United States Patent

[11] **3,571,784**

[72] Inventors **Hubert W. Naus**
Monrovia;
Robert N. Summers, Banning; Joe J. Sonyi,
Yucaipa, Calif.

[21] Appl. No. **799,194**
[22] Filed **Feb. 14, 1969**
[45] Patented **Mar. 23, 1971**

[73] Assignee **International Telephone and Telegraph Corporation**
New York, N.Y.

[54] **CONTACT ASSEMBLY FOR ELECTRICAL CONNECTOR**
2 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **339/217,** 339/213
[51] **Int. Cl.** **H01r 9/12**
[50] **Field of Search** 339/204, 205, 217, 213, 214, 30

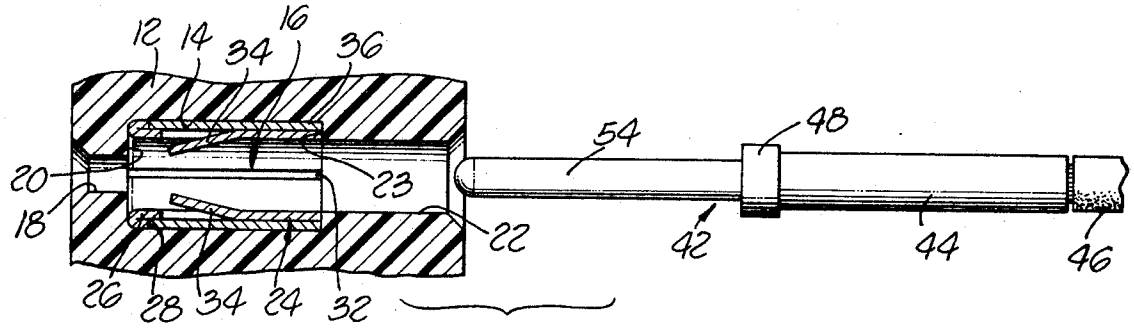
[56] **References Cited**

UNITED STATES PATENTS

1,635,830	7/1927	Gagnon	339/30
2,726,376	12/1955	Heath	339/220
2,758,291	8/1956	Richards	339/94
3,112,149	11/1963	Bachman	339/217(S)
3,158,424	11/1964	Bowen	339/217(S)
3,358,266	12/1967	Chandler et al.	339/217(S)X
3,475,720	10/1969	Culver	339/217(S)

Primary Examiner—Marvin A. Champion
Assistant Examiner—Robert A. Hafer
Attorneys—C. Cornell Remsen, Jr., Walter J. Baum, Paul W. Hemminger, Percy P. Lantzy and Thomas E. Kristofferson

ABSTRACT: The disclosure relates to a contact assembly formed of a clip mounted in an insulator block. The clip, which is a hollow tube, contains inwardly extending tangs. In order to prevent the insulator plastic material from flowing around and locking the tang during the molding process, and to prevent a rearward force on a terminal member from moving the clip, a sleeve is placed around the clip before it is inserted in the mold. The edge of the forward end of the sleeve abuts the end portion of a lip formed on the forward end of the clip. Upon insertion of a contact terminal into the clip, a collar on the terminal is locked by the tang. Should the terminal be subjected to a rearward force, the force is translated to the sleeve, thus effectively retaining the clip in position.



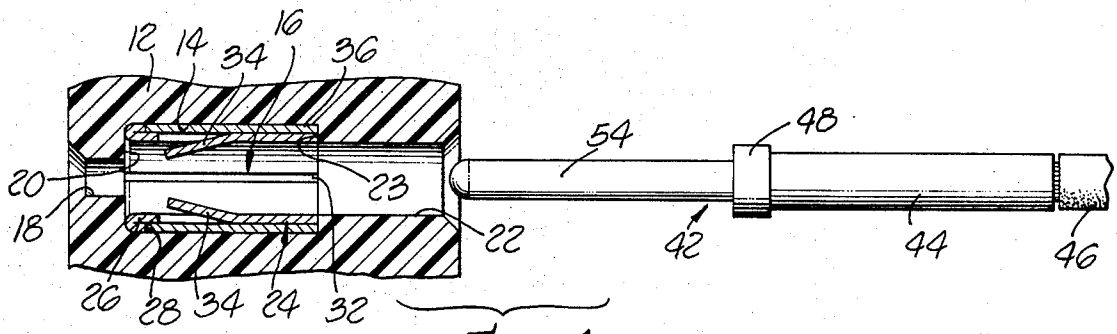


FIG. 1.

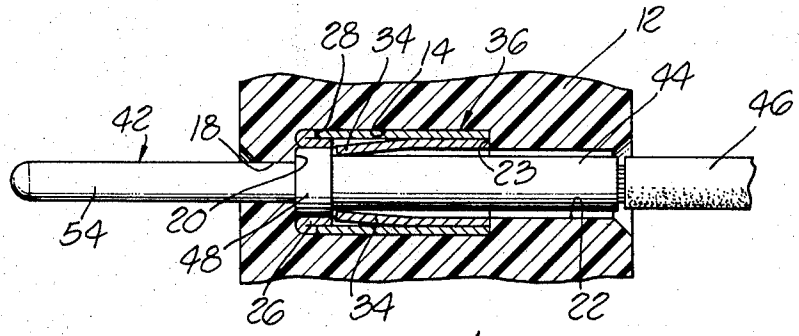


FIG. 2.

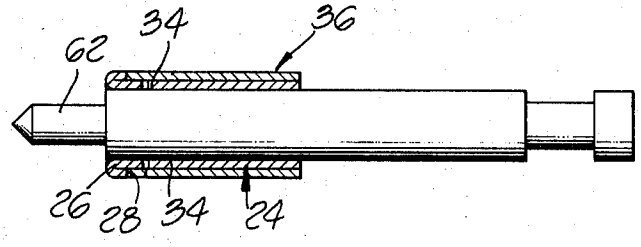


FIG. 3.

HUBERT W. NAUS
ROBERT N. SUMMERS
JOE J. SONYI
INVENTORS.

BY Harvey S. Hertz

ATTORNEY

CONTACT ASSEMBLY FOR ELECTRICAL CONNECTOR

CONTACT ASSEMBLY FOR ELECTRICAL CONNECTOR

The invention relates in general to a contact assembly for an electrical connector, and, more particularly, to a contact retention clip mounted in an insulator block for preventing axial movement of a terminal member.

BACKGROUND OF THE INVENTION

In the U.S. Pat. No. 3,158,424, there is described a contact mounting for an electrical connector in which a contact terminal member may be inserted in the bore of an insulation block from the rear face thereof, caused to be locked in the bore against axial movement in either direction, and which is movable by manipulation entirely rearwardly of the insulation block, access to the front of the block or the front of the contact terminal being wholly unnecessary. In order to provide such a real release contact mounting, a spring member or tang is provided in the bore having a portion inclined forwardly and inwardly with respect to the axis of the bore and retained by the connector body against axial shifting. The inclined portion of the spring member is adapted to be radially deflected outwardly by a tool to free the stop means from blocking an electrical termination structure and thereby permit withdrawal of the contact terminal member rearwardly from the bore. Normally, the rear release contact mounting is formed in a tubular cavity restricted by smaller diameter tubular cavities on each end.

A simple method of producing such an insulator block would be to provide a two piece mold wherein the larger tubular cavity is formed on the end surface of one of the blocks. However, such a two piece insulator mold requires twice as many core pins and dies as a one piece insulator construction. Moreover, for certain requirements, it has been found necessary to use one piece insulator construction. To produce a one piece insulator, various techniques of producing a molded undercut in the insulator material have been found to be rather complex and expensive. For example, disposable core pin bushings could be used as sodium nitrate table salt mixtures which would produce the desired undercut. However, it was found that air bubbles were trapped in the salt mixture which caused the bushing to collapse under the molding pressure. Alternatively, etching techniques for metal bushings have been attempted but the long time required for the etching process makes the use of metal bushings undesirable.

Another approach to provide the rear release contact mounting in a one piece insulator would be to mold the contact mounting directly in the insulator as the insulator is being formed. In view of the fact that the rear release contact mounting operates by means of a spring member, it is necessary to prevent any plastic insulating material from flowing in and around the tangs of the contact mounting which form the spring member. An obvious approach to such a technique would be to provide a shroud or sleeve around the clip as a protective cylinder. However, initial tests during the molding techniques showed that the clips would move due to the pressure of the plastic material flowing into the mold cavity causing the spring clip to open up slightly and ride rearwardly on removal of a core pin.

A still further problem with regard to rear release contact mountings has been the fact that rearward force on the contact terminal member has caused the contact mounting to move rearwardly due to the clip being incompletely mounted in the insulator block.

In order to overcome the attendant disadvantages of prior art contact assemblies and provide a contact assembly within a single piece insulator the present invention utilizes an outer sleeve of soft metal which surrounds the contact assembly which is made of a harder material than the outer sleeve. Thus, the outer sleeve is able to expand when located on a core pin during the insulator forming process and pressures which are built up during the molding process would not deform to the inner sleeve. Moreover, the outer sleeve is positioned with respect to the inner sleeve so that a rearward force on the contact member would prevent the inner sleeve from moving.

SUMMARY OF THE INVENTION

More particularly, the invention comprises a contact assembly forming a clip mounted in an insulator block. The clip, which is a hollow tube, contains at least one inwardly extending tang. In order to prevent the insulator plastic material from flowing around and locking the tang during the molding process, and prevent a rearward force on a terminal member from moving the clip, a sleeve is placed around the clip before it is inserted into the mold.

The advantage of the invention, both as to its construction and mode of operation, will be readily appreciated as the same become better understood by reference to the following detailed description when considered in connection with the accompanying drawings, in which like reference numerals designate like parts throughout the FIGS.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 depicts the contact assembly mounted in an insulator block prior to insertion of a contact terminal;

FIG. 2 depicts the contact assembly of FIG. 1 with a contact terminal inserted therein; and

FIG. 3 depicts an assembly view of the device of FIG. 1 prior to the molding process.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, there is shown in FIG. 1 a contact assembly formed in an insulator block 12. The block comprises a central cavity 14 into which the rear release contact assembly 16 is mounted. On opposite sides of the cavity 14 are a forward reduced diameter cavity 18 having a rearwardly facing shoulder 20 and a rear reduced cavity 22 having a forward facing shoulder 23. By forming the cavities 18 and 22 of smaller diameter than the cavity 14, the enlarged cavity 14 helps prevent the contact assembly 16 from being moved in an axial direction either forwardly or rearwardly.

The contact assembly 16 comprises an inner cylindrical clip 24 having a lip 26 at its forward end which bends outwardly and whose end 28 is formed back onto the main portion of the clip 24. Further, a longitudinal slot 32 is formed in the clip 24 and extends the entire length thereof for the purpose of allowing the clip to expand and contract. A plurality of tangs 34 are formed in the surface of the clip member 24 and extend forwardly and inwardly. Surrounding the clip 24 is an outer cylindrical sleeve 36 which forms a relatively tight fit around the clip 24 and is flush with the rear end of the clip 24. The edge of the forward end of the sleeve 36 abuts the end portion 28 of the lip 26. Thus, the sleeve 36, together with the lip 26 form a flush outer surface.

A contact terminal 42 contains a rearward tubular section 44 which may constitute a crimping sleeve, for connection with an electrical conductor 46. A stop means in the form of a flange or collar 48 is secured to the forward end of the tubular section 44. Extending forwardly from the tubular section 44 is a pin contact terminal element 54.

Upon insertion of the contact terminal 42 through the cavity 22, the collar 48 causes the tangs 34 to be deflected radially outwardly until the collar 48 passes the tangs. The forward surface of the collar 48 then abuts the rearward facing shoulder 20. Should a rearward force be applied to the terminal 42, the ends of the tangs would contact the rear face of the collar 48 as depicted in FIG. 2. Thus, it should be noted that any rearward force on the contact terminal would tend to cause the clip 24 to move rearwardly also. However, as can be seen, such a rearward force would also be translated to the sleeve 36 through the lip 26. Thus, the clip 24 is effectively retained within the cavity 14.

It is conventional in rear release contact assemblies to withdraw the terminal member 42 by slipping a tool in

between the external surface of the tubular section 44 and the internal surface of the clip 24 until the tool has come into contact with the collar 48. Such action results in the tangs 34 being deflected radially outwardly, freeing the shoulder 48 and allowing the terminal member 42 to be removed from the insulator block.

Referring now to FIG. 3 there is shown the contact assembly of FIGS. 1 and 2 prior to molding. The clip 24 is slid over a core pin 62 causing the tines 34 to deflect radially outwardly over the outer surface of the core pin 62. The clip 24 may be made of a hard metal such as beryllium copper alloy 25. The outer cylindrical sleeve 36 is then slipped over the clip 24. The cylinder 36 may be made of soft metal such as beryllium copper alloy 10. The member 24 is normally metal stamped from a flat piece of material and then formed into the cylinder. Then it is heat-treated to retain its configuration. The sleeve 36, however, is also formed but it is not heat-treated, thus, allowing it to expand during the molding process. Then the dielectric insulator material is poured into a mold into which the device depicted in FIG. 3 is placed. A typical insulator material which could be used is epoxy resin Epiall 1908. After the molding process has been completed, the core pin is removed allowing the tines 34 to spring inwardly resulting in the contact assembly of FIGS. 1 and 2.

We claim:

1. A contact assembly comprising an insulator block having a first cavity, and a second cavity of smaller diameter than said first cavity and adjoining one end of said first cavity and coaxial therewith, the junction of said cavities forming a first shoulder, and contact retention means mounted within said first cavity, comprising a generally cylindrical inner tubular member whose inner diameter adjacent said second cavity is at least equal to said second cavity diameter and having a lip at one end adjacent said shoulder which bends back onto the outer surface of said tubular member, a portion of the wall of said tubular member being struck inwardly to provide an axially extending tang, and an annular outer sleeve surrounding said tubular member, one end of said sleeve abutting the edge of the lip of said tubular member.

2. A contact assembly in accordance with claim 1 and further comprising a third cavity formed in said insulator block coaxial with said first and second cavities, said third cavity adjoining said first cavity at the outer end of said first cavity and having a diameter smaller than said first cavity, the junction of said first cavity and said third cavity forming a second shoulder, said contact retention means abutting said first shoulder and said second shoulder.