May 9, 1967 J. V. CULL 3,317,989

CONNECTOR INSTALLATION TOOL

Filed Aug. 12, 1965

Fig. 1

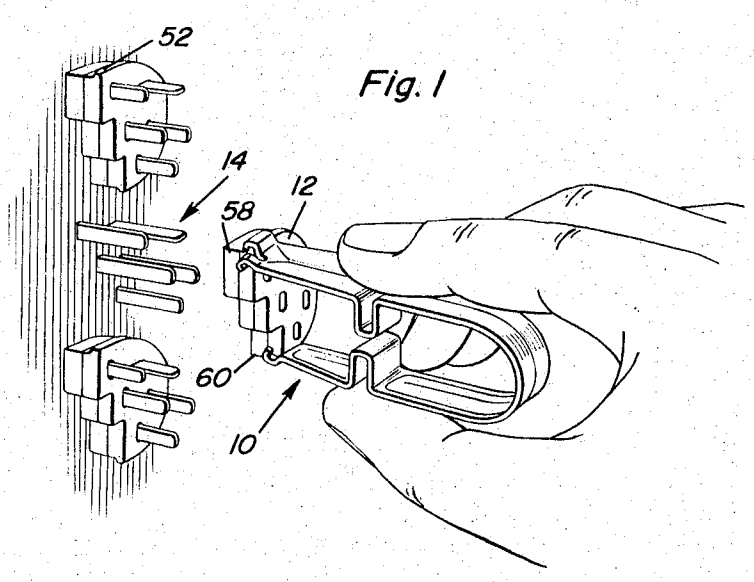


Fig. 2

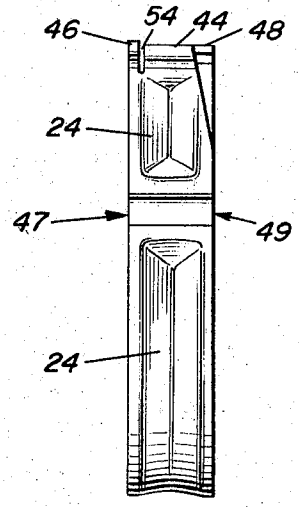


Fig. 3

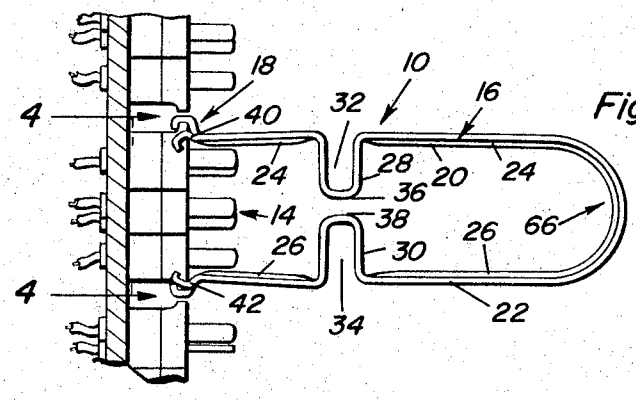


Fig. 4

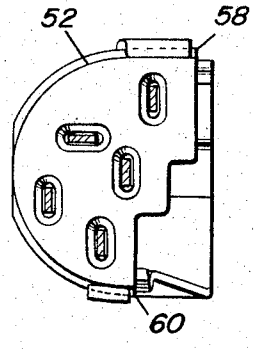
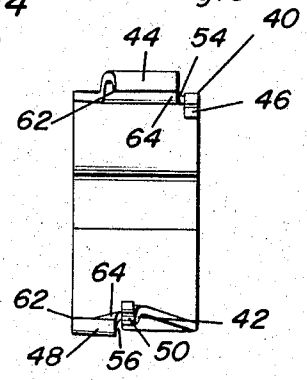


Fig. 5



John V. Cull

INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson

Attorneys

United States Patent Office 3,317,989
Patented May 9, 1967

3,317,989

CONNECTOR INSTALLATION TOOL

John V. Cull, P.O. Box 7342, Dallas, Tex. 75209

Filed Aug. 12, 1965, Ser. No. 479,074
11 Claims. (Cl. 29—203)

This invention relates to connector installation tools and more particularly to a tool especially adapted to insert and withdraw connectors from an electrical circuit.

Automatic numbering identification (ANI) connectors are widely in use in capacitor-resistor circuits on direct distance dialing equipment. Due to space requirements, the connectors are very closely spaced on circuit boards or the like. Hence, it has been difficult to insert and withdraw the connectors from the circuit boards.

It is therefore an object of the present invention to provide a tool for installing and removing ANI connectors from their circuit connections. Specifically, the tool is designed for use with the connectors disclosed in my copending application Ser. No. 378,210 filed June 26, 1964, for Thirteen Traffic Connector.

A further object of the present invention is to provide an installation tool for use with electrical connectors which is simple in design, can be fashioned out of readily obtainable materials and is efficient in operation.

A further object of the present invention is to provide an installation tool for use with electrical connectors which is electrically insulated, resilient, and which may be used in upright or inverted position and/or held in either hand.

It is a still further object of the present invention to provide an installation tool which has grippers adapted to hold connectors for placement in tight-fit circuit boards which will slide off the connectors laterally if insufficient room is available to be pulled straight out.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a perspective view showing the connector installation tool comprising the present invention in use;

FIGURE 2 is an elevational view of the connector installation tool comprising the present invention;

FIGURE 3 is a view partly in section showing the tool comprising the present invention in side elevation;

FIGURE 4 is a sectional view taken substantially on the plane of the line 4—4 of FIGURE 3 and illustrating the relationship between the connector installation tool and the connector; and

FIGURE 5 is an end elevational view of the connector installation tool.

Referring now more particularly to the drawings, numeral **10** refers generally to a connector installation tool comprising the present invention. As may best be seen from the view of FIGURE 1, tool **10** is used with electrical connectors **12**, generally known as automatic numbering identification (ANI) connectors, by being compressed in the mid region thereof thereby gripping a connector **12**. The connector **12** may then be placed over or removed from electrical terminals **14**.

Connector installation tool **10** is made preferably of spring steel or some other resilient material, and consists of a body portion **16** and a head portion **18**. The body portion **16** is a generally U-shaped member and has side walls **20** and **22** in which are provided recessed or concave areas **24** and **26** for added resiliency. U-shaped legs **28** and **30** project inwardly from the side walls and form channels **32** and **34**. The legs **28** and **30** provide

an abutting surface at their ends **36** and **38** which will limit the inward movement of the tool upon compression, thereby preventing the tool from being deformed.

The head portion **18** consists of two bifurcated heads **40**, **42** formed integrally with the side walls **20** and **22**. The first bifurcated head **40** has a jaw portion **44** and a stop tab portion **46**. The bifurcated head **42** also has a jaw portion **48** and a stop tab portion **50**. It may be seen for example in FIGURE 4 that the jaws **44** and **48** and the stop tabs **46** and **50** are inwardly opening and concave, the jaws **44**, **48** fitting over the flanges **52** of the connector member **12** when in position. The stop tabs **46** and **50** will thereby fit against the connector member **12** to limit lateral movement of the connector member **12**. Further, if the space between adjacent connector member **12** is too tight to allow the tool **10** to be opened and withdrawn straight out, the tool **10** may be slid laterally off the connector member **12**.

Referring to FIGURES 2 and 4, it is seen that the stop tab **46** extends from a point lying in a plane **47** defined by one side of the tool laterally of said plane to a channel **54** dividing the stop tab **46** from the jaw member **44**. The jaw portion **44** extends from the channel **54** laterally of the tool and stops short of the other side of the tool. The jaw member **48** extends from a point lying in a plane **49** defined by the other side of the tool and extends laterally of the plane **49** to the channel **56**. Stop tab **50** extends from the channel **56** laterally of the tool and stops short of the first side of the tool. Thus it may be seen that the jaw members **44** and **48** are laterally offset, and the stop tabs **46** and **50** are laterally offset, thereby enabling the tool to grip the connector member **12** which has laterally offset opposite edges **58**, **60**, without being laterally deformed.

An epoxy coat or other insulating material may be placed on the tool **10** in order to provide insulation on said tool and to prevent electrical shorts during installation or removal of the connector members **12**.

The jaws **44** and **48** are slanted outwardly from point **62** to point **54** to provide a conforming surface to the curvature of a connector member, thus providing a more positive grip on the connector member for installation or removal. As may be seen in FIGURE 4 the jaws **44** and **48** are closer together at point **62** than at point **64**.

It may be appreciated that due to the U-shaped construction of the tool **10**, a user's finger may be inserted into the bottom of the U at **65** to aid in the withdrawal of the tool while engaging a connector member **12**.

The stop tabs **46** and **50** are positioned so as to form a stop for the connectors **12** to rest against thereby providing a positive resting position for the connectors during the installation or removal thereof. Further, the legs **28** and **30** provide a mechanical stop for compressing the tool to hold a connector **12**, thus providing a positive stop and firm grip on a connector in the tool when the abutting surfaces **36** and **38** of the legs **28** and **30** are compressed together.

The concave areas **24** and **26** add stiffness to the tool **10** in the direction of movement of the heads **40** and **42** and also prevent the heads **40** and **42** from moving laterally with respect to each other, thus providing the lateral or horizontal stability required to hold the connectors **12**.

Further, the tool **10** is small enough so that the user can operate it with one hand, thereby leaving one hand free for other purposes. Also, the tool provides maximum visibility of the connectors **12** during the installation thereof, allowing the installer to more easily install the connectors on straight or misaligned terminals.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those

skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. For use with a connector mounted on electrical terminals, a connector installation tool comprising a body of resilient material, U-shaped leg means extending inwardly from opposing side walls of said body whereby said leg means will contact upon compression of said body, head portions integral with said body and at opposing ends of said side walls, said head portions comprising first and second jaws respectively, said jaws being movable towards each other upon compression of said body whereby said tool can be used to grip and carry connectors either toward or away from electrical terminals, said head portions including first and second stop tabs respectively adjacent said first and second jaws whereby a connector held between said jaws will be free to move laterally of said jaws in only one direction.

2. The apparatus of claim 1 wherein said first jaw extends from a point lying in the plane defined by one side of said tool toward said other side of said tool terminating adjacent said first stop tab, and said second stop tab extends from a point lying in a plane defined by the other side of said tool towards said one side of said tool terminating adjacent said second jaw whereby said first and second jaws and said first and second stop tabs are laterally offset each from the other.

3. The apparatus of claim 2 wherein said first and second jaws have first and second inwardly opening concave flange gripping portions adapted to grip flanges on said connectors, said first and second flange gripping portions being spaced further apart from each other at the first side of said tool than at the other side thereof.

4. A connector installation tool comprising a U-shaped body of resilient material adapted to be compressed at a region adjacent the ends thereof, a first U-shaped leg in a first wall of said body extending inwardly of said body and defining a channel in said first wall, a second U-shaped leg in the second wall of said body opposite said first leg extending inwardly of said body and defining a channel in said second wall, said first and second legs constituting a contact stop means for said body upon compression at said region, a first bifurcated head integral with said first wall at the end thereof, a second bifurcated head integral with said second wall at the end thereof, each of said first and second heads including a jaw portion and a stop tab portion whereby said tool is adapted to grip a connector between said jaw portions and limit the movement of said connector to one lateral direction.

5. The apparatus of claim 4 wherein said jaw portions and stop tab portions are inwardly opening and concave, said jaw portions and said stop tabs portions being respectively laterally offset from each other whereby a connector having laterally offset opposing sides may be gripped by said tool.

6. The apparatus of claim 5 wherein said jaw portions are open at one lateral end with respect to each other and spaced further apart at said one lateral end that at the other lateral end.

7. The apparatus of claim 5 wherein said tool is covered with insulating material whereby electrical shorts during use of the tool is prevented.

8. For use with a connector mounted on electrical terminals, a connector installation tool comprising a body portion of resilient material, said body portion including side walls, head portions integral with said body portion and at opposing ends of said side walls, each of said head portions comprising a jaw respectively, said jaws being movable towards each other upon compression of said body whereby said tool can be used to grip and carry connectors either toward or away from electrical terminals, each of said jaws including a stop tab at one edge thereof to permit lateral movement of the tool and connector in relation to each other in only one direction.

9. A connector installation tool comprising a U-shaped body of resilient material and including side walls adapted to be compressed inwardly by exerting pressure thereon, each of said walls having a bifurcated head at the end thereof, each bifurcated head including a gripping jaw and a stop tab at one end of the jaw for engaging an edge surface of a connector gripped by the jaws to limit relative movement of the jaws in relation to the connector to one lateral direction when the jaws are grippingly engaged with the connector.

10. The structure as defined in claim 9 wherein said jaws are inclined laterally with respect to each other for camming the connector toward the stop tabs when the jaws are in gripping engagement with the connector.

11. A tool comprising a pair of movable heads mounted for movement toward and away from each other, each of said heads including a jaw portion and a stop tab alongside of the jaw portion, said stop tabs being closer to each other than the jaw portions whereby lateral movement of the jaw portions in relation to an article being gripped by the jaw portions when they move toward each other will be limited to one direction.

References Cited by the Examiner

UNITED STATES PATENTS

1,521,689	1/1925	King	81—43
2,376,135	5/1945	Frasher	81—43 X
3,253,327	5/1966	McElligatt	29—206

JOHN F. CAMPBELL, *Primary Examiner.*

THOMAS H. EAGER, *Examiner.*