

Aug. 12, 1969

O. F. CREW ET AL
INSERTION TOOL AND FOLLOWER

3,460,229

Filed Dec. 1, 1966

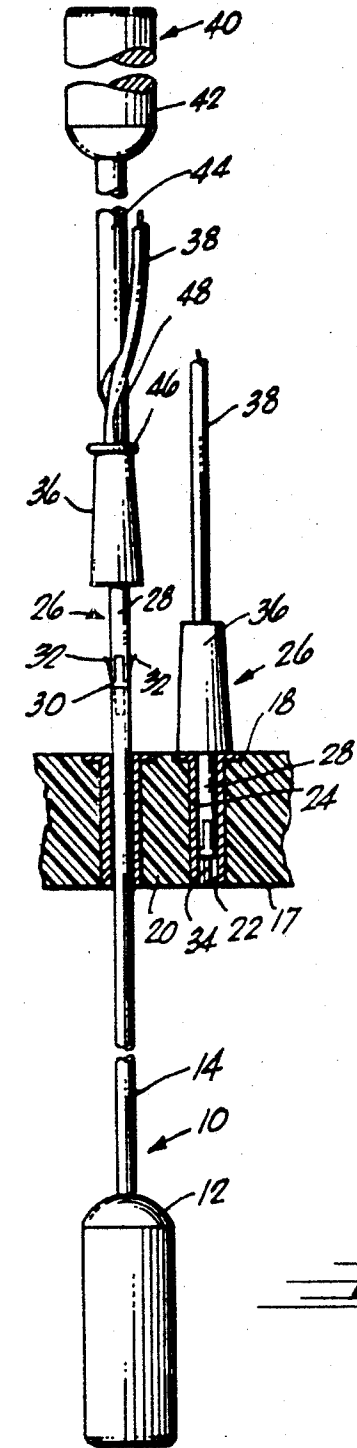


Fig. 1

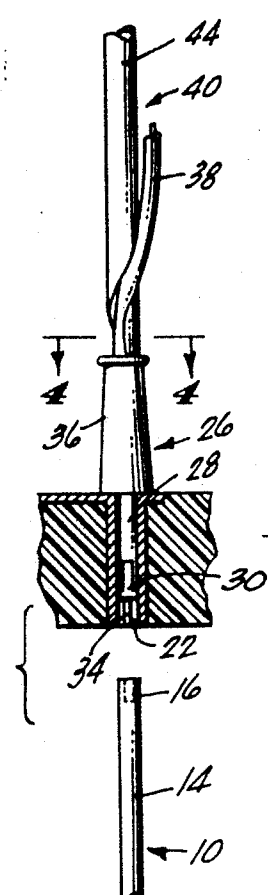


Fig. 2

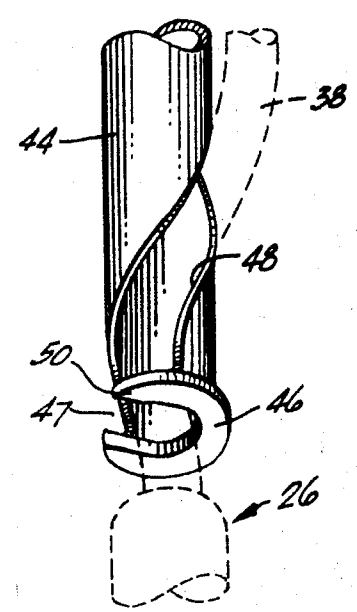


Fig. 3

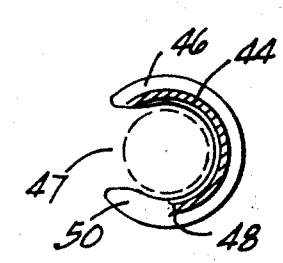


Fig. 4

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INSERTION TOOL AND FOLLOWER

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Filed Dec. 1, 1966, Ser. No. 598,458
Int. Cl. B25b 27/14

U.S. Cl. 29—203

3 Claims

ABSTRACT OF THE DISCLOSURE

A follower tool has a stem with an axial hole in the end to receive the tip of a male connector pin. This tool guides the male connector pin into the female receptacle on a panel board. An insertion tool has a stem which is hollow and which has a spiral guide slot cut through the wall at its end. The groove receives the electrical conductor to which the plug is attached and the plug male connector pin may thus be positioned with the insertion tool to follow the follower tool into engagement with the female receptacle on the panel board. The two tools, the follower tool in the rear of the panel board, and the insertion tool in front, may be used to insert the plug into and remove it from the panel in a cluttered field of many connectors and attached conductors.

The invention described herein was made in the performance of work under a NASA contract and is subject to the provisions of Section 305 of the National Aeronautics and Space Act of 1958, Public Law 58—568 (77 Stat. 435; 42 U.S.C. 2457).

BACKGROUND OF THE INVENTION

In many instances, modern electrical and electronic equipment assemblies are complex, small, compact, and delicate. In equipment such as that designed for use as a computer programming panel, for example, numerous pin and socket type terminals must be correctly positioned in the receptacle or terminal assemblies. These terminals are closely spaced on the receptacle assembly panel and literally hundreds of contacts are made within a relatively small space. Electrical conductors, or wires, extend from these conductors and present a maze of "spaghetti" or jumbled and entangled wires through which a connector plug must be passed in order to be positioned in its corresponding terminal on the board. The proper positioning of such contacts without damage and with reasonable economy of installation time, has presented a difficult problem which is solved by the insertion and follower tools of the present invention.

SUMMARY OF THE INVENTION

The insertion and follower tools comprising the present invention are used for connecting and removing electrical plugs from an electrical terminal panel. The follower tool is inserted into the appropriate pin hole in a terminal panel from its rear side and protrudes out through the maze of "spaghetti" wire extending from the front surface of the panel. The follower has an end suitable for engagement with a male connector which is to be inserted into the terminal through which the follower has been placed. The insertion tool engages the male connector in such a manner that it may be used to insert the male connector into the terminal into which the follower has been inserted. The follower and inserter are used together to insert the male connector, and also to effect its removal, quickly and conveniently and without damage to the wires or connectors. In a cluttered field of many plugs crowded onto the terminal panel, the insertion

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and removal of plugs has been a difficult and time-consuming operation.

BRIEF DESCRIPTION OF THE DRAWING

FIGURE 1 is a sectional view through a terminal panel, showing the insertion tool, follower tool and electrical plug connected together and positioned for insertion of the plug into the panel opening;

FIG. 2 is a sectional view through a panel terminal board showing the male connector engaged within the terminal hole, the follower tool withdrawn and the insertion tool still in contact with the connector;

FIG. 3 is an enlarged perspective view of the end of the insertion tool, showing how the conductor is engaged and retained thereby; and

FIG. 4 is a sectional view taken along the line 4—4 in FIG. 2.

DESCRIPTION

Referring now to FIG. 1, there is shown a follower tool 10 comprising a handle 12 and stem 14. The stem preferably is of stainless steel tubing of 1/8" O.D. with an internal diameter at its end 16 of .077 inch. Should the steel tubing be solid, then this internal diameter should define a recess approximately 1/4" deep. The terminal panel 17 has a front 18 and a rear 20 interconnected with a plurality of holes 22 which are made electrically conductive by plating or by the insertion of metallic cylinders 24 having an inside diameter suitable to receive male connectors 26. The male connector or plug 26 is of conventional type used in making plug-in connections. It consists of a male pin 28 having a diameter of approximately 1/8". A sleeve 30 fits over the end of the pin and has outwardly directed spring-like contacts 32 which insure electrical contact with the inner metallic surface 24 of the hole 22. The end 34 of pin 28 has a reduced outer diameter and may be received by end 16 of follower tool 10. Sleeve 36 innerconnects end 28 with its associated conductor 38.

The insertion tool 40 consists of a handle 42 and a hollow stem 44, having a bearing member or pressure foot 46 at the end thereof. This pressure foot 46 has an opening 47 communicating with a spiral guide slot 48 in the lower end of the hollow stem 44. In operation the pressure foot 46 is inserted over the electrical conductor 38 and is positioned against the top surface of sleeve 36. The conductor 38 is then inserted into the spiral guide slot 48 and maintained there by the operator while inserting the plug pin 28 into the opening of panel 16.

Referring now to FIG. 2, it can be seen that after the insertion tool has been used to insert the plug 26 into opening 22, the follower tool 10 may be withdrawn as shown. The manner in which the insertion tool 40 engages with and becomes disengaged from the plug 26, however, can best be understood with reference to FIGS. 3 and 4. Here the hollow stem 44 is shown with the pressure foot 46 affixed to the bottom thereof. Foot 46 is crescent-shaped and has a portion removed to provide for an opening 47 through which the conductor 38 may pass. The conductor 38 is then fed into the spiral guide slot 48 in the wall of hollow stem 44. The pressure foot 46 engages the top end of sleeve 26 as the insertion tool is used in urging the connection of the plug with the receptacle in the panel. As shown in FIG. 4, pressure foot 46 has a hook portion 50 which helps retain the conductor 38 in position within the spiral guide slot 48. After the conductor is in position in the opening 48 of pressure foot 46, the insertion tool 40 is then rotated clockwise to insert the conductor 38 into the spiral guide slot 48 and conversely, the disengagement of the insertion tool from the plug may be accomplished by a counter-clockwise rotation.

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Having thus described the preferred embodiment of the present invention, it is to be understood that modifications and variations therefrom will readily occur to one skilled in the art, and it is to be understood that these deviations are to be considered as part of the present invention as set forth in the appended claims.

What is claimed is:

1. An insertion and follower tool combination comprising:

a follower tool with a handle having a solid stem affixed thereto,

said stem having an outer diameter small enough to permit insertion thereof through contact openings in an electrical terminal panel,

said stem having a recess in the end thereof adapted to receive the lower tip of a plug male connector to be inserted in one of said contact openings,

the insertion tool having a handle with a hollow stem affixed thereto,

said hollow stem having a spiral groove slot in the wall thereof extending from the end of said stem,

said slot being of sufficient width to permit insertion therein of an electrical conductor connected to an upper end of an electrical plug on the end thereof.

said tools adapted to oppose one another and to move simultaneously with one another to assemble said electrical plug male connector within a contact opening in an electrical terminal panel.

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2. An insertion and follower tool combination as in claim 1,

said hollow stem having a crescent-shaped bearing member on the end thereof,

said bearing member having an opening therein to permit its insertion over said conductor and to permit said bearing member to contact the top surface of said plug and to transmit a longitudinally directed force thereto to thereby insert said plug into said contact opening.

3. An insertion and follower tool combination as in claim 2,

said bearing member having a hook portion thereon whereby engagement of said conductor into said slot requires clockwise rotation of said second handle and disengagement therewith requires counterclockwise rotation.

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U.S. Cl. X.R.
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