TOOL FOR CONNECTING AND SEPARATING ELECTRICAL CONNECTORS

Filed Nov. 15, 1962

INVENTOR.
One type of electrical connector is designed in two mating parts, each part being secured to an electrical conductor. The parts are designed so that they are joined together a number of times to make or break a circuit. A connector of this type is disclosed in patent application, Serial No. 722,000, filed November 5, 1958, in the name of Kenneth Arkwright (now abandoned).

The object of this invention is to provide a tool for connecting or disconnecting a splice of the above-described type. It is a further object of this invention to provide such a tool which is simple to operate, has relatively few movable parts, and is designed to secure connectors together in a firm relationship by an easy stroke of the tool. Also, the tool is capable of easily disconnecting the mated parts without damaging them.

Another object of this invention is to convert a scissors-type, pivoted tool into one where the connecting and disconnecting motion is applied rectilinearly.

Other objects and attainments of the present invention will become apparent to those skilled in the art upon a reading of the following detailed description when taken in conjunction with the drawings in which there is shown and described an illustrative embodiment of the invention; it is to be understood, however, that this embodiment is not intended to be exhaustive nor limiting of the invention but is given for purposes of illustration in order that others skilled in the art may fully understand the invention and the principles thereof and the manner of applying it in practical use so that they may modify it in various forms, each as may be best suited to the conditions of a particular use.

In the drawings:

FIGURE 1 is a perspective view of a device embodying the principles of this invention;

FIGURE 2 is an exploded, perspective view of the members which connect and disconnect the electrical conductor;

FIGURE 3 is a sectional view taken through plane 3--3 of FIGURE 1;

FIGURE 4 is a view similar to FIGURE 3, illustrating a pair of connectors secured within the members;

FIGURE 5 is a view similar to FIGURE 4, illustrating the connectors being urged into reverse position from that shown in FIGURE 4;

FIGURE 6 is an exploded view of a connector prior to engagement;

FIGURE 7 is a view similar to FIGURE 2 showing an alternative embodiment; and

FIGURES 8 and 9 are sectional views illustrating the action of the embodiment of FIGURE 7.

As shown in FIGURE 1, a common type of scissors-action tool, generally designated 10, includes a pair of handles 12 and 14 secured by a pivot member 16, so that jaws 18 and 20 rotate accurately by opening or closing the handles 12 and 14.

The connector assembly and disassembly means (FIGURE 2) comprises a pair of relatively slidably members 24 and 26. The assembly/disassembly member 24 includes a flat plate 28 having an elongated slot 30 and a hole 31 therein. A finger-like member 32 extends laterally from the other end of the plate in a direction which is opposite to the finger member 32. Half of the assembly/disassembly member 26 is identical with the assembly/disassembly member 24. This half includes a plate-like member 36 having a slot 38 therein, and a finger means 40 projecting therefrom in the same direction as the finger member 32 on plate 28.

The other half of the assembly/disassembly member 36 is somewhat more complex. A fourth finger member 42, which extends in the same direction as the finger member 34, is secured to the plate 36 by a right-angle member. The right-angle member includes a pair of right-angled surfaces 44 and 50. One surface 44 is at a right-angle to the finger member 42 and has an aperture 48 extending thereto. The other surface 50 of the right-angle member is also at a right-angle to the plate 36 and extends in the same direction as the finger 42. While the finger 42 and the plate 36 are approximately the same width as the assembly/disassembly means 28, the right-angle member is somewhat narrower, being slightly less than the width of the slot 30 in the assembly/disassembly means.

The assembly/disassembly members 26 and 28 are formed together by rotating the members 36 ninety degree (90°) from the position shown in FIGURE 2, and inserting the finger member 42 in the plate 28, the plate 36 is again rotated to the position shown in FIGURE 2, and the right-angle member projects into the slot 30 until the members 24 and 26 are parallel. A bearing pin 52 is inserted into the aperture 48, and the slot 39 is staked to the jaw 18 (FIGURE 3). A second bearing pin 54 is inserted into the hole 31 of the plate 28, through the jaw 20, aligned with the slot 38 in the plate 36. This is also staked into position so that the members 24 and 26 are secured to the jaws 18 and 20. The members 24 and 26 are free to pivot about pins 52 and 54. It is noted that all the finger members have a half-round opening in their free end to match an abutment on the connector.

A typical connector, as shown in FIGURE 6, is secured to a pair of conductors C, C' for joining them in electrical conductive relationship. One connector has a central pin 60 which is secured to the conductor C; and the other conductor has a central metal shell 62 which is secured to the other conductor C'. A central portion 64 is adapted to fit in the half-round openings of the finger members with abutting means 66 and 68 located on either side thereof. The other conductor has a central portion 70, also adapted to fit into the half-round opening, with abutting means 72 and 74 on opposed sides.

As shown in FIGURE 4, when it is desired to connect a pair of conductors C, C' together, the central portions 64 and 70 are inserted into half-round portions of finger members 42 and 34 respectively. Initially the handles 12 and 14 are in the open position. Closing the handles causes the jaws 18 and 20 to drive the finger members 42 and 34 toward each other so that the finger member 42 bears against abutment means 74 on the connector, and finger member 34 bears against abutment means 66 on the other half of the connector to cause the pin 60 and shell 62 to be driven into tight engagement as shown in FIGURE 5.

When it is desired to disconnect the connector, the completed connector is inserted between the finger members 32 and 40 so that the finger member 32 bears against the abutment means 72 and the finger member 40 bears against the abutment means 68. The handles again are in the open position to accommodate the length of the connector. When the handles 12 and 14 are driven toward each other, finger means 32 and 40 are driven rectilinearly away from each other against members 72 and 68, thus separating the connector.

The embodiment illustrated in FIGURES 7--9 com-
prises a three-piece, assembly/disassembly device. The
intermediate member 24 is identical with member 24, in-
cluding plate 28', slot 30', hole 31' and fingers 32', 34'.
A two-piece assembly constitutes the equivalent of
member 26. This is comprised of a plate-like member
36' similar to plate 36, with a slot 38' and finger means
40' projecting therefrom in the same relationship as the
device shown in FIGURE 2. However, the plate-like
member 36' extends a lateral distance, approximately equal
to the length of plate 28'. A hole 41' is disposed in the
plate member 36' at one end thereof.

The other part of the assembly is comprised of a sur-
faced 46' with finger member 42' extending at a right-angle
therefrom. An opening 48' in the surface 46' is adapted
to be aligned with the opening 41' in the plate 36'. The
embodiment of FIGURE 7 is similar in design and func-
tion to that shown in FIGURE 2, except that a pair of
members 36' and 46' are bolted together rather than
formed integrally. This design facilitates assembly of
the device.

As shown in FIGURES 8 and 9, a rivet 52' secures
the plate 46' and plate 36' to a jaw 18' of the tool. A
second rivet 54' extends through the hole 31', the other
jaw 20' of the tool, and the slot 38', to permit relative
motion in the slots 30' and 38'.

Changes in construction will occur to those skilled in
the art and various apparently different modifications and
embodiments may be made without departing from the
scope of the invention. The matter set forth in the fore-
going description and accompanying drawings is offered
by way of illustration only. The actual scope of the in-
vention is intended to be defined in the following claims
when viewed in their proper prospective against the prior
art.

We claim:

1. A device for changing the spatial relationship of
portions of an electrical connector including: a plurality
of relatively slidable elements, one of said elements com-
prising a first flat member with a slot therein, and finger
means at each end of the flat member, said finger means

2. A device for changing the spatial relationship of
portions of an electrical connector including: a pair of
relatively slidable elements, one of said elements com-
prising a first flat member with a slot therein, and finger
means at each end of the flat member, said finger means

3. A device for changing the spatial relationship of
portions of an electrical connector including: a pair of
relatively pivotal jaws, connector-engageable means secured
to each of said jaws, said connector-engageable means being
interlinked and relatively slidable, linkage means between
said jaws and said connector-engageable means for trans-
lating pivotal motion into linear motion, whereby the
pivotal movement of the jaws drives the connector-engage-
able means in a linear direction.

References Cited by the Examiner

UNITED STATES PATENTS

3,094,774 6/63 Nazarov et al.------------------29--203
3,098,289 7/63 Demler ------------------------29--203

WHITMORE A. WILTZ, Primary Examiner.
THOMAS H. EAGER, Examiner.