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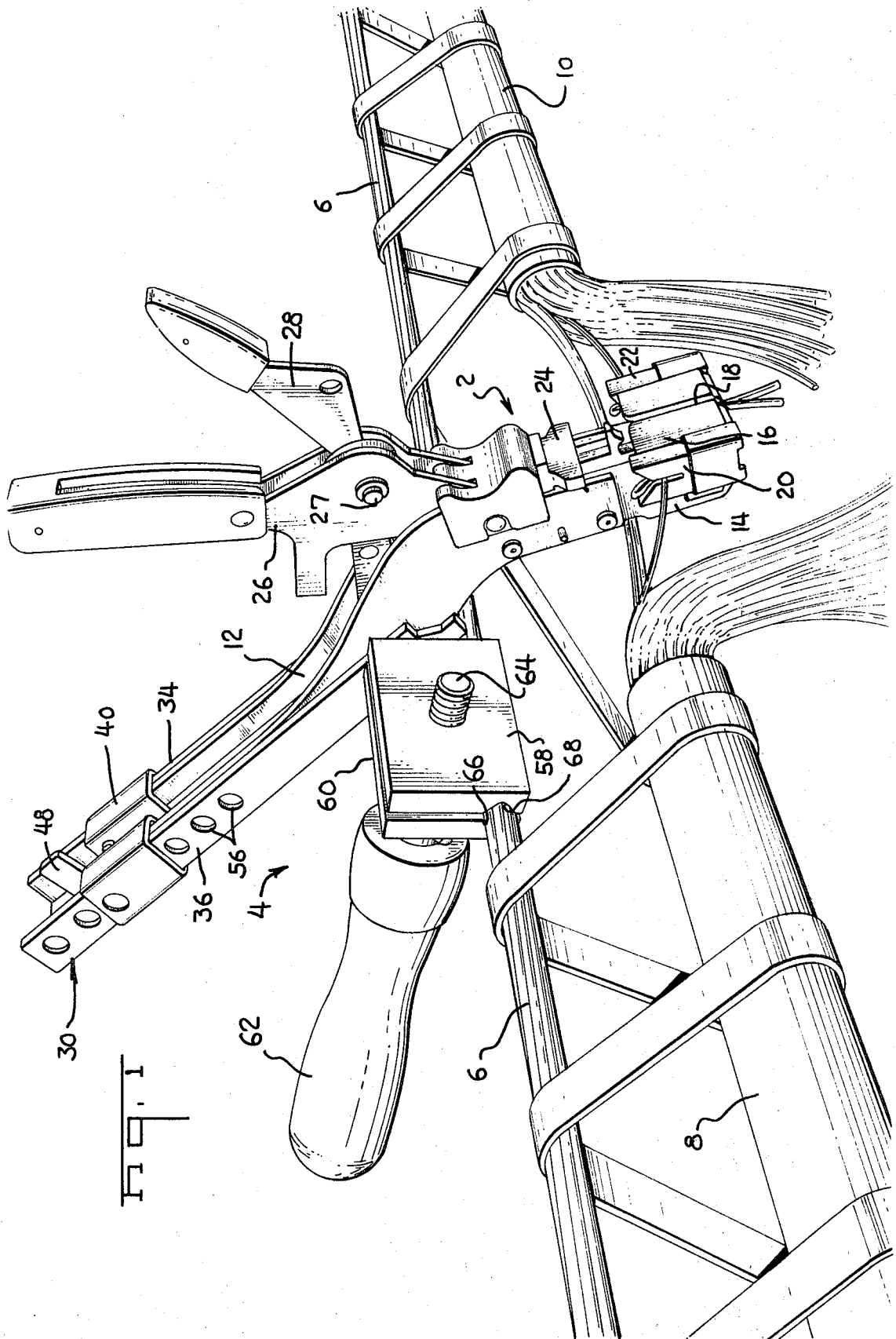
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3,528,155

CABLE SPLICING APPARATUS

Filed Nov. 17, 1967

2 Sheets-Sheet 1



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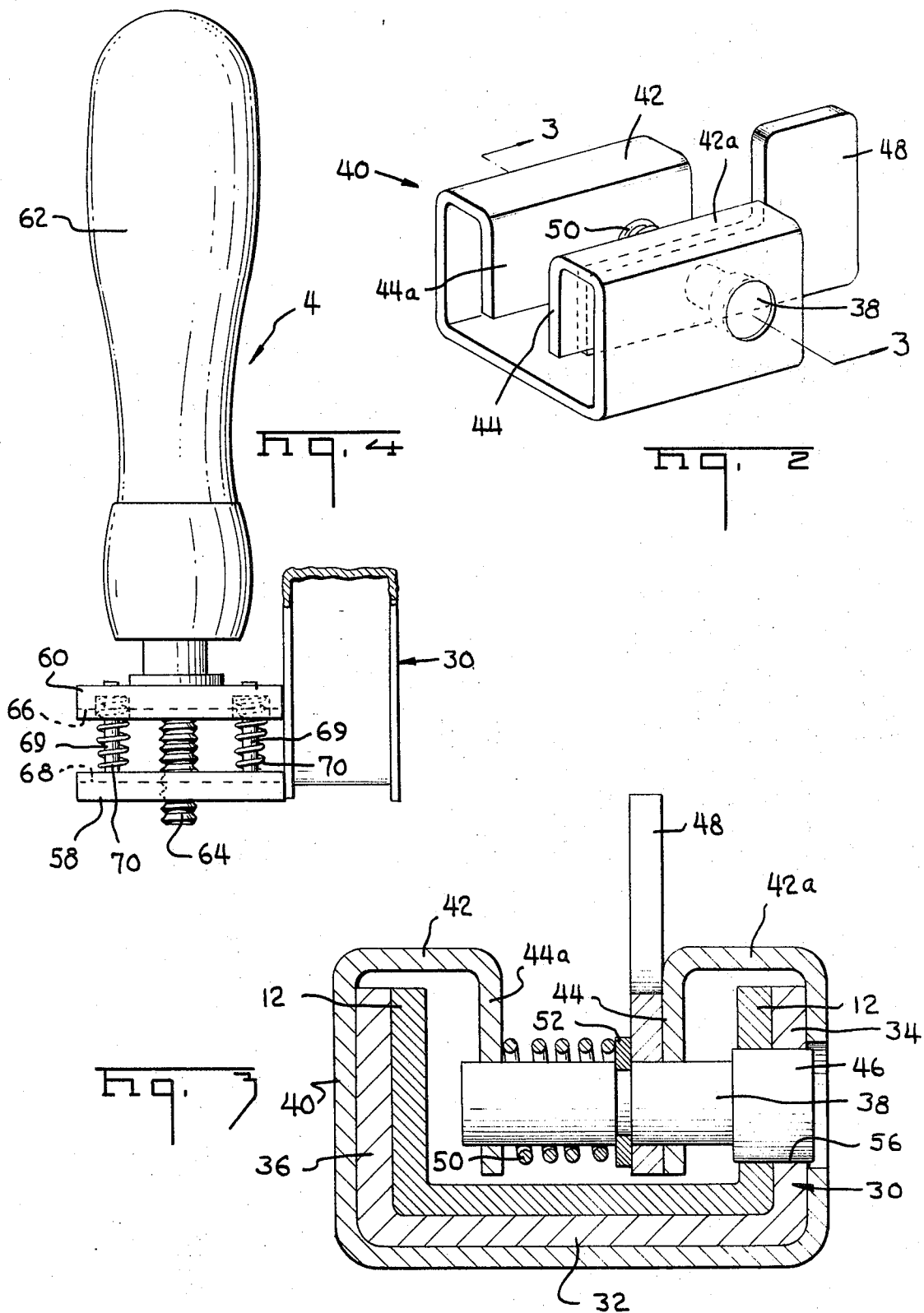
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CABLE SPlicing APPARATUS

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1 Claim

ABSTRACT OF THE DISCLOSURE

Plier-type tool for crimping electrical connector onto wires extending axially towards each other has fixed and movable handle. Upon relative movement of movable handle towards fixed handle, connector is crimped onto wires to form connection. Adjustable clamping means is provided on fixed handle and extends laterally therefrom. Fixed handle can be secured to messenger cable by means of this clamping means so as to locate tool head adjacent to telephone cable which is supported by the messenger cable.

BACKGROUND OF THE INVENTION

It has become common practice within the past few years to splice the ends of telephone cables to each other by means of crimpable connectors which are crimped onto the ends of the individual wires in the cables. Where two cables, each of which contains a relatively large number of conductors, for example, 5,600 individual conductors, are being spliced to each other, it is preferable to use a semi-automatic or an automatic crimping apparatus of the type shown and described in the copending application of Grey M. Gurley et al., Ser. No. 625,096, filed Mar. 22, 1967, now U.S. Pat. No. 3,431,621, issued Mar. 11, 1969. Automatic crimping devices of this type are particularly adapted to be used in a manhole for underground cables and require a suitable work support by means of which they are mounted in the vicinity of the cable ends. The technician using this type of apparatus can concentrate on the operations of selecting the individual wires from the cable ends and positioning them in the crimping device and need not be concerned with supporting or holding the tool. Plier-type hand tools of the type disclosed in U.S. Pat. 3,328,871, are, on the other hand, used where a relatively smaller number of wires in the cables are being spliced and where the ends of relatively small cables are being spliced to each other. Where only a few electrical connections must be made, a satisfactory procedure is for the technician to hold the hand tool with one hand and position the wires in the tool with his other hand when he makes the splice.

Under some circumstances, a relatively large number of electrical connections must be made when splicing cable ends to each other but the number involved is not sufficient to justify the use of a relatively large semi-automatic applicator or to justify the time required to set up a work support for such an applicator. At the same time, it would be desirable to provide a relatively simple and efficient means to support a hand tool adjacent to the cable ends so that the technician would have both hands free to select and position the individual wires in the tool and would not be encumbered with the additional operation of holding the tool while selecting and positioning the wires. These conditions exist particularly in the case of aerial telephone cables since the technician will ordinarily be working on the surface of a platform or on a mast when the splice is being made.

The present invention is directed to a work support or tool holder which is particularly adapted to hold a plier-type crimping tool in close proximity to the ends of telephone cables or the like which are being spliced to each other. It is accordingly an object of the invention to pro-

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vide an improved apparatus for connecting the individual conductors contained in the ends of multi-conductor cables which are being spliced to each other. A further object is to provide an improved tool holder by means of which a crimping tool can be mounted adjacent to the ends of cables which are being spliced. A further object is to provide an adjustable clamp by means of which a plier-type crimping tool can be mounted on a messenger cable associated with an aerial telephone cable or on another suitable support adjacent to the cable ends.

These and other objects of the invention are achieved in a preferred form of tool holder which is particularly adapted to be used with a plier-type crimping tool having a fixed handle and a movable handle. The tool, which may be of the type shown in U.S. Pat. 3,328,871, contains a crimping die and a crimping anvil which are moved relatively towards each other when the movable handle is swung towards the fixed handle. A tool holder in accordance with the invention comprises a channel-shaped member which is adapted to receive the fixed handle of the tool and which, in effect, functions as an extension of this handle. A clamping device is secured to the side of this channel and extends laterally therefrom and contains means for quickly and firmly anchoring the support to a messenger cable or to a similar structure adjacent to the cable ends. The tool handle is slidably contained in the channel member and can be locked in any given position of adjustment so that the head of the tool can be located in a desired position relative to the cable ends.

In the drawings:

FIG. 1 is a perspective view of a preferred form of apparatus in accordance with the invention;

FIG. 2 is a perspective view of a latch mechanism by means of which the tool handle is secured to the tool support;

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

FIG. 4 is a plan view of the clamping means for clamping the tool holder to a messenger cable.

Referring first to FIG. 1, the present invention comprises a tool holder and support 4 which is adapted to support a plier-type crimping tool 2 on a messenger cable 6. It will be understood that the messenger cable will be associated with a telephone cable which contains a multiplicity of individual conductors. Ordinarily, the telephone cable is lashed to the messenger cable 6 but when a splice is being made, the lashings are undone so that the ends of the telephone cables will be spaced from the messenger cable in order to provide some working slack for the technician.

The tool 2 will be described herein only to the extent necessary for an understanding of the instant invention, reference being made to the above-identified Pat. 3,328,871 for further details of this crimping tool. The tool 2 thus comprises a fixed handle 12 which extends downwardly as viewed in FIG. 1 and has a head portion 14 on its end in which a suitable crimping die 16 is mounted. The die 16 is slotted intermediate its ends as shown at 18 so that the wires 8, 10, which are to be connected to each other, can be positioned in the tool die and their ends led through the slot as shown. Advantageously, suitable wire guides 20, 22 are provided on each side of the die to accurately locate the wires in the die and to hold them lightly while the connection is being made.

The connector which is to be crimped onto the wires is supported on the surface of the anvil 24 which is moved relatively towards and away from the die by means of a movable handle 26, and an auxiliary handle 28. In use, the wires are positioned as shown in the crimping die, the handle 28 is first swung towards the handle 26 about its pivot 27, and the handles 26 and 28 are then swung as a unit towards the fixed handle 12. During

such movement of the handles towards the fixed handle, the ends of the wires are trimmed by a wire trimming member which moves into the slot 18. Thereafter, the connector supported on the anvil is moved towards the die and crimped onto the trimmed ends of the wires.

The fixed handle 12 is generally channel shaped in cross-section and is adapted to be slidably received in a channel member generally indicated at 30 having a base 32 and sidewalls 34, 36. Fixed handle 12 can be anchored in any one of several positions by means of a locking pin 38 mounted in a slide member 40 which surrounds the external surface of the channel 30 and is slidably mounted thereon. On its upper side as viewed in FIG. 3, this slide member has inwardly directed flanges 42, 42a which are bent downwardly as shown at 44, 44a between the sidewalls 34, 36. Pin 38 has an enlarged head 46 which is adapted to extend through an opening in the sidewall of the tool handle 12 and to extend into one of several openings 56 in the sidewall 34 of the channel member 30. This pin extends through aligned openings in the flange portions 44, 44a, and through an arm 48. A washer 52 is mounted on the pin adjacent to the arm 48 and spring 50 is interposed between this washer and the opposed side of the flange portion 44a. It will be apparent that when the arm 48 is moved leftwardly as viewed in FIG. 3, the pin 38 will also be moved leftwardly permitting the slide member to be moved relatively over the surface of the channel member 30.

A pair of clamping locks 58, 60 function to clamp the channel member 30, and the tool held therein, to the messenger cable 6. The clamping block 58 is secured to the sidewall 36 as by welding of the channel 30 and the clamping block 60 is held against the rearward surface of the block 58 by means of a screw 64 on the end of a handle 62. The screw 64 extends loosely through an opening in the block 60 and is threaded through a corresponding opening of the block 58 so that when the handle 62 is turned about its own axis, the blocks will be drawn relatively towards each other. The opposed faces of the blocks 58, 60 are provided with transversely extending grooves 66, 68 which are adapted to receive the messenger cable 6. It will thus be apparent that when the blocks are drawn towards each other by rotating the handle 62, the clamping means will be clamped onto the cable 6. Advantageously, guide pins 69 extend between the blocks and are surrounded by springs 70 which normally bias the blocks apart. The biasing force of these springs is, of course, overcome when the blocks are moved towards each other.

In use, the technician merely turns the handle 62 in one direction to allow the blocks 58, 60 to spring apart and then positions the blocks in surrounding relationship to the messenger cable 6 at the desired location. He then tightens the handle 62 to clamp the apparatus firmly to the cable. It will be apparent that he can locate the tool in any desired orientation with respect to the cable axis thereby to locate the head portion 14 of the tool immediately adjacent to his work area. The tool head 14 can be moved radially towards and away from the axis of the messenger cable 6 (and, therefore, towards and away from the work area) by merely disengaging the latch mechanism comprising the pin 38, sliding the tool handle 12 within the channel member 30 to the desired location and reengaging the locking pin 38 with the sidewall of the channel member and the sidewall of the tool handle 12.

Devices in accordance with the invention have been found to be particularly useful in the splicing of aerial telephone cables which have a messenger cable 6 associated therewith. The hand tool can be clamped to the messenger cable 6 in a minimum of time and the head portion 14 can be located precisely in the work area. After the tool has been mounted on the messenger cable, the technician has both hands free to thread the wires into the tool head and insert an uncrimped terminal into

the tool. After performing these operations, only one hand is required to push the handle 28 towards the handle 26 and to subsequently push the handles 28, 26 in unison towards the fixed handle 12. The invention provides an added margin of safety for the lineman working on the aerial cable in that it relieves him of the obligation of manipulating a tool with one hand and attempting to thread the wires into the tool and hold the connector in the tool with the other hand.

The invention is not necessarily limited to use with aerial cables. It can be used in a manhole or under other circumstances. Under such other circumstances, a simple rod 18 can be substituted for the messenger cable and supported on the floor of the manhole adjacent to the cable. Tool holders in accordance with the invention are, of course, usable with a variety of plier-type crimping tools and are not restricted to use with the particular tool shown in the drawing or referred to.

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. The actual scope of the invention is intended to be defined in the following claim when viewed in their proper perspective against the prior art.

What is claimed is:

1. Apparatus for making electrical connections among the conductors of a multi-conductor cable, said multi-conductor cable having a messenger cable associated therewith, said apparatus comprising:

a splicing tool having a head portion and a handle means, said head portion having means therein for forming an electrical connection upon actuation of said handle means,

clamping means for clamping said apparatus to said messenger cable, said clamping means comprising a pair of parallel plates and means for moving said plates relatively towards and away from each other, said plates being adapted to be positioned on opposite sides of said messenger cable and moved toward, and into clamping engagement with, said cable, handle holding means integral with one of said plates, said handle holding means comprising a channel member extending transversely of the planes of said plates, said handle means being between the sidewalls of said plates, and securing means on said channel member effective to secure said handle means to said channel member in selective positions along the axis of said channel member whereby,

said clamping means can be clamped to said cable in any desired rotational position with respect to the axis of said messenger cable, and said handle means can be secured to said channel member at selective positions along the axis thereof thereby to permit location of said head portion of said tool conveniently with respect to said multi-conductor cable.

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