United States Patent

Filia

[15] **3,673,848**

[45] **July 4, 1972**

[54] WORK LOCATOR WITH INSULATION ADJUSTMENT FOR CRIMPING TOOL

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[22] Filed: **April 21, 1970**

[21] Appl. No.: **30,389**

[52] **U.S. Cl.** ..... **72/410**, 29/203 H, 81/421

[51] **Int. Cl.** **B21d 9/08**

[58] **Field of Search** ..... 81/418, 421, 422, 424, 426; 29/203 H, 203 HC, 203 HM, 243.56, 282; 140/121; 72/409, 410

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Primary Examiner—Charles W. Lanham
Assistant Examiner—Michael J. Keenan
Attorney—Schellin and Hoffman

[57] **ABSTRACT**

This specification discloses a tool intended for use in crimping terminals on insulated conductors having bared end portions and which tool includes a work locator for positioning a terminal in the tool in proper relation to the dies of the tool, and a bared conductor with respect to the terminal and dies, with the locator including mechanism which accomodates elongation of the terminal and conductor caused by the crimping operation. The tool also includes a crimping die which crimps a portion of the terminal about the insulation and which die is adjustable on the jaw by which it is carried to accommodate insulation of various sizes.

19 Claims, 14 Drawing Figures

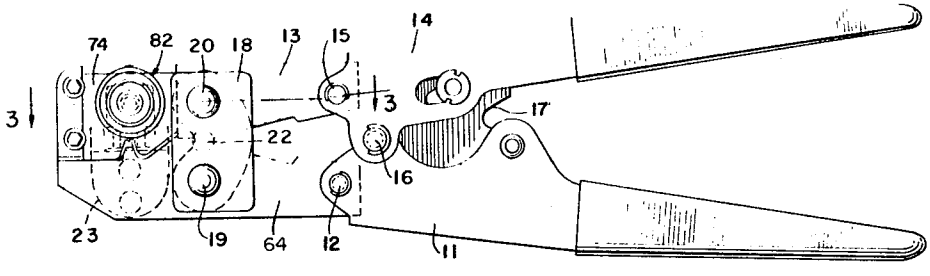

FIG. 1.

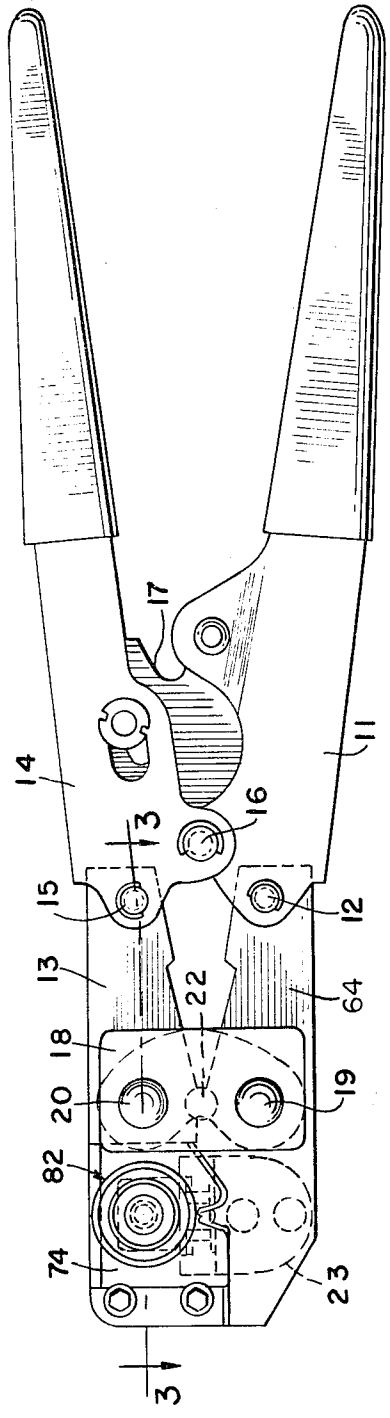

FIG. 2.

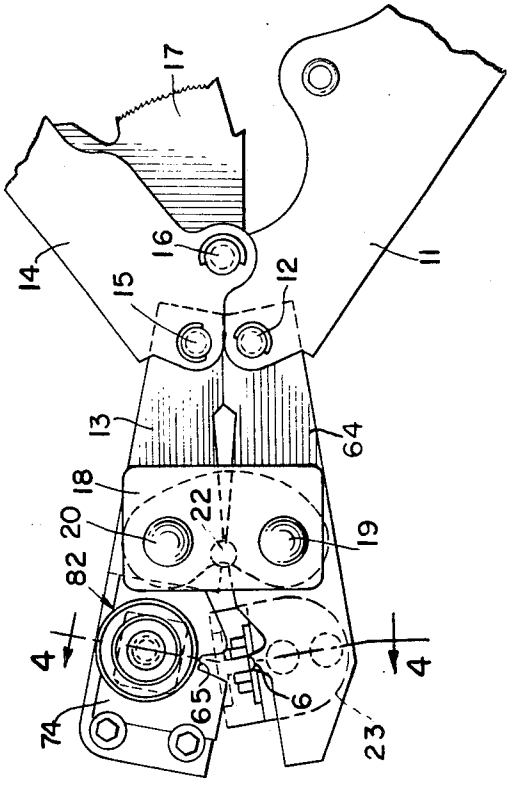

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FIG. 3.

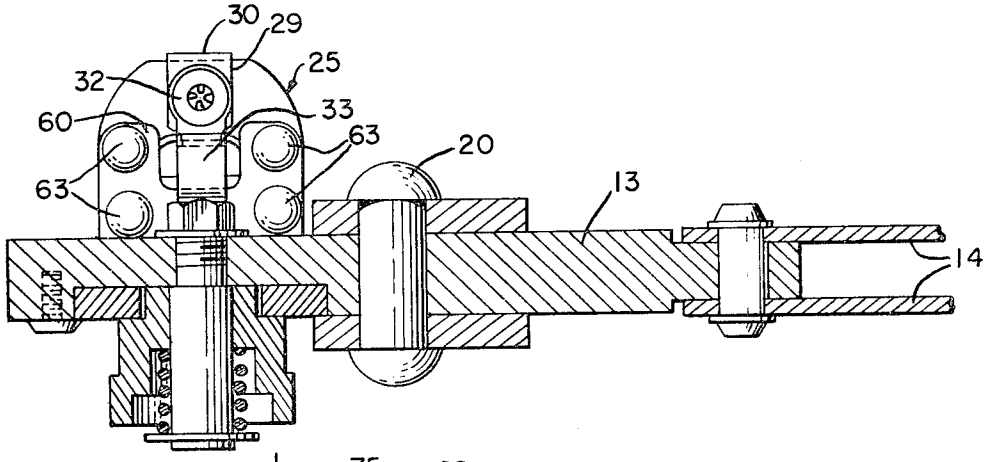

FIG. 4.

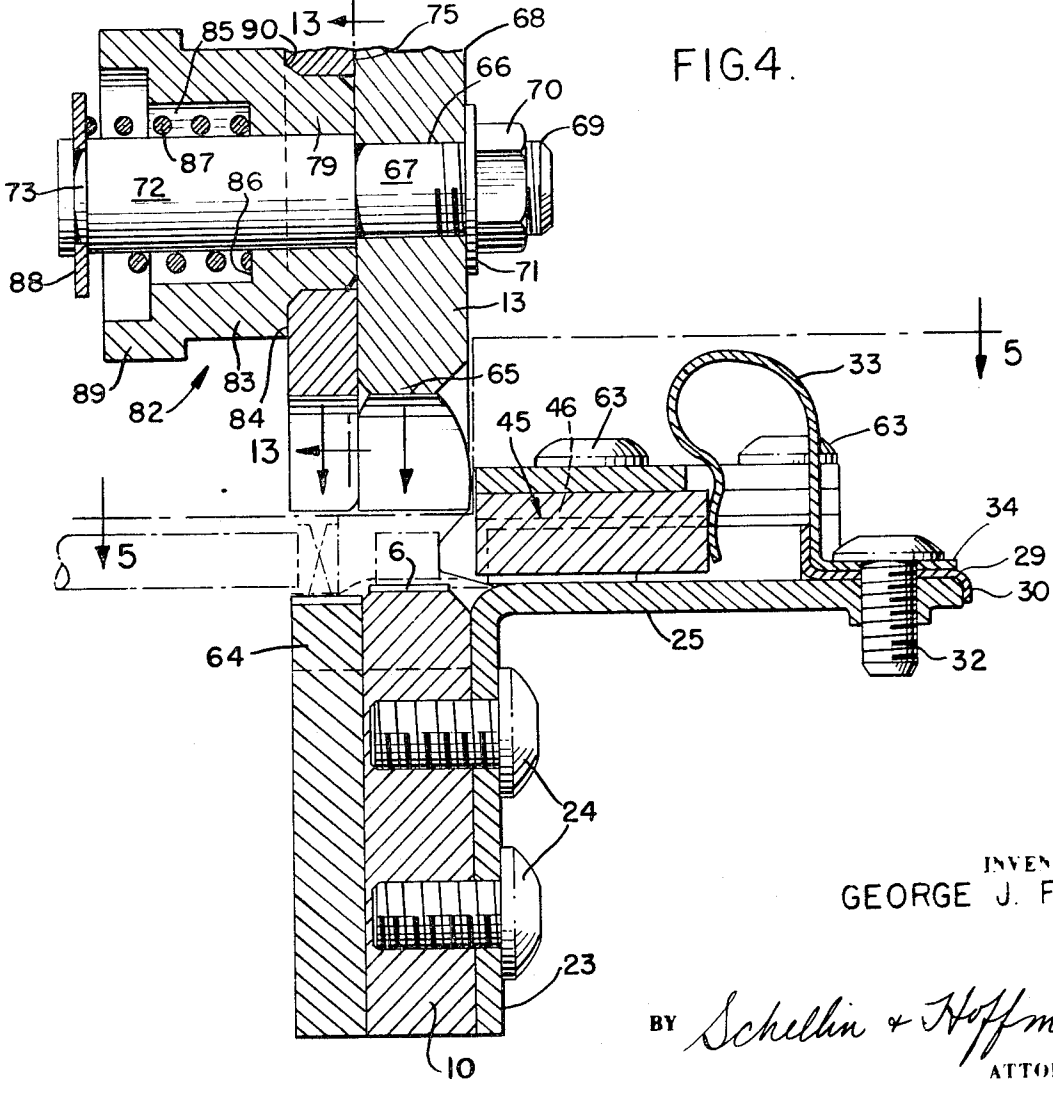

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FIG. 5.

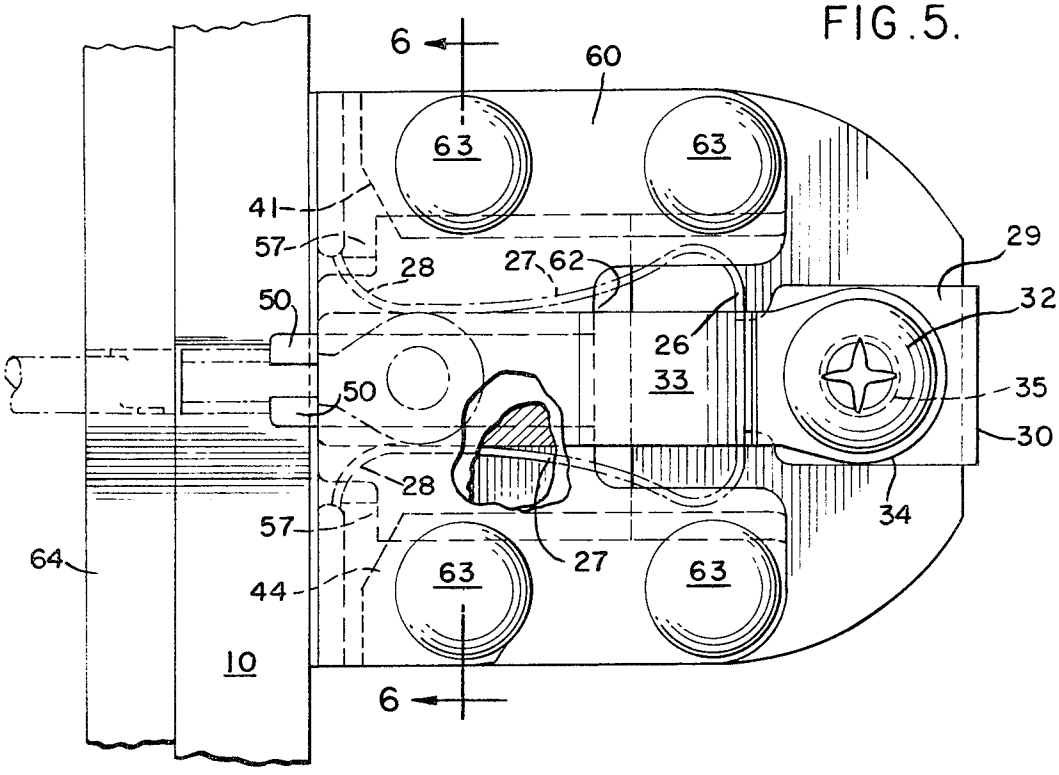

FIG. 6.

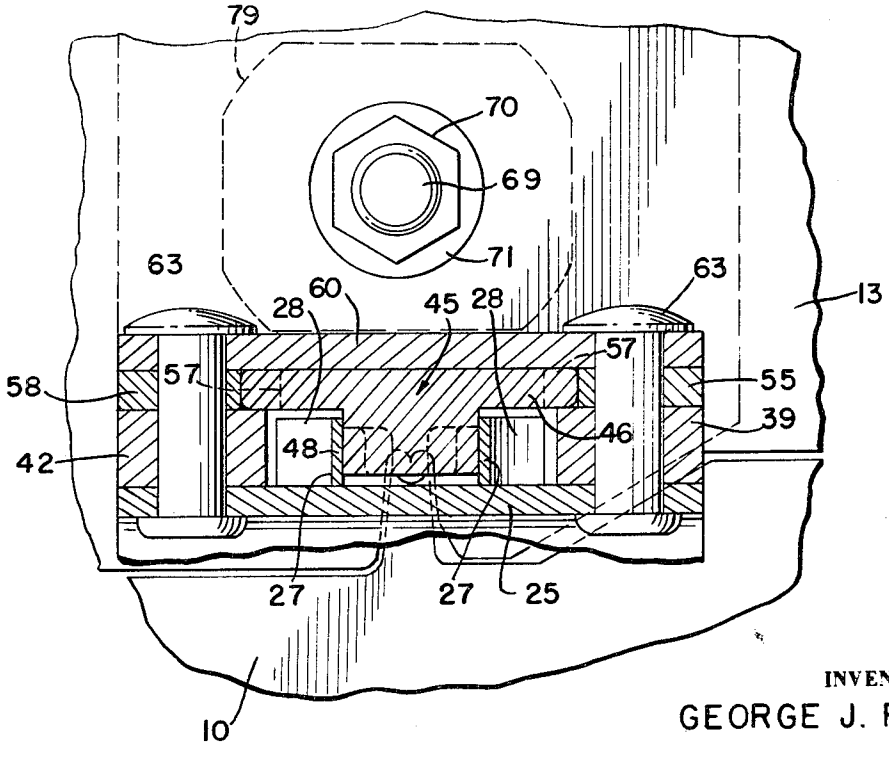

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FIG. 7.

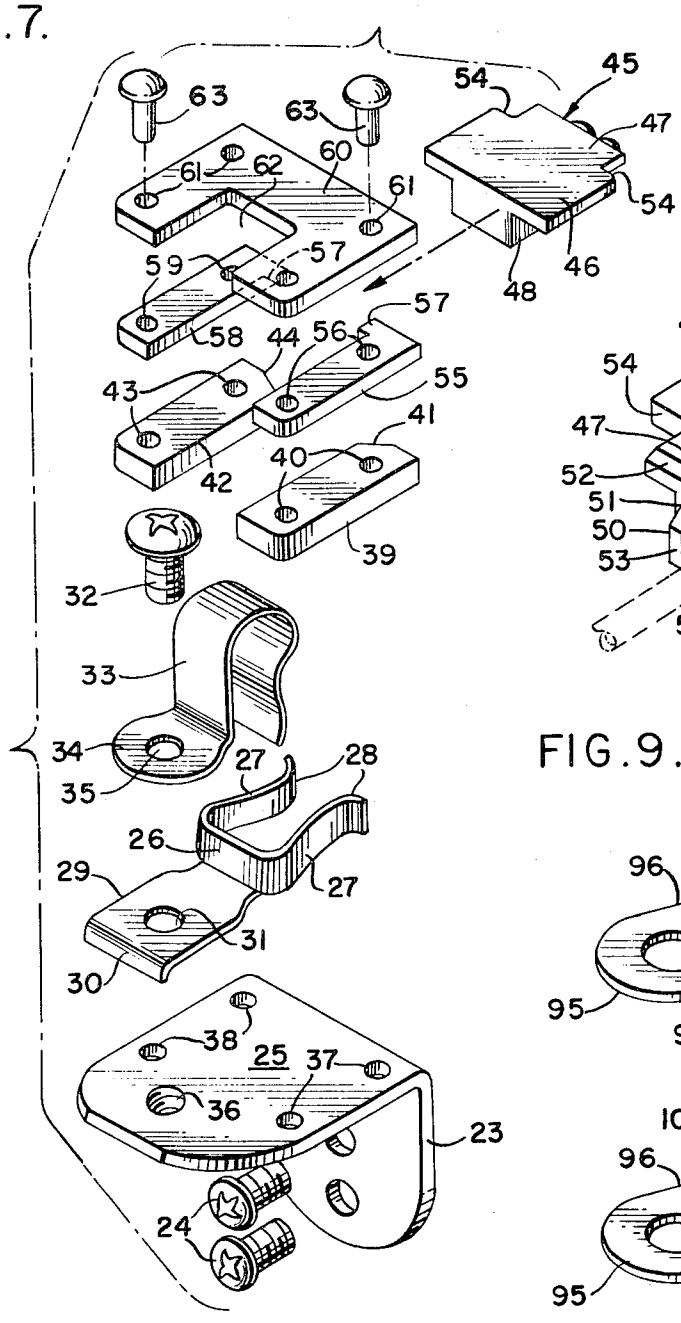


FIG. 8.

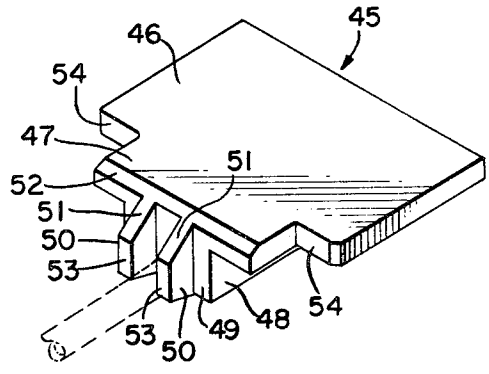
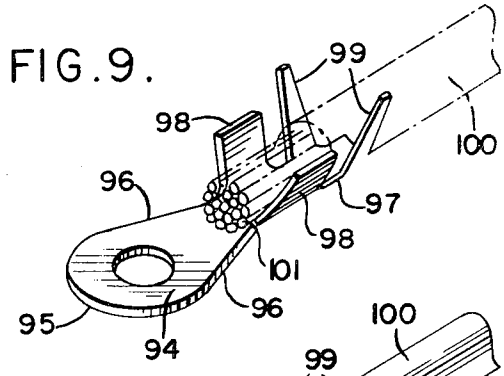


FIG. 9.



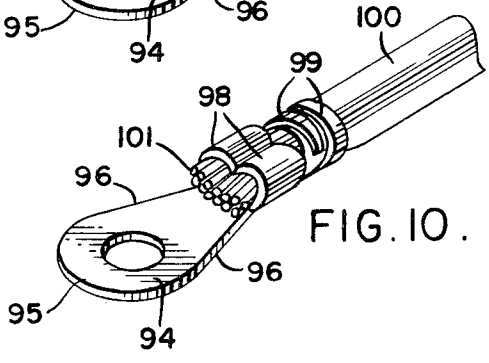


FIG. 10.

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FIG. 11.

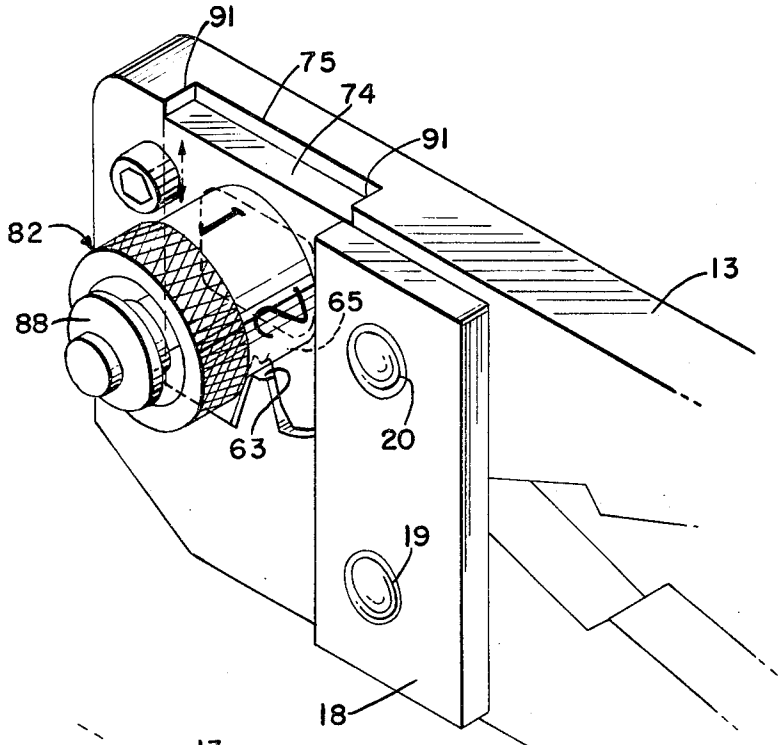

FIG. 12.

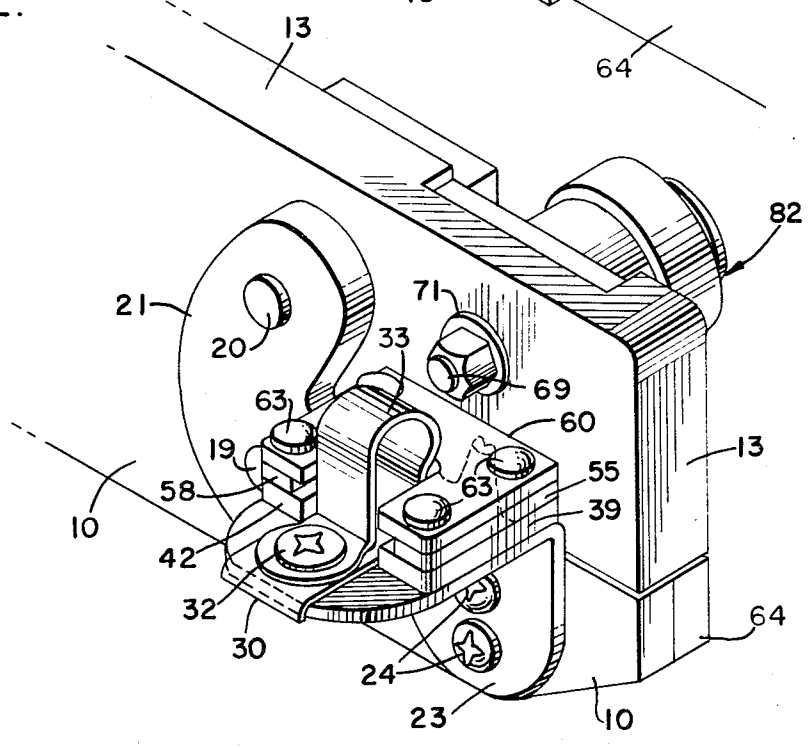

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FIG. 13.

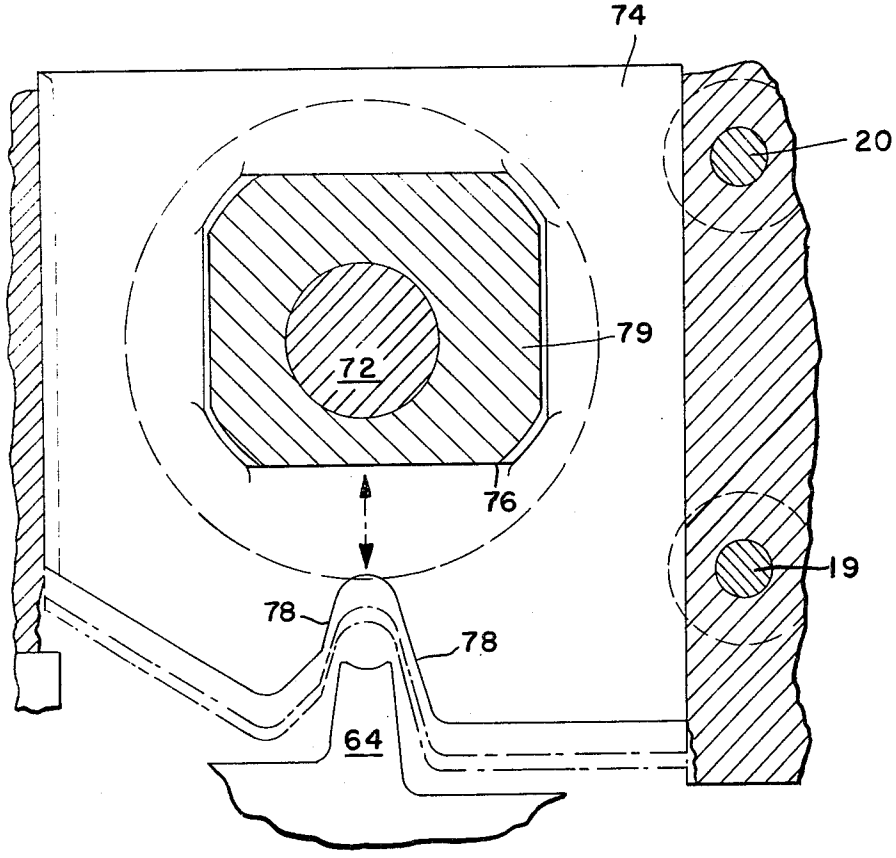
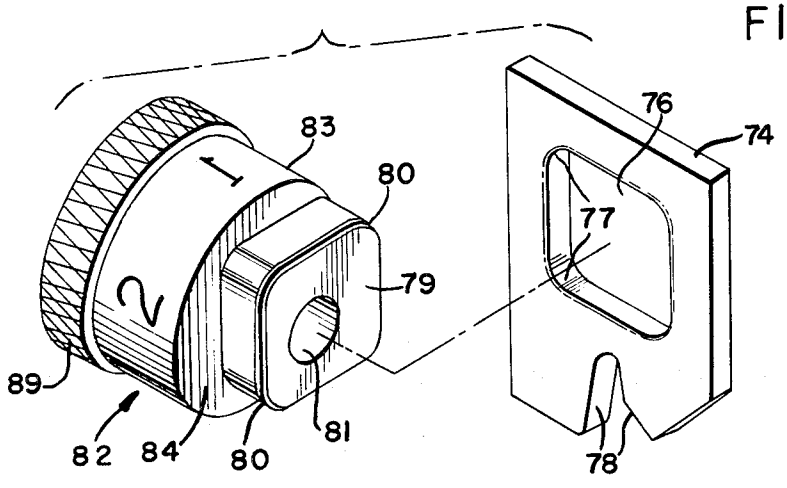


FIG. 14.



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WORK LOCATOR WITH INSULATION ADJUSTMENT FOR CRIMPING TOOL

The present invention relates to tools now commonly employed to crimp a terminal on the end of an insulated conductor having a stripped end portion and is concerned primarily with such a tool which includes a work locator which will accept and accommodate terminals of various types and within a wide range of sizes and which also includes a crimping die for applying a portion of the terminal to the insulation and which is adjustable to different sizes of the insulation.

BACKGROUND OF THE INVENTION

A tool of the type with which the present invention is concerned is a hand tool having the characteristics of a pair of pliers. Such a tool includes a pair of jaws which may be identified as the anvil jaw and the crimping jaw. The anvil jaw carries a pair of anvil dies, one for a bared conductor and that portion of terminal which is crimped thereto, and the other for the insulation and the terminal elements which are crimped thereabout. The crimping jaw also carries two crimping dies, one for the terminal portion that is crimped to the conductor, and the other for the terminal elements that are crimped to the insulation.

Terminals now meeting with widespread usage are of different styles and come in various sizes. Perhaps the terminal which is more widely used comprises a flat tab the end portion of which is, for the major part, circular and formed with an aperture which is intended to receive a binding post or comparable electrical connecting element. From this circular portion the tab tapers to a stem or trough-like formation which receives the bared conductor. Integral with the side walls of the stem, extending outwardly therefrom in diverging relation, and located at the end of the stem where it joins the tab, are a pair of ears which are to be crimped about the bared conductor. Located between these ears and the free end of the stem are a pair of tangs which are longer than the ears and intended for crimping to the insulation. The latter operation is normally of the wrap-around type so these tangs are not only in diverging relation but are offset or staggered to allow for an overlap in the finished crimp.

Other types of terminals are commonly known as spade terminals. In these types the flat tab is formed with a U-shaped recess opening into the tab from its free end and which defines a pair of legs. In one kind of spade terminal these legs are flat throughout their extent and in another type the ends of the legs are bent to provide end flanges at an angle of 90° with respect to the legs.

A work locator for a crimping tool of this character should accurately position the terminal relative to the dies in what might be called two dimensions. Thus, the longitudinal insertion must be accurately controlled to insure that the ears aforesaid are properly located with respect to dies which crimp them to and about the conductor. The tab should also be positioned in a plane that is normal to the path of movement of the dies as they perform a crimping operation.

In order to meet the demands of the using public, the joinder of the terminal to the conductor must be secure and of the nature of a fused or welded connection. This means that pressure is applied to the dies to a degree which deforms the metal of the conductor and terminal with the deformation consisting mainly of an elongation of these elements. This elongation is present in two opposed longitudinal directions. That elongation which is effective back towards the insulated conductor is of no consequence because it does not affect the location of the work. However, the elongation towards the tool has, in known tools of this type, disturbed the accurate location of the terminal relative to the dies.

A conductor of a particular diameter may carry insulation of various diametric sizes. Thus, a conductor of one diameter is often provided with insulation of any one of three diameters. While some attempt has been made to accommodate different sizes of insulation in one tool, the known devices for this purpose have been shims or comparable means which require disassembly of the tool to make an adjustment for insulation size.

OBJECTS OF THE INVENTION

With the foregoing conditions in mind, the present invention has in view the following objects:

1. To provide, in a crimping tool of the character aforesaid, a work locator which will accept and accommodate terminals of the types above noted and within a wide range of designs.

2. To provide, in a crimping tool of the kind aforesaid, a work locator which accommodates elongation of the terminal and conductor which is engendered by the crimping operation and without disturbing the accurate positioning of the terminal relative to the dies.

3. To provide, in a crimping tool of the nature noted, a crimping jaw having an insulation crimping die adjustably mounted thereon whereby the crimping insulation die may be adjusted to variations in insulations without disassembling the tool.

Various other more detailed objects and advantages of the invention such as arise in connection with carrying out the above noted ideas in a practical embodiment will in part become apparent and in part be hereinafter stated as the description of the invention proceeds.

SUMMARY OF THE INVENTION

The foregoing objects are attained by providing, in a crimping tool of the type noted, an anvil jaw having a bracket secured to a side face thereof and which bracket presents an outwardly extending table. Anchored to the top face of this table is a U-shaped spring having inwardly bowed legs with outwardly curled end portions defining a flared mouth. The free end of a terminal tab is inserted in this mouth and between the legs. Due to the construction of the spring the tabs of terminals of different types and sizes may be received thereby with the legs exhibiting a gripping action on the side edges thereof to securely position the terminal.

Positioned above this spring in what, for the purposes of this specification, is called an abutment slide. The edge of this slide that is disposed towards the jaws, or inner edge, is formed with a depending wall from which extend, in a relation normal to the wall, a pair of spaced flanges located centrally of the slide. The free end edges of these flanges constitute abutments which are engaged by the ears of a terminal to limit inserting movement thereof. The flanges are spaced to snugly receive a bared conductor therebetween and the depending wall between the flanges constitutes an abutment or stop for the end of a conductor on which a terminal has been loosely assembled.

A vertically disposed spring of generally U-shape is mounted on the table at the end remote from the jaws and a leg of this spring engages the outer edge of the abutment slide to urge it towards the jaws.

Additional mechanism is provided to guide and position the slide and limit its movement, also to maintain the assembled relation of the parts above described.

The crimping jaw carries a post which projects therefrom on the side of the tool opposite to that on which the bracket is mounted. The insulation crimping die is formed with a rectangularly shaped opening having curved corners. A cam block of square shape with rounded corners is received in this opening and is eccentrically and rotatably mounted on an enlarged portion of the post. This cam block is carried by an operating member having a counterbore through which the post extends. An expansion coil spring is disposed in the counterbore and about the post. One end of this spring bears against the end wall of the recess defined by the counterbore and the other end against a spring retainer carried by the post at its free end. The tendency of the spring is to maintain the cam block in the opening in the insulation crimping die. However, it may be overcome to withdraw the block from the opening for adjusting purposes.

Due to the eccentricity of the axis of rotation of the cam block, each of the sides thereof is at a different distance from the axis. Thus, by withdrawing the block from the opening in the die, rotating it a proper angular distance, and then per-

mitting it to be forced into the opening under the action of the spring, the position of the insulation die relative to the insulation jaw may be adjusted. The edge of the inner face of the cam block is formed as a taper or inclined surfaces so that as the block enters the die opening the die is moved under the cam action of this taper.

For a full and more complete understanding of the invention, reference may be had to the following description and accompanying drawings wherein:

FIG. 2 is an elevation of the jaw end of a crimping tool including the improvements of this invention with the jaws depicted in closed position.

FIG. 2 is a view similar to FIG. 1 with portions of the handles omitted and showing the jaws as opened.

FIG. 3 is a section through the crimping jaw, being taken about on the plane represented by the line 3—3 of FIG. 1.

FIG. 4 is a transverse section through the jaws as opened, being taken about on the plane 4—4 of FIG. 2.

FIG. 5 is a detailed plan taken on an enlarged scale and with parts broken away of the work locator per se.

FIG. 6 is another detail on an enlarged scale taken as a section through the locator and about on the plane represented by the line 6—6 of FIG. 5.

FIG. 7 is a perspective developing the elements of the work locator in exploded relation.

FIG. 8 is a detailed perspective on an enlarged scale of the abutment slide, depicted in a position which is the reverse of that illustrated in FIG. 7.

FIG. 9 is a perspective of a terminal per se with an insulation shown in phantom as assembled therewith and before crimping.

FIG. 10 is a perspective depicting the terminal of FIG. 9 after crimping.

FIG. 11 is a detailed perspective looking at the side of the jaws from which the insulation adjustment mechanism projects.

FIG. 12 is a detailed perspective looking at the opposite side from which the bracket which mounts the work locator extends.

FIG. 13 is a detail on a greatly enlarged scale showing the insulation anvil and crimping dies in elevation and cam block and post in section. This view is taken about on the plane represented by line 13—13 of FIG. 4.

FIG. 14 is a perspective illustrating the insulation crimping die and cam block in exploded relation.

Referring now to the drawings, wherein like reference characters denote corresponding parts, and first more particularly to FIGS. 1 and 2, an anvil jaw 10 is pivotably connected to a handle 11 by pivot pin 12. Similarly, a crimping jaw 13 is pivotably connected to a handle 14 by a pivot pin 15. Handles 11 and 14 are pivotably assembled by pivot 16.

A ratchet mechanism is shown at 17. This mechanism is not a part of the present invention and is fully disclosed in U.S. Pat. No. 3,277,751. Its function is to insure that once a crimping operation is started by compressing the handles, the latter cannot be moved with a separating action until the handles have been fully compressed to the limit which determines a complete crimping operation.

Referring momentarily to FIGS. 1 and 2, a plate 18 is shown as mounted on one side of jaws 10 and 13 by pivot pins 19 and 20. These pins extend through the respective jaws and also through a link 21 on the opposite side. These jaws 10 and 13 are pivotally mounted intermediate their ends on plate 18 and link 21 with the connections being somewhat loose.

In the plane defined by the axes of pivots 19 and 20, the confronting edges of jaws 10, 64 and 13 are formed with recesses which receive a pivot pin 22. The jaws rock on this pin 22.

Referring now to FIG. 4, a bracket 23 is shown as secured to a face of anvil jaw 10 by screws 24. Included as a part of bracket 23 is a table 25 which extends outwardly from the jaw and is disposed in what, for the purposes of this specification, is called a horizontal plane. The work locator now to be described is mounted on this table 25.

Referring now to FIG. 7, which should be considered in conjunction with FIG. 4, a U-shaped spring 26 has inwardly bowed legs 27 terminating in outwardly curved end portions 28 which cooperate to define a flared mouth. An anchoring plate 29 is formed integrally with spring 26 and has an end flange 30 and an opening 31. As shown in FIG. 4, plate 29 is secured to the upper face of table 25 with flange 30 overlapping the end edge of the table by a screw 32. Thus, U-spring 26 is disposed in the horizontal plane of the table 25.

A vertical spring 33 is of generally U-shape with one leg having its end formed with an anchoring tab 34 having an opening 35. Tab 34 overlies plate 29 with openings 31 and 34 in alignment. Screw 32 passes through these aligned openings to secure spring 33 in erect position on table 25.

Table 25 is formed with an aperture 36 through which screw 32 passes. It is also formed with a pair of holes 37 on one side and a second pair of holes 38 on the other side. A lower guide bar 39 has a pair of holes 40 which align with holes 37 when guide bar 39 is positioned on table 25. The inner side of bar 39 is mitered at the end edge as shown at 41 for a purpose to be later described.

A second lower guide bar 42 having a pair of holes 43 and a mitered corner 44 at the end of its inner edge and is positioned on table 25 with openings 43 and 38 in alignment.

A sliding abutment is identified in its entirety at 45. It is an integral one piece unit comprising a plate 46 of sufficient width to extend partially over lower guide bars 39 and 42 on which it rests in the area inside of openings 40 and 43. Extending from the inner edge of plate 46 and centrally thereof is an extension 47. Depending from the lower face of plate 46 and extension 47 is a guide rib 48 which assumes a position between lower guide bars 39 and 42. Rib 48 has an inner end face 49 from which project a pair of spaced flanges 50. The top edges of flanges 50 are bevelled at 51 and this bevel is continued upwardly through the top end edge of extension 47 as shown at 52. The inner end faces of flanges 50 shown at 53 constitute abutments for terminal ears as will be later described. Flanges 50 are spaced apart to snugly receive a bared conductor therebetween and the end face 49 of rib 48 between flanges 50 constitutes an abutment for the conductor end. Shoulders 54 are formed by extension 47 which is narrower than plate 46.

An upper guide bar 55 has holes 56 which align with holes 40 and 37. It rests on lower guide bar 39 and is formed with abutment extension 57 which cooperates with one of the shoulders 54 as will be later described. A second upper guide bar 58 has a pair of holes 59 which align with holes 43 and 38. It also has an abutment extension 57 which cooperates with the other of shoulders 54. Plate 46 is positioned between upper guide bars 55 and 58.

A cap plate 60 is formed with four holes 61. Two of these align with holes 56, 40 and 37 and the other two with holes 59, 43 and 38. Cap plate 60 is formed with a recess 62 which enters from the outer end and which is dimensioned to accommodate vertical spring 33 when the cap plate is assembled over abutment slide 45 and the upper guide bars 55 and 59. Fastening elements such as rivets 63 pass through the four sets of aligned openings and maintain the assembled relation of the work locator.

Referring now to FIGS. 4 and 5, anvil jaw 10 is provided with a conductor die 6 and an insulation die 64. These dies may be separate elements or integrally joined as illustrated. Crimping jaw 13 is formed with a conductor crimping die 65 which cooperates with anvil conductor die 6.

Crimping jaw 13 is formed with an opening 66 which receives a post 67 which projects beyond face 68 and has a threaded portion 69. A nut 70 is screwed onto threaded portion 69 and a washer 71 is interposed between nut 70 and face 68. Post 67 is formed with a cylindrical section 72 of enlarged diameter and this enlarged portion 72 is formed with a groove 73 adjacent to its free end.

Referring now to FIG. 14, which should be considered in conjunction with FIG. 4, an insulation crimping die is designated 74. It is in the form of a plate which is slidably

mounted on face 75 of crimping jaw 13 by structure to be later described. It is formed with a rectangularly shaped opening 76 the corners of which are rounded at 77. The opening 76 is in the nature of an oblong, that is, it is longer across the plate than it is in the transverse dimension. Insulation crimping die 74 is formed on its lower edge with crimping surfaces 78 which are fashioned to wrap the tangs of a terminal about the insulation on a crimping operation.

A cam block 79 is square and has rounded corners 80. It is dimensioned to fit within opening 76 in insulation crimping die 74 with clearance on the sides as depicted in FIG. 13. Block 79 is formed with a cylindrical opening 81 that is dimensioned to accurately receive enlarged portions 72 of post 67. The center of opening 81 is offset or eccentric with respect to the true center of the square cam block 79. Thus, this center of the opening is at different distances from the four sides of the cam block.

An operating unit indicated generally at 82 includes a barrel 83 that is integral with cam block 79 and which presents a shoulder 84 which normally engages the outer face of die 74. Barrel 83 is formed with a bore that is a continuation of opening 81 and which is enlarged to provide a counterbore 85. This counterbore 85 presents a shoulder 86. An expansion coil spring 87 is positioned in counterbore 85 and about enlarged portion 72 of post 67. One end of spring 87 abuts shoulder 86 and the other end engages a spring retainer 88 that is mounted in groove 73.

Under normal conditions spring 86 maintains cam block 79 within opening 76. Barrel 83 is enlarged at its free end to provide an operating member 89 which may have a knurled surface (FIGS. 11 and 14). The underside of operating member 89 may be readily engaged by the fingers of a user to withdraw cam block 79 from opening 76 after which the cam block is rotated an angular distance sufficient to bring a different side surface into effective relation with respect to the lower side surface of opening 76, that is, the surface most closely adjacent to the crimping surfaces 78. In this connection it is notable that the edges of the surfaces which define opening 76 at face 84 may be bevelled as indicated at 90 (FIG. 4) so that as cam block 79 is moved under the influence of spring 86 into opening 76 there will be a camming action which moves insulation crimping die 74 into a desired relation with insulation anvil die 64.

This adjustment may be readily understood by referring to FIG. 13. In this view the full line depicting the lower edge of die 74, that is, the edge with the die surfaces, is the position which results from the illustrated position of cam block 79 in opening 76. The broken lines depict different positions which may be obtained by changing the position of cam block 79 in opening 76.

In this connection it is notable that under conditions now prevailing three sizes of insulation are ordinarily provided for a conductor of a particular diameter. Thus, it is necessary to provide only three adjustments for the insulation crimping die. With this condition is mind, it is practical and preferable to provide for only three adjusted positions of the insulation crimping die 74. When this condition obtains cam block 79, its rounded corners 80, opening 76, and its rounded corners 77 are dimensioned and contoured to permit rotation of cam block 79 from an original position to only two other positions and by rotating cam block 79 in only one direction from its starting position.

Referring now to FIGS. 3 and 11, the structure and devices which maintain the insulation crimping die 74 assembled on jaw 13 will be described. Surface 75 (FIG. 4) is formed as the bottom of a shallow groove in jaw 13. This groove presents side surfaces 91 between which die 74 is slidably received. Plate 18 extends over a portion of the die 74 at the handle side (FIG. 11) and the heads 92 of screws 93 extend over and engage the other side of die 74.

OPERATION

The operation of the above described crimping tool will be described in conjunction with the terminal illustrated in FIGS. 9 and 10. This terminal comprises a flat tab 94 the outer end of which is rounded as indicated at 95 with the opposite portion having tapered sides 96. Integral with the narrow end of the tab portion defined by tapered sides 96 is a stem 97 which is of a trough-like shape. Immediately adjacent to tab 94 a pair of ears 98 extend from the sides of stem 97 in diverging relation. A pair of tangs 99, which are longer than ears 98, are spaced from the ears and also extend from the side walls of stem 97. These tangs are intended to be crimped to the insulation with a wrap-around action which results in an overlap of the tangs as shown in FIG. 10. Hence, they are offset or staggered.

Insulation crimping die 74 is first adjusted to the size of insulation 100 of the conductor to which the terminal is to be applied. This is accomplished by manipulating operating unit 82 in the manner above described.

As a terminal is inserted, the rounded end of tab 94 moves past the mouth defined by bevels 41 and 44 on lower guide bars 39 and 42. It then enters the mouth of horizontal spring 26 defined by curved end portions 28 of spring legs 27. As the tab is introduced into the spring, the widest portion of the tab moves past the narrowest passage of the spring and as this takes place the bowed legs 27 grip the side edges of the tab to hold it in position with a high degree of security. It is possible that under some conditions the spring may exert a tendency to pull the tab into the spring.

The insertion of the terminal is continued until the edges of ears 98 on the terminal engage the abutment surfaces 53 on flanges 50 which constitute a stop. The conductor is now inserted. The free end of conductor 101 engages the surface 49 between the flanges 50 with this surface acting as an abutment for the conductor. The terminal, conductor and insulation are now properly positioned relative to the dies.

Handles 11 and 14 are now compressed to move both the conductor and insulation jaws 10 and 13 together. This action, of course, moves the dies towards each other. If a terminal is not inserted in the locator as conductor crimping die 65 moves towards conductor anvil die 6, the edge of the die engages inclined surfaces 51 on flanges 50 to move abutment slide 45 away from the dies. The crimping operation is completed by compressing the handles to the degree required for a full crimp after which the jaws may be separated and the crimped terminal removed from the tool.

After this removal vertical spring 33 returns the abutment slide to its original position for the next crimping operation.

Movement of the abutment slide 45 relative to table 25 is limited by extensions 57 on the upper guide bars 55 and 58 and shoulders 54 on plate 46 of the slide.

It is evident that the springs 26 and 33, and particularly the former, enable the work locator to accept terminals of the types noted above and within a wide range of sizes. Moreover, the spring biased abutment slide adequately accommodates elongation created by the crimping operation.

While a preferred specific embodiment of the invention is hereinbefore set forth, it is to be clearly understood that the invention is not to be limited to the exact constructions, mechanisms and devices illustrated and described because various modifications of these details may be provided in putting the invention into practice.

What is claimed is:

1. In a crimping tool including an anvil jaw, a conductor die carried by said anvil jaw, an insulation die carried by said anvil jaw, a crimping jaw pivotally assembled with said anvil jaw, a conductor die on said crimping jaw, an insulation jaw on said crimping jaw, handle means, and operating connections between said handle means and jaws whereby operation of said handle means causes relative movement of said jaws, a work locator comprising:

a. a bracket secured to one of said jaws and presenting a table extending from the jaw by which it is carried and disposed in a plane normal to the path of relative movement of the jaws;
b. a U-shaped spring secured to said table and including a pair of legs defining a space for receiving the tab of a terminal;
c. an abutment slide on said table, movable relative thereto and having a pair of abutment surfaces adapted to be engaged by the ears of a terminal and an abutment surface adapted to be engaged by the end of a conductor;
d. a spring anchored to said table and engaging said abutment slide to bias said slide towards the jaws;
e. guide means controlling movement of said slide on said table, and
f. means for maintaining said slide and guide means assembled on the table.

2. The crimping tool of claim **1** in which the bracket is secured to a side face of the anvil jaw.

3. The crimping tool of claim **1** in which the U-shaped spring has inwardly formed legs terminating in outwardly curved end portions defining a mouth for receiving the tab of a terminal.

4. The crimping tool of claim **1** in which the spring which biases the abutment slide is U-shaped and arranged normal to the table with one leg of the spring being anchored to the table and the other leg in abutting engagement with the slide.

5. The crimping tool of claim **1** in which the abutment slide has a pair of spaced flanges projecting from an end face thereof and having abutment surfaces engageable by the ears of a terminal with that portion of the end faces between the flanges constituting an abutment for a conductor end.

6. The crimping tool of claim **5** in which the flanges have bevelled ends engageable by the die for the conductor on the other of said jaws to move said slide against the influence of the spring which biases the slide.

7. The crimping tool of claim **1** in which the guide means comprises a pair of lower guide bars secured to the table and a pair of upper guide bars above said lower guide bars and secured to said table, said abutment slide having a depending rib received between said lower guide bars and the slide is positioned between said upper guide bars.

8. The crimping tool of claim **7** in which the abutment slide and upper guide bars are formed with cooperating abutment surfaces which limit movement of the slide relative to the table jaws.

9. The crimping tool of claim **7** in which the lower guide bars are formed with bevel surfaces which define a mouth in confronting relation to said U-spring.

10. The crimping tool of claim **7** together with a cap plate having a recess receiving the spring which biases the slide and fastening elements passing through a plurality of series of alignment openings in said table, guide bars and cap plate.

11. The crimping tool of claim **1** in which the work locator is mounted on the anvil jaw, and mechanism for adjusting the position of the die for insulation on the crimping jaw, said mechanism being mounted on said crimping jaw.

12. In a crimping tool including an anvil jaw, a conductor die carried by said anvil jaw, an insulation die carried by said anvil jaw, a crimping jaw pivotally assembled with said anvil jaw, a conductor die on said crimping jaw, an insulation jaw on said crimping jaw, handle means, and operating connections between said handle means and jaws whereby operation of said handle means causes relative movement of said jaws, mechanism for adjusting to different sizes of insulation comprising:
a. a polygonal opening in the insulation crimping die, the latter being slidably assembled on said crimping jaw;
b. a post secured to said crimping jaw and extending through and beyond the opening in the slide;
c. a cam block having an opening receiving said post whereby it is pivotal thereon and including a plurality of surfaces at different distances from the axis of rotation of Said block and anyone of which is adapted to assume a position relative to the sides of the opening which determines the position of the die relative to the crimping jaw;
d. an operating unit connected to said cam block, and
d. a spring on said post which normally maintains the cam block in the opening but which may be overcome to withdraw the block from the opening to permit rotation which brings another of said surfaces on the block into effective position.

13. The crimping tool of claim **12** in which the opening in the die is rectangular and the block is square with the axis of rotation of the block being eccentric with respect to its true center.

14. The crimping tool of claim **12** in which the cam block and operating unit are integral and has a bore receiving the post and defining the axis of rotation of the block.

15. The crimping tool of claim **14** in which the operating unit is formed with a counterbore and defining a recess and the spring is a compression spring in the counterbore about the post and confined by an end wall of said recess and a spring retainer carried by said post.

16. The crimping tool of claim **15** in which the post has an enlarged portion received in openings in said block and operating unit.

17. The crimping tool of claim **12** in which the operating unit includes a barrel having an enlarged end portion constituting an operating member.

18. The crimping tool of claim **12** in which the ends of the surfaces defining the opening are bevelled to provide a cam action as the block is inserted in the opening.

19. The crimping tool of claim **16** in which there is a shoulder between the post and enlarged portion thereof and which shoulder engages one face of the crimping jaw and the post has a threaded portion extending beyond the outer face of the crimping jaw together with a nut on said threaded portion which cooperates with said shoulder to secure the post to the crimping jaw.

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