one segment serves to retain the connector in the aperture when the connector body is pressed through the aperture and the connector.

2. The improvement in solder well terminal connector of claim **1** further characterized in that said at least one segment is radially compressible to retain the connector.

3. The improvement in solder well terminal connector of claim **2** further characterized in that said at least one wall segment is formed outwardly to a crown disposed radially outside of the normal transverse dimensions of the connector body, and stop means on said body longitudinally spaced from said crown, the passage of said crown through the aperture permitting said at least one outwardly formed segment to expand and retain the connector in the aperture against said stop means.

4. The improvement in solder well terminal connector of claim **3** further characterized by and including a retaining lip formed on said at least one wall segment adjacent said crown.

5. In a solder well terminal connector including an elongated hollow body having a side wall, a closed bottom, an open top, and a plurality of wire lead gripping fingers formed inwardly from the wall leaving cutouts in the wall separated by wall segments, the improvement comprising: a fastener arrangement for retaining the connector in a mounting aperture, said fastener arrangement including at least two oppositely disposed wall segments formed outwardly of the normal transverse dimensions of the body, whereby said at least two segments are compressed when the connector body is pressed through the aperture and the connector is retained in the aperture.

6. The improvement in solder well terminal connector of claim **5** further characterized in that said fastener arrangement is formed of four of said wall segments, each of said four wall segments being formed outwardly to a crown disposed radially outside of the normal transverse

imensions of the connetcor body, and stop means on aid body longitudinally spaced from said crowns, the assage of said crowns through the aperture permitting aid outwardly formed segments to expand and retain the onnector in the aperture against said stop means.

7. The improvement in solder well terminal connector f claim 6 further characterized by and including a re-aining lip formed on each of said four wall segments djacent a corresponding crown.

8. A solder well terminal connector, comprising: an longated hollow body, said hollow body having a side vall, a closed bottom, and an open top, a plurality of wire ead gripping fingers formed inwardly from said wall in adially spaced relationship around said wall, the form-ng of said wire lead gripping fingers leaving cutouts in aid wall separated by wall segments extending longitu-linally of said body, at least one of said wall segments eing formed outwardly of the normal transverse dimen-ions of said body, whereby said at least one segment is ompressed when the connector is pressed through an perture formed in an element and having corresponding ransverse dimensions substantially equal to said normal ransverse dimensions, expansion at said at least one seg-nent after passage substantially through the aperture erving to retain the connector in the aperture.

9. The terminal connector of claim 2 further charac-erized in that said at least one wall segment is formed utwardly to a crown disposed radially outside of the ormal transverse dimensions of the connector body, a etaining lip formed on said one wall segment adjacent aid crown, and stop means on said body between said pen top and said lip, said stop means and lip retaining he element between them.

10. The solder well terminal connector of claim 8 urther characterized by and including at least four of aid wall segments formed outwardly of the normal trans-verse dimensions of said body.

11. A mounting arrangement for semipermanently ffixing a solder well terminal connector to a chassis ele-nent or the like, comprising: means formed out of said hassis element so as to leave an opening of predeter-mined transverse dimension in the element, a solder well terminal connector extending through said opening, said solder well terminal connector comprising an elongated hollow body, said hollow body having a side wall, a closed bottom, and an open top, a plurality of wire lead gripping fingers formed inwardly from said wall in ra-dially spaced relationship around said wall, the forming of said wire lead gripping fingers leaving cutouts in said wall separated by wall segments extending longitudinally of said body, at least one of said wall segments being formed outwardly of the normal transverse dimensions of said body, whereby said at least one segment is com-pressed when the connector is pressed through said open-ing, expansion of said at least one segment after passage substantially through said opening serving to temporarily retain the connector in said opening, and solder means semipermanently holding said at least one segment ex-panded to prevent removal of the connector from said opening.

12. The mounting arrangement of claim 11 further characterized in that extension means comprises a bead around said opening, said at least one wall segment ex-panding under said bead.

13. In a solder well terminal connector assembly in-cluding a solder well terminal connector seated in a mounting member wherein the terminal connector in-cludes an elongated hollow body having a side wall, a closed bottom, an open top, and a plurality of wire lead gripping fingers formed inwardly from the wall leaving cutouts in the wall separated by wall segments, the im-provement comprising: a fastener arrangement for retain-ing the connector assembly in an aperture through sup-port means, said fastener arrangement including at least one of said wall segments formed outwardly of the nor-mal transverse dimensions of the body, whereby said at least one segment is compressed when the connector body is pressed through the aperture so as to retain the assembly on the support means.

14. A male-female connector assembly comprising: a female terminal connector including a longitudinally ex-tending receiving passage defined by wall means, recess means formed in said wall means extending transversely of the longitudinal axis of said passage, a solder well terminal connector seated in said receiving passage, said solder well terminal connector comprising an elongated hollow body, said hollow body having a side wall, a closed bottom and an open top, a plurality of wire lead gripping fingers formed inwardly from said wall in ra-dially spaced relationship around said wall, the forming of said wire lead gripping fingers leaving cutouts in said wall separated by wall segments extending longitudinally of said body, said wall segments being formed outwardly of the normal transverse dimensions of said body to corresponding crowns, said crowns extending into said recess means in the wall means of said female terminal connector to retain said solder well receiving passage in said terminal connector.

15. The male-female connector assembly of claim 14 further characterized in that said wall means comprises a base wall and a pair of upstanding side walls, insertion of said solder well terminal connector into said receiving passage after wire leads have been soldered in said solder well terminal connector causing at least one of said walls in said female terminal connector to bend outwardly and permit the insertion of the male terminal connector to the point where said crowns seat in corresponding recesses.

16. The male-female connector assembly of claim 14 further characterized in that said recess means comprise slots extending through corresponding walls.

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MARVIN A. CHAMPION, *Primary Examiner.*

PATRICK A. CLIFFORD, *Examiner.*

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,355,701 November 28, 1967

Edward A. Biba

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 7, line 26, for the claim reference numeral "2" re: -- 8 --; line 30, after "said" insert -- at least --; column 8, line 33, for "receiving passage" read -- terminal connector --; line 34, for "terminal connector" read -- receiving passage --.

Signed and sealed this 10th day of December 1968.

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents