United States Patent

Brown et al.

[15] **3,665,574**

[45] **May 30, 1972**

[54] TOOL HOLDER FOR CABLE SPLICING TOOL

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[21] Appl. No.: **38,660**

[52] **U.S. Cl.**.....**29/203 MW,** 29/203 HT, 29/203 J

[51] **Int. Cl.**.....**H05k 3/32,** H01r 43/04

[58] **Field of Search**.....29/203 MW, 203 HT, 203 J, 203 R, 29/203 P

[56] **References Cited**

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3,528,155 9/1970 Marshall.....29/203 MW

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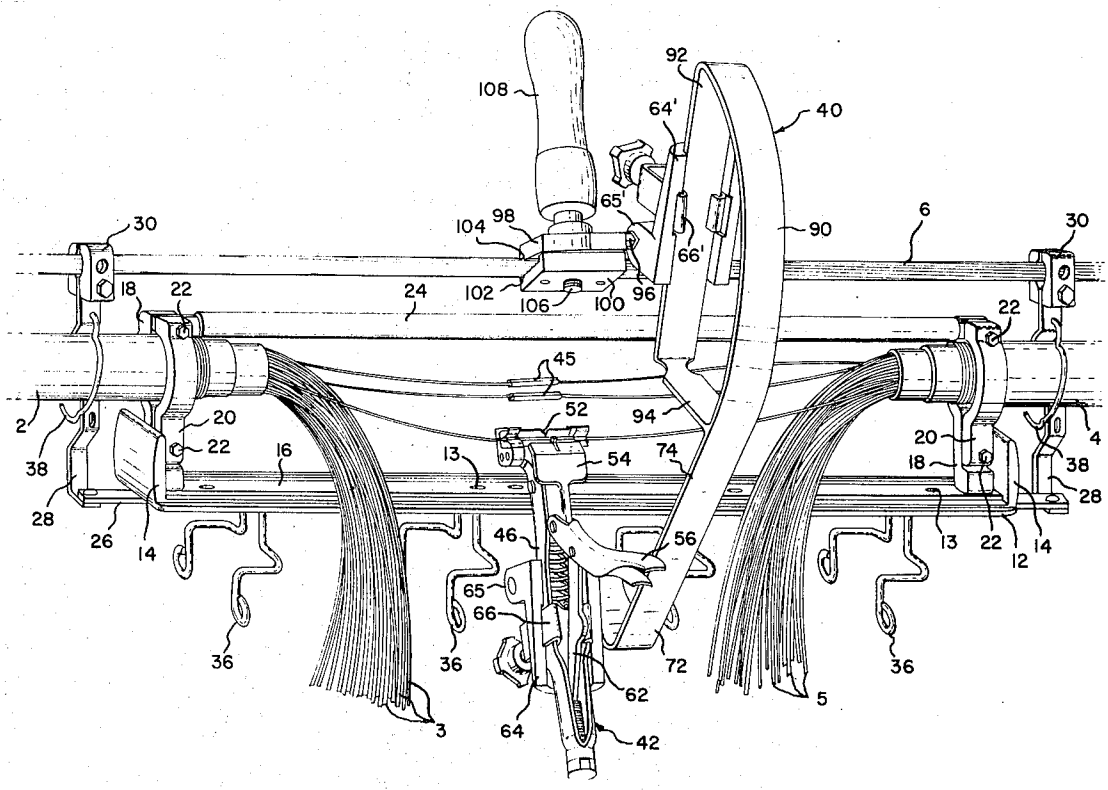
[57] **ABSTRACT**

Tool Holder for Cable Splicing Tool has clamping means to clamp the holder to a messenger cable associated with the cable. Suspending arm is adjustably secured to the clamping means and has a length such that it will extend laterally or transversely of the cable axis past the cable. A second clamping means is provided on the end of the suspending arm which receives the cable splicing tool, adjustment of both the suspending arm and the tool being permitted in both a rotational sense and an axial sense so that any desired attitude of the tool can be achieved.

6 Claims, 4 Drawing Figures



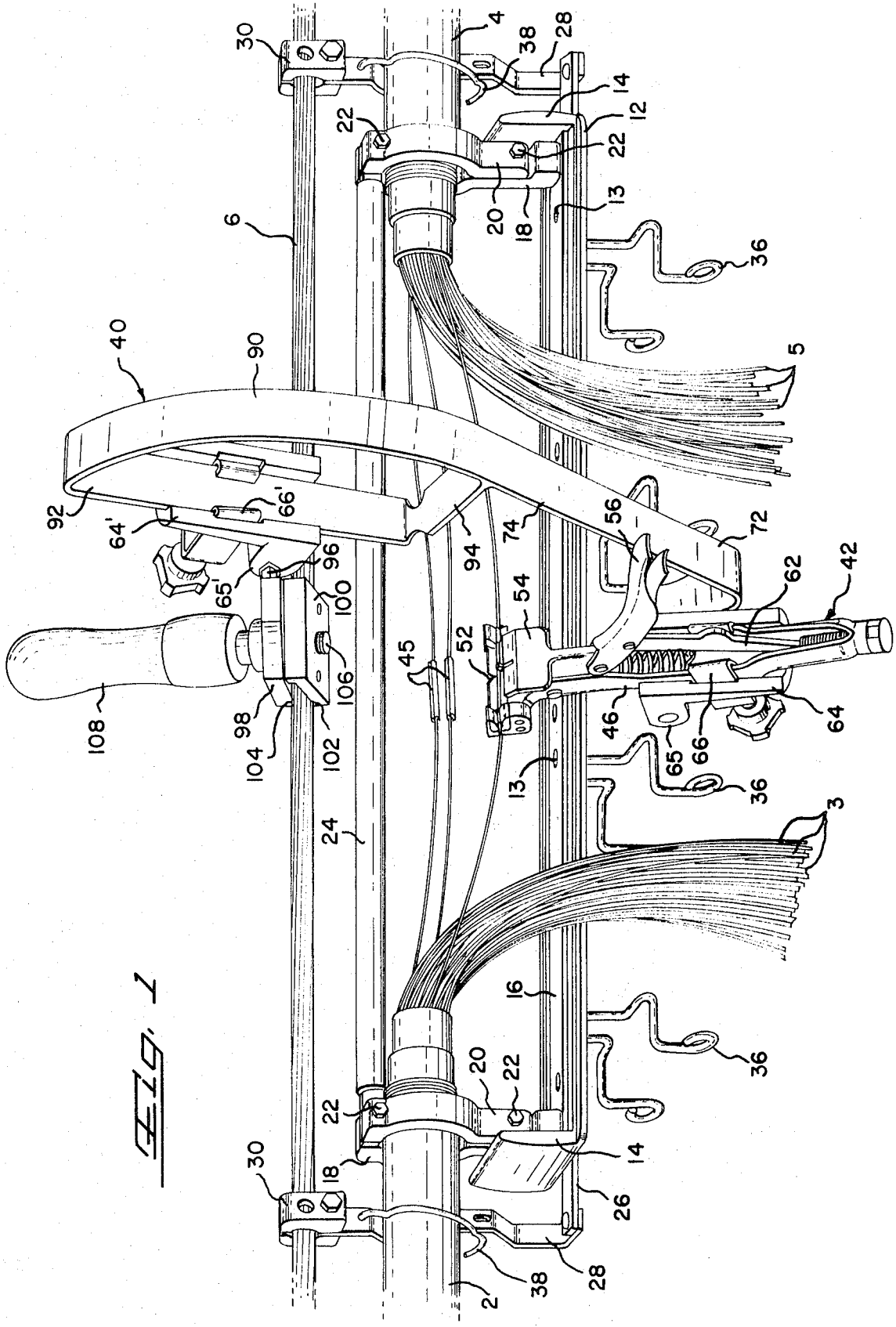

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FIG. 1

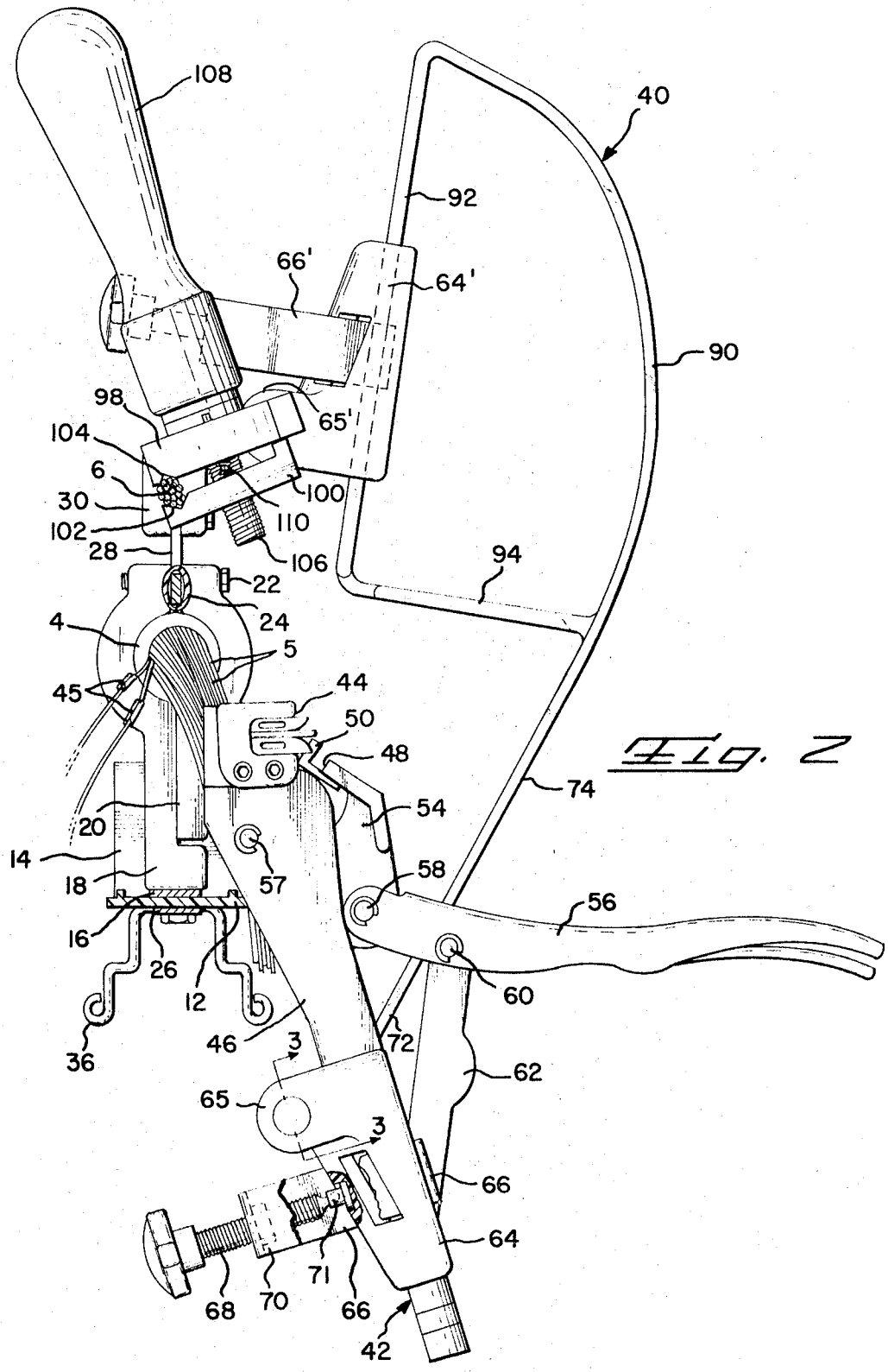
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Fig. 2

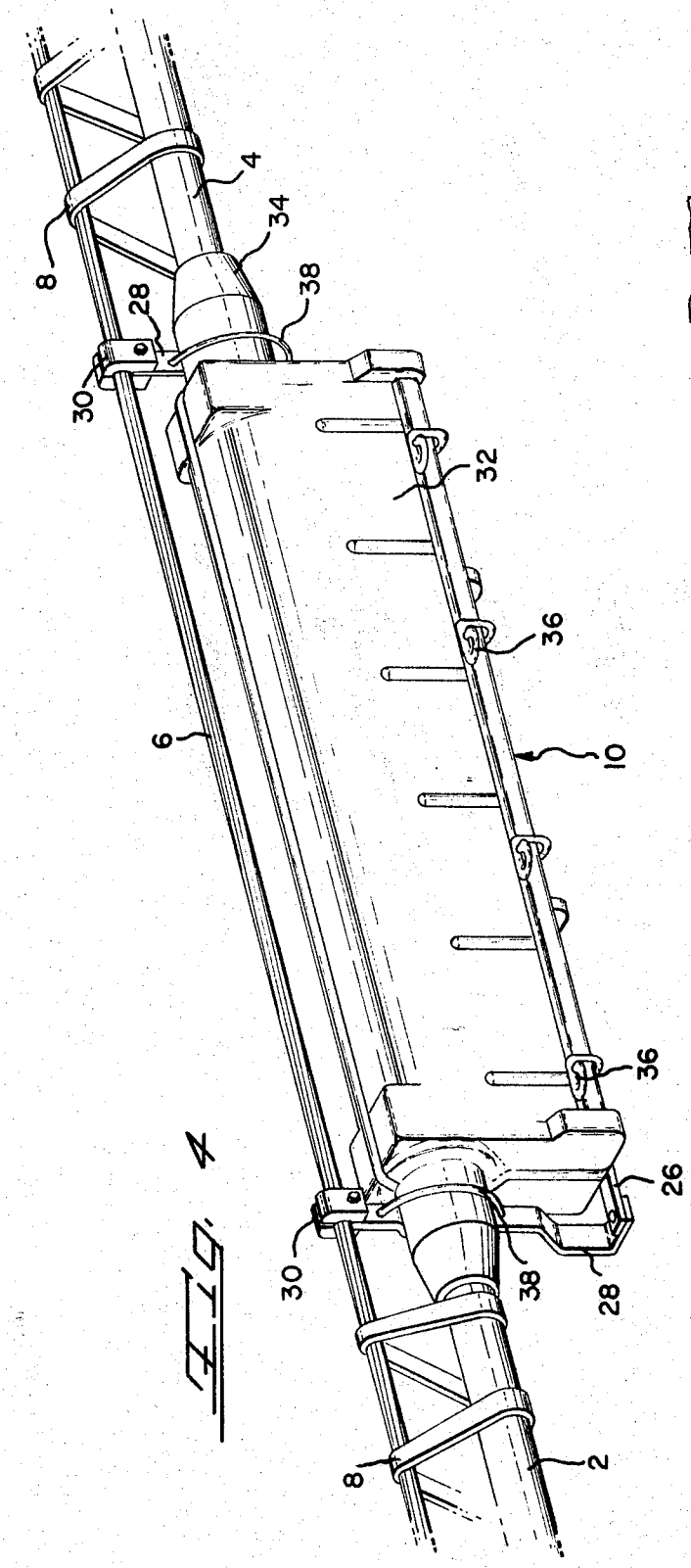

FIG. 4

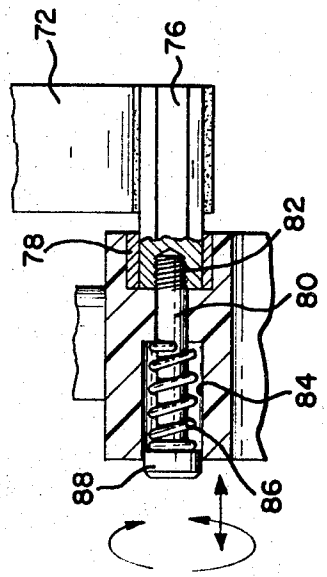

FIG. 3

TOOL HOLDER FOR CABLE SPLICING TOOL

BACKGROUND OF THE INVENTION

It is now common practice to connect the conductors of a multi-conductor cable to each other by means of a crimping tool which is adapted to trim the ends of two wires positioned therein and crimp an electrical connector onto the trimmed ends in a single operation. Such cable splicing operations are frequently carried out on aerial telephone cables as, for example, when two cable sections are being spliced during the installation of a new cable or where tap wires are being connected to the conductors in an existing cable.

Subsequent to the widespread adoption of the use of crimpable connectors in cable splicing operations, a tool holder was developed which functions to support the crimping tool on the messenger cable which is associated with the multi-conductor cable so that the lineman would have both hands free for the operations of inserting the connectors in the tool, selecting the conductors in the cable which are to be connected, and actuating the crimping tool. An added margin of safety is obtained when a tool holder is used because of the fact that the lineman is not required to hold the tool with one of his hands and an increase in the productivity of the lineman is obtained for the same reason. This previously known tool holder, disclosed and claimed in application Ser. No. 683,856, now U. S. Pat. No. 3,528,155, has, therefore, proved highly satisfactory and is in widespread use. However, it has also been discovered that certain cable splicing operations require a higher degree of adjustability of the tool as regards the position of the tool head with respect to the cable axis, the attitude of the tool with respect to the cable axis, and the distance separating the tool and the cable, than can be provided by the known type of tool holder. This requirement of added versatility is particularly necessary where the splice between the cable ends is being made with a so-called "ready access box", an enclosure and support for a cable splice which is commonly used in the telephone industry.

An object of the present invention is to provide an improved tool holder for supporting a connector crimping tool in close proximity to a multi-conductor cable. A further object is to provide a tool support which permits location of the tool in a wide variety of positions and in any desired attitude relative to the cable. A further object is to provide a tool holder which is sturdy and durable, which is of simplified construction, and which can be mounted on, or removed from, the messenger cable associated with the multi-conductor cable in a very short time. A still further object is to provide a tool holder which permits rapid change in the position of the tool during use.

These and other objects of the invention are achieved in a preferred embodiment thereof which is described in the foregoing abstract, which is described in detail below, and which is shown in the accompanying drawing in which:

FIG. 1 is a perspective view of a tool holder in accordance with the invention mounted on a messenger cable adjacent to a splicing operation which is being carried out.

FIG. 2 is a side view of a tool holder of FIG. 1 looking from the left in FIG. 1.

FIG. 3 is a view taken along the lines 3—3 of FIG. 2.

FIG. 4 is a perspective view of a ready access box or enclosure on a telephone cable which contains a completed cable splice.

Referring first to FIG. 4, a typical cable splice between the ends 2, 4 of two cable sections is commonly contained in a splice support and enclosure 10 of a type referred to as a ready access box. The cable sections are supported by a messenger cable 6 which extends between utility poles and from which the multi-conductor cable is suspended by suitable lacing material 8.

The enclosure 10 comprises an elongated base member 12 (FIG. 1), of suitable insulating material such as rubber, having upwardly extending flanges 14 on its ends. Metal bars 16, 26 are positioned against the upper and lower surfaces respectively of the base member 12 and secured to each other by

suitable fasteners 13 which extend through the base member as indicated. Two-part clamps 18 are secured to the ends of the metal bar 16 and extend upwardly to the cable ends and are secured to the cable ends by suitable fasteners 22 which hold the two parts of the clamps against the cable sections. A frame bar 24 is secured to the upper ends of the clamps 18 and extends parallel to the cable axis so that the two cable ends will be held in substantial alignment with each other to facilitate the splicing operation in which the wires 3 in the cable end 2 are connected to the wires 5 in the cable end 4. The metal bar 26 on the underside of the base member 12 extends axially beyond the flanges 14 and is suspended from the messenger cable 6 by suspending arms 28 which extend upwardly, around the cable ends, and which have their upper ends secured to the messenger cable 6 by suitable clamps 30. It will thus be apparent that the weight of the enclosure is supported directly by the messenger cable and the enclosure, in turn, supports the cable ends during splicing.

It should be mentioned that in the finished splice as shown in FIG. 4, a cover 32 is positioned over the frame bar 24 and has its lower edges held against the base member 12 by clamps 36 which are rotatably mounted on the underside of the metal bar 26 so that they can be swung from the position of FIG. 1 to the position shown in FIG. 4 after the cover has been placed over the splice. The cover may include integral sealing boots 34 as shown which embrace the outer coverings of the cable ends to prevent the admission of moisture. These sealing boots are held in close engagement with the cable ends and are held in their closed positions by means of simple wire springs 38 mounted in the suspending arms 28.

A tool holder 40 in accordance with the instant invention is adapted to support a cable splicing tool 42 in virtually any desired position and attitude with respect to the work area during a splicing operation. It will be understood that any desired type of splicing tool can be used in conjunction with a tool holder of the type shown, the tool 42 being constructed in accordance with the principles disclosed in the U. S. Pat. to Vickery and Rheem, No. 3,328,872. The splicing tool shown has a head 44 which includes a crimping die for crimping an open-U type connector 45 onto the ends of two wires. The tool head 44 is integral with a first handle 46 which is of generally arcuate cross section and which extends downwardly in FIG. 1 and is held in a fixture described below. An anvil 48 is provided in the tool head and a wire cutter 50 mounted on the anvil for movement therewith is adapted to enter a wire receiving slot 52 in the head portion of the tool. The anvil 48 extends from a plate 54 which extends between the sides of the handle 46 and which was pivoted at 57 to the upper portion of this handle as viewed in FIG. 2.

A second handle 56 has its inner end pivotally connected at 58 to the plate 54 and a link 62 has one end pivoted to the handle 56 and its other end pivotally mounted between the sidewalls of the fixed handle 46 at the lower end thereof. The disclosed linkage comprises a conventional over-center toggle mechanism of a type commonly used for plier type tools.

The handle 46 of the tool is held in a fixture comprising a block 64 which may be of a firm polymeric material, having channel-shaped recess for reception of the handle. By virtue of the fact that the block 64 and an additional block 64' described below, are of insulating material, the tool is thoroughly in sulated from the messenger cable. A U-shaped clamp has arms 66 which extend through openings in the sides of the block 64 and the ends of these arms are inwardly turned for engagement with the edges of the handle. The handle is securely held in the block by means of a clamping screw 68 which is threaded through the bight portion 70 of the clamp and which has a toggle member 71 on its end that bears against a recess in the block 64. It will be apparent that by merely loosening the screw 68, the tool can be moved upwardly or downwardly from the position shown in FIG. 2 and clamped in its new position thereby to move the tool head 44 towards and away from the cable axis.

Block 64 has an enlarged portion 65 extending leftwardly from its upper end as viewed in FIG. 2, which is secured to the lower end 72 of a suspending arm 74 in a manner shown in FIG. 3. A hexagonal rod is welded or otherwise secured to the lower end 72 of the suspending arm and extends laterally of the arm into a hexagonal insert 78 in the enlarged portion 65 of the block 64. The rod 76 is threaded at its lefthand end for the reception of a screw 80 which extends through the enlarged portion of the block and has a head 88 on the lefthand side of the block. A spring 86 is interposed between the inner side of the head 88 and the end of an enlarged recess 84 in the block to prevent loosening of the screw 88 during use.

The securing means shown in FIG. 3 permits adjustment in a rotational sense of the tool about an axis extending through the screw 80 and the bar 76 by pulling the arm rightwardly as viewed in FIG. 3 with concomitant compression of spring 86 until the rod 76 is removed from insert 78. The block 64 is then rotated relative to rod 76 to the desired position and the rod is reinserted into the insert.

The arm 76 extends upwardly past the axis of the cable and has an outwardly extending arcuate upper section 90 and a downwardly extending straight portion 92, the lower end of this straight portion being rightwardly bent and being secured to the intermediate section of the arm 74 by welding in order to add rigidity to the arm. The straight section 92 of the arm is adjustably clamped in a block 64' by means of a U-shaped clamping member 66' and a clamping screw 68' as shown. The clamping assembly 64', 66', 68' may be identical to the clamping assembly having corresponding unprimed reference numerals described above and the upper clamping assembly need not therefore be described in detail. It will be apparent that the straight section 92 of the arm can be adjusted upwardly or downwardly as viewed in FIG. 2 by merely loosening the screw 68; moving the arm section 92 to the desired position and tightening the screw.

The enlarged section 65' of the block 64' has a hollow hexagonal insert 78' which receives a short hexagonal bar section 96 which is integral with and extends from a clamping plate 98. The clamping plate 98 and an opposed clamping plate 100 clamp the arm to the messenger cable 6 by means of a screw 106 in the end of a handle 108, this screw being threaded through a suitable opening in the plate 100 so that when the handle is turned in a direction to tighten the two plates onto the messenger cable, the entire assembly will be held on the cable. Advantageously, a spring 110 is interposed between the surfaces of the plates 100, 98 to urge these plates apart when the screw 106 is loosened. As shown in FIG. 2, opposed surface portions of the plates 98, 100 may be recessed to provide clamping surfaces for the messenger cable.

Some of the advantages of the disclosed embodiment of the invention will be apparent from an inspection of FIG. 1 in the light of the following remarks.

It is desirable when the ends of two cable sections are being spliced, to have a minimum amount of slack wire in each of the connections between one of the wires 3 and one of the wires 5. If the connections are to be made with only a slight amount of slack, the connector must be crimped onto the wire ends at a location relatively close to the axis of the cable since the crimped connection must be removed from the tool after the crimping operation has been carried out and some slack must be provided to permit such removal. Where the tool is supported by a tool holder in accordance with the invention, the head of the tool can be located in any desired position; that is at any desired distance from the axis of the cable and in any desired attitude with respect to the axis of the cable, and finally in any desired angular orientation with respect to the axis of the cable. It follows that while a splice is being made, the first splices may be formed while the tool head is located relatively close to the cable axis. As additional splices are made, the tool can be moved relatively away from the cable by means of its adjustable mounting on the lower end of the suspending arm and can be positioned in the most advantageous attitude from a time and motion standpoint for the lineman. As the volume of the splices increases, the entire arm can be swung around the axis of the messenger cable 6 or around the axis of the upper hexagonal mounting bar 96 to provide clearance for the previously completed connections. The holder can, of course, be moved axially along the messenger cable 6 when desired and can be mounted on or removed from the cable by merely tightening or loosening the screw 106 on the end of the handle 108.

While the drawing shows a ready access box having two entering cables, it is common practice to provide such enclosures at junction points for three cables. The instant invention is also advantageous where this latter condition exists because of the large number of possible positions in which the tool can be clamped.

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 foregoing description and accompanying drawings is offered by way of illustration only.

We claim:

1. A tool holder for supporting a splicing tool proximate to a multi-conductor cable, said cable having a supporting member extending thereabove and substantially parallel to said cable, said tool comprising a tool head and actuating means extending from said tool head, said tool holder comprising:

first clamping means having clamping surfaces for engagement with said supporting member for clamping said tool holder to said supporting member,

a suspending arm secured to said first clamping means and extending transversely of said clamping surfaces, said arm having an end portion which is spaced from said first clamping means by a distance greater than the distance between said supporting member and said cable,

second clamping means on said end portion of said suspending arm, said second clamping means being adapted to clampingly engage said actuating means of said tool with said head disposed proximate to said cable whereby the conductors of said cable can be positioned in said tool head and connected upon operation of said actuating means.

2. A tool holder as set forth in claim 1 wherein said suspending arm is adjustably secured to said first clamping means to permit adjustment of said arm in the direction of its length thereby to permit selective positioning of said end portion of said arm and said tool head with respect to said cable.

3. A tool holder as set forth in claim 1 wherein said suspending arm is adjustably secured to said first clamping means to permit selective positioning of said arm in a rotational sense with respect to said supporting member.

4. A tool holder as set forth in claim 1 wherein said second clamping means adjustably engages said tool to permit rectilinear adjustment of said tool towards and away from said cable.

5. A tool holder as set forth in claim 1 wherein said second clamping means adjustably engages said tool to permit rotational adjustment of said tool with respect to said second clamping means.

6. A tool holder for supporting a splicing tool proximate to a multi-conductor cable, said cable having a supporting member extending thereabove and substantially parallel, to said cable said tool comprising a tool head and handle means extending from said tool head, said tool holder comprising:

first clamping means having clamping surfaces for engagement with said supporting member for clamping said tool holder to said supporting member,

a suspending arm secured to, and extending from, said first clamping means, said suspending arm being secured to said first clamping means by securing means which permits selective positioning of said arm in a rotational sense, with respect to said supporting member, and in the direction of the length of said arm,

second clamping means on the end of said arm, said second clamping means being adapted to engage said handle of

said tool selectively along the length thereof and said second clamping means being selectively positionable on said end of said arm in a rotational sense.

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