Feb. 2, 1971 E. J. CASTELLANI 3,559,267

TOOL

Filed Nov. 1, 1968

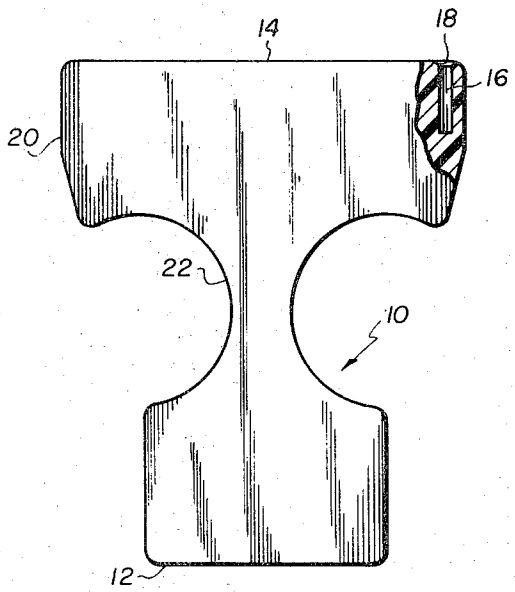


FIG. 1

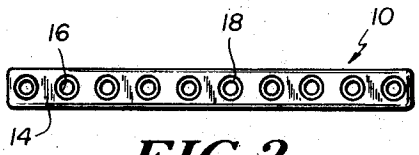


FIG. 2

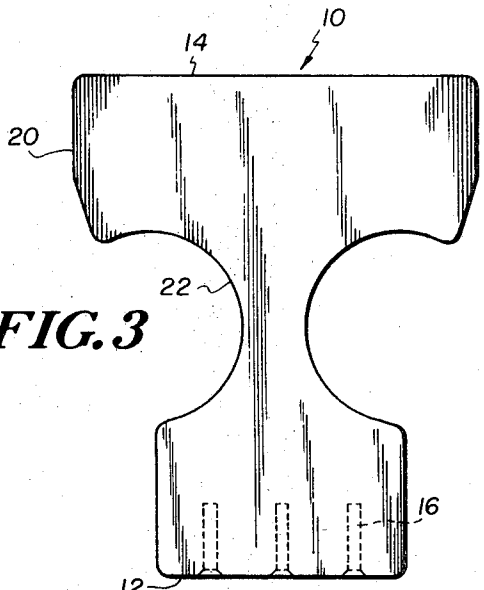


FIG. 3

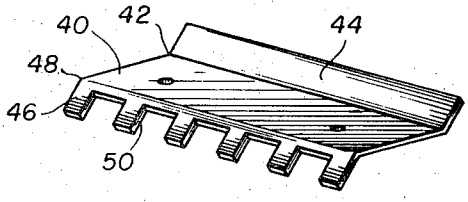
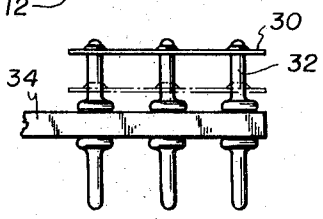


FIG. 4



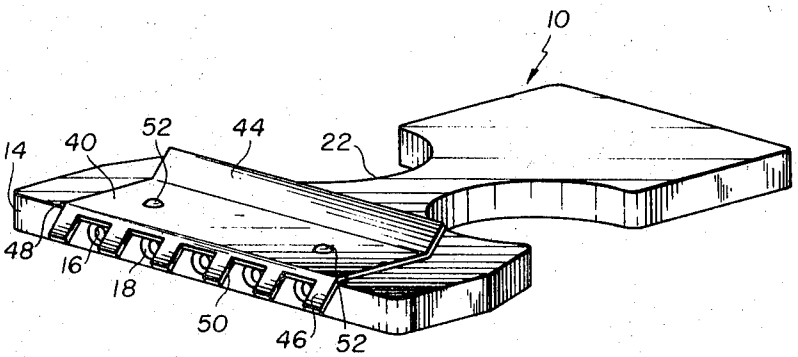


FIG. 5

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TOOL

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Filed Nov. 1, 1968, Ser. No. 772,584
Int. Cl. H05k 13/04
U.S. Cl. 29—203 5 Claims

ABSTRACT OF THE DISCLOSURE

The disclosure is directed to a tool for installing and removing bus connectors from a plurality of contact pins of a multi-pin connector board. The tool consists of two end faces each of which has a plurality of apertures therein sufficient in diameter and depth to receive therein the contact pins of said board. A bus connector will be applied to the uppermost portion of the pins then the pin tips will be introduced into the apertures within said tool and the tool by forcing downwardly thereon will cause the bus connector to take a position adjacent the surface of the board itself. The apertures are chamfered at their entry to facilitate the entry of the contact pins within the apertures and also to provide desired relief for deformance of any material of the bus connector about the pin as the pin is inserted. The opposite ends of the tool are of different lengths so that each may accommodate a different number of apertures to be used for short or long bus connectors. In addition, provision is made for the inclusion of an extracting plate adjacent either, or both, of the ends which extraction plate may be used to remove a bus connector already positioned upon the contact pins. The extraction plate consists of a comb-like end having a plurality of slots of sufficient size to go about the contact pins. The extraction plate is moveable from a first position out of contact with the pins to a second position in contact with the pins thus trapping the bus connector therebetween and upon the application of force to the tool, in a direction away from the board, the bus connector may be removed therewith.

CROSS REFERENCE TO RELATED APPLICATIONS

Bus connectors described herein are described and claimed in copending application entitled, "Bus Connector," by Edward J. Castellani, Serial Number 772,546, filed Nov. 1, 1968.

BACKGROUND OF THE INVENTION

Field of the invention

The invention is employed in the field of grouping together, or busing, a plurality of contact pins on a multi-pin connector board.

Description of the prior art

Prior art devices of the type generally described herein are not found, in that connections between adjacent contact pins of a multi-pin connector board are achieved by means of terminals wired, or jumpered, together, or by the direct jumpering of contact pins by means of soldering conductors or jumper wire thereto.

SUMMARY OF THE INVENTION

The invention provides a simple tool for the installation of bus connectors of the type described in the copending application cited above. It provides a simple tool having at its two ends a plurality of apertures for receipt therein of the contact pins of a multi-pin connector board. The first end is shorter than the second end in order to accommodate different lengths of bus connectors. Intervening side members between the two end portions are shaped to permit the tool to be easily grasped in the hand and to apply force to it regardless of which end is made to engage the contact pins. The spacing of the apertures is the same as the center to center spacing of the contact pins and the depth of the apertures are sufficient to accommodate therein the entire height of the contact pins above the contact board. The entrances to the apertures are chamfered such as to permit easy insertion of the pins into the apertures and to permit relief area for any expansion of material as a result of the bus connector being forced upon the contact pins. Further, an extractor plate may be provided at one or both ends of the tool to facilitate the removal of bus connectors already assembled on the contact pins of a multi-pin connector board. The extractor plate is fastened to the tool at one of its ends and the second end is free to move in cantilever fashion. The free end of the extractor plate is comb-like with a plurality of slots equal in spacing with the center to center distance of the contact pins and of sufficient size to accommodate therein such contact pins. The tool is positioned with the extractor plate in a first position out of contact with the contact pin and pressed to the level of the board and in contact with the bus connector. The extractor plate is then moved to a position under the bus connector and with the contact pins entering the slots of the extractor plate. The tool is then moved in the direction away from the board taking with it the trapped bus connector. It is therefore an object of this invention to provide a tool for the easy assembly of bus connectors to the contact pins of a multi-pin connector board.

It is yet another object of this invention to provide a simple, inexpensive tool for the installation and removal of bus connectors from contact pins.

It is still another object of this invention to provide a tool to accommodate different bus connector lengths.

Other objects and features of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose, by way of example, the principles of the invention, and the best modes which have been contemplated for carrying them out.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation of a tool constructed in accordance with the concepts of the invention showing a portion thereof partially fragmented.

FIG. 2 is a top view of one end of the tool of FIG. 1.

FIG. 3 is a side elevation of the tool of FIG. 1 showing the manner in which it is employed to install bus connectors to the contact pins of a multi-pin connector board.

FIG. 4 is a perspective view of an extraction plate employed with a further embodiment of the invention.

FIG. 5 is a perspective view of the extraction plate of FIG. 4 coupled to the tool of FIG. 1.

Similar elements will be given similar reference characters in each of the respective figures.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Turning now to FIGS. 1 and 2 there is shown a tool **10** constructed in accordance with the concepts of the invention. Tool **10** has a first end **12** and a second end **14**, end **14** being of greater length than **12**. Placed within each of the ends **12** and **14** are a plurality of apertures **16** which may be better appreciated from FIG. 2. Each of the apertures is chamfered as at **18** to provide easy access to the apertures **16**. In addition, the chamfered portion **18** will provide relief for the deforming material of the bus connector during its installation to the contact

pins. The end **12** is similarly equipped with a plurality of apertures not shown in the view. To facilitate the use of the tool varying aperture arrangements dependent upon the number of contact pins involved may be made. Sides **20** are provided with notches **22** to permit the tool **10** to be grasped and easily employed for the insertion of bus connectors, or the withdrawal of bus connectors from the contact pins. Any other convenient shape may also be employed.

Turning now to FIG. 3 there is shown the installation of a bus connector **30** upon the contact pins **32** of a multi-pin connector board **34**. The bus connector **30** is placed as shown by the solid line at the top portion of the contact pins **32** at which time the tool **10** is brought into position such that the tips of the contact pins **32** will enter the apertures **16** in the end **12** of the tool **10**. A force upon the tool **10**, in the direction of board **34**, will then force the contact pins **32** within the aperture **16** of the end **12** and will force the bus connector **30** down along the contact pins **32** from the position shown in solid line and that shown in dotted line adjacent the connector board **34**. The tool **10** may then be withdrawn for use with other installations.

Turning now to FIG. 4 there is shown an extractor plate which may be employed with the tool **10** of the FIG. 1 for the extraction of bus connectors from the contact pins of a multi-pin connector board. The extractor plate **40** is formed as at **42** to provide a pivot whereupon the depression along the tab **44** will cause the opposite tab **46** to be displaced. Tab **46** extends at approximately right angles to the main portion of the plate **40** and is formed as at **48**. A plurality of slots **50** spaced from one another by distance equal to the center to center spacing of the contact pins and of a size sufficient to accommodate the contact pins therein are provided along the tab **46**. As is shown in FIG. 5 the extractor plate is assembled to the tool **10** by means of pins **52**. With the application of force to the tab **44**, away from tool **10**, the plate **40** will take a position such that the slots **50** align themselves with the apertures **16** of the tool **10**. However, upon the application of force toward the tool **10** upon the tab **44**, extractor plate **40** will pivot tab **46** leaving the edge **14** of the tool **10** fully exposed.

In employing the tool for extraction purposes the tool **10** will be positioned such that the apertures **16** are placed over the contact pins and the tool **10** is moved downwardly so that the edge **14** is in contact with the bus connector. This is done while force is applied to the tab **44** of the extractor **40** to hold tab **46** away from the bus connector. After contact has been achieved between the edge **14** and the bus connector, force is applied to the tab **44** away from tool **10** and permitted to position the slots **50** in tab **46** about the pins thus trapping the bus connector between the edge **14** and the tab **46** of the extractor. Now the application of force to the tool **10** in a direction away from the board will cause the removal of the bus connector of the tool.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to the preferred embodiments, it will be understood that various omissions and substitutions and changes of the form and details of the devices illustrated and in their operation may be made by those skilled in the art, without departing from the spirit of the invention.

The embodiments of the invention in which an exclusive property or privilege is claimed is defined as follows:

1. A tool for positioning connectors on the contact pins of a multi-pin board, comprising: a body portion having a first end and a second end and a pair of sides; each of said first and said second ends having a plurality of apertures therein, said apertures being in selective, spaced apart adjacent relationship, being separated by a distance equal to the center to center spacing between said contact pins, and having a depth at least equal to the height of said contact pins to permit either one of said first or second ends of said tool to be positioned adjacent a plurality of contact pins in alignment with said apertures in said first or second end and disposed upon said contact pins to position a connector placed thereupon adjacent said board; and an extraction plate mounted adjacent either said first or said second end, said plate having a plurality of slots spaced apart by a distance equal to the center to center spacing of said contact pins; said plate being movable to a first position out of alignment with said apertures and to a second position in alignment with said apertures, whereby a connector positioned upon said contact pins may be positioned between one of said first or said second ends and said extraction plate in said second position and withdrawn from said contact pins as said tool is moved away from said board.

2. A tool, as defined in claim **1**, wherein the lengths of said first and second ends are different and each has a different number of apertures.

3. A tool, as defined in claim **1**, wherein said sides are notched to permit said tool to be grasped to position either said first or second end adjacent said contact pins.

4. A tool, as defined in claim **1**, wherein the entrance to said apertures is chamfered to permit easy engagement of said contact pins with said apertures.

5. A tool, as defined in claim **1**, wherein extraction plates are provided adjacent both said first and said second ends.

References Cited

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THOMAS H. EAGER, Primary Examiner