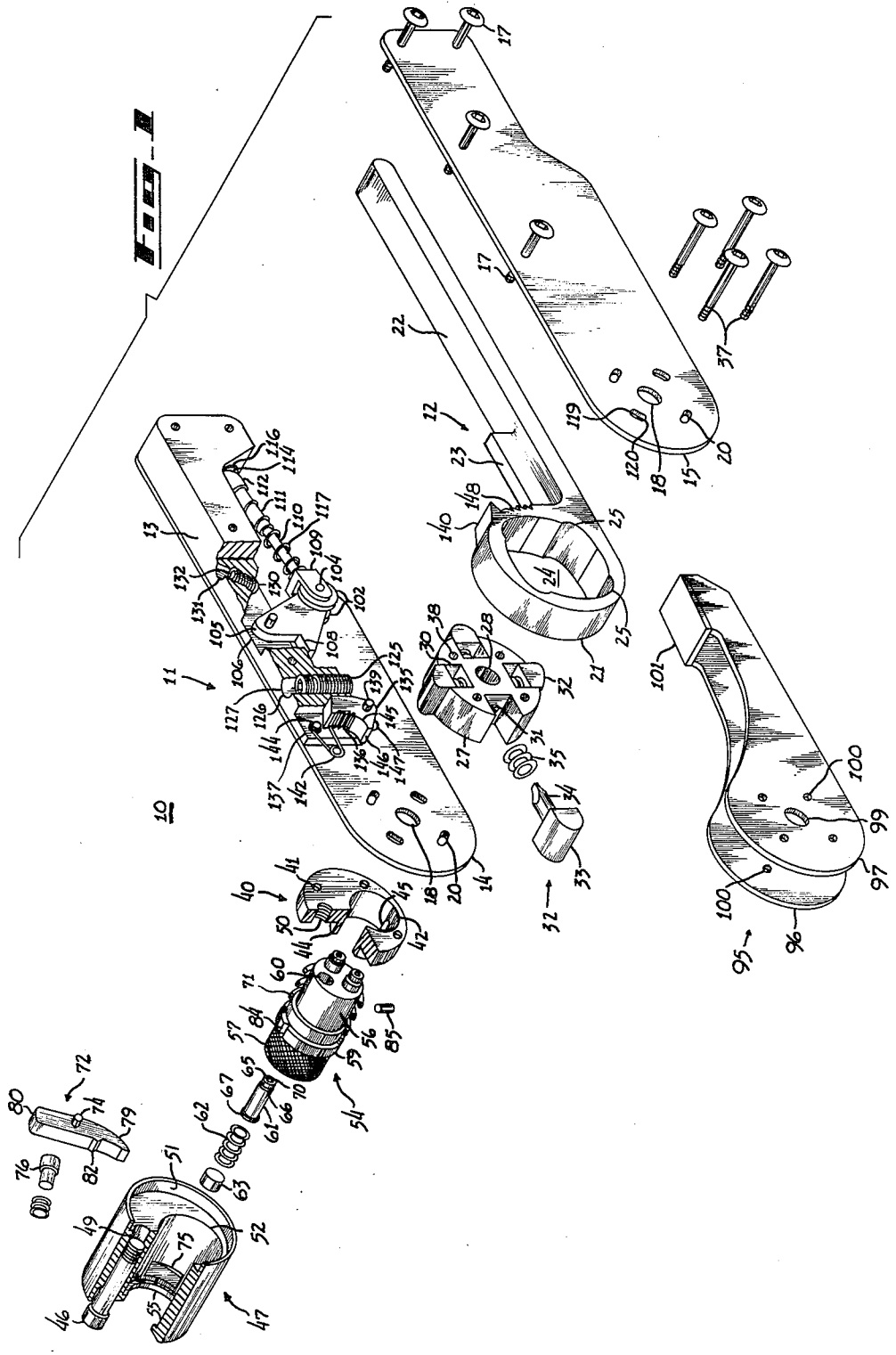
Aug. 10, 1965 M. B. HOLMES ETAL 3,199,335

CRIMPING TOOL

Filed Feb. 9, 1962 2 Sheets-Sheet 1

FIG. 1



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Filed Feb. 9, 1962 2 Sheets-Sheet 2

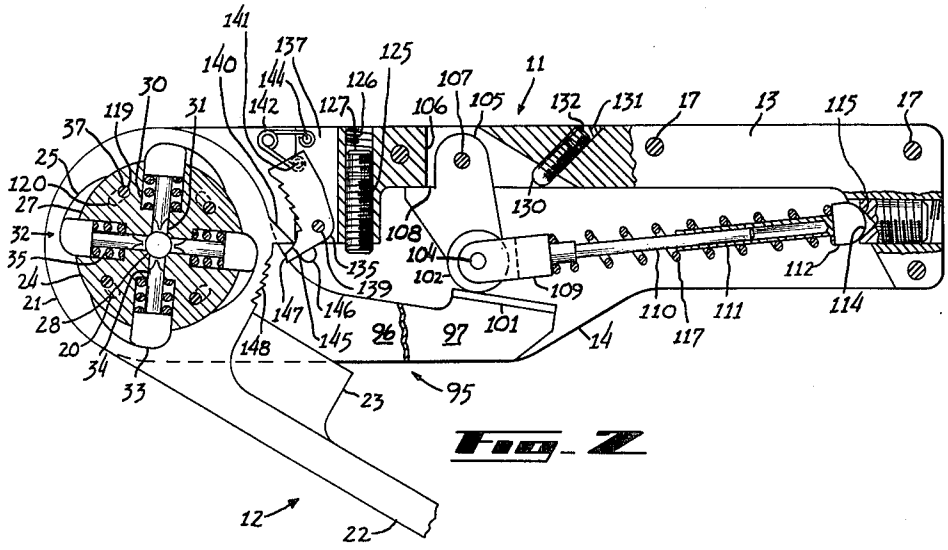

Fig. 2

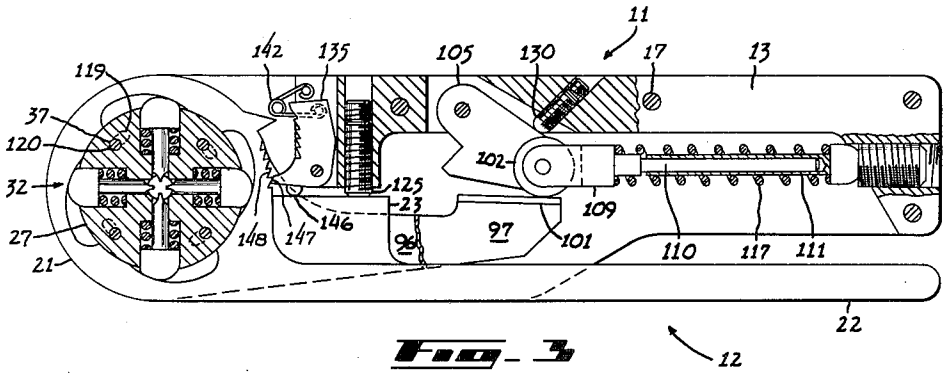

Fig. 3

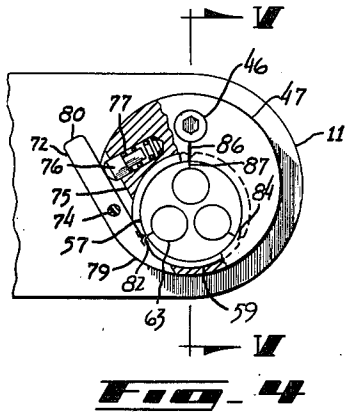

Fig. 4

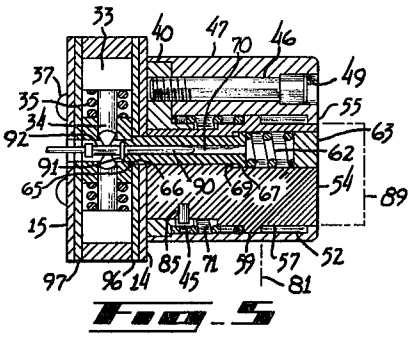

Fig. 5

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3,199,335

CRIMPING TOOL

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11 Claims. (Cl. 72—410)

The present invention relates generally to crimping tools and, more particularly, to a crimping tool which locates a connector in the optimum crimping position with respect to the crimping punches, and which automatically applies the required amount of pressure upon the punches to effect an optimum crimp for a particular connector-conductor combination.

In crimping a connector to the end of an electrical conductor there are two basic criteria by which the quality of the connection is determined. First, there must be no appreciable voltage drop across the connection; and secondly, since the connector may be frequently engaged with, and disengaged from, a matching socket, the connection must exhibit a certain predetermined minimal tensile strength. It has been found that these requirements are best fulfilled by forming the indentations of the crimp at positions symmetrically spaced about the circumference of the connector and at the axial center of the conductor-receiving, or barrel, portion of the connector. The depth of the indentations so formed should be uniform and great enough to provide the required electrical and tensile properties at the connection without unduly distorting, or rupturing, the barrel wall section. It is also desirable that a crimping tool be adapted to accommodate a relatively wide range of connector and conductor sizes.

The crimping tool comprising the present invention incorporates a connector locating device for positioning a relatively wide range of connector sizes in such relation to the crimping punches that the indentations of the crimp are symmetrically spaced on the connector barrel, of uniform depth, and formed at the axial center thereof. There is also provided an overload release mechanism which serves to assure that the punch pressure applied to a particular connector-conductor combination is large enough to form indentations whose depth is sufficient to yield the required tensile strength, yet not great enough to cause rupturing of the connector barrel. In addition a ratchet mechanism is employed in the tool to insure that the required punch pressure is applied before the punches are disengaged from the connector. These characteristics of the tool provide for crimped connections which are of consistently high quality irrespective of variations in the size and hardness of the connectors and conductors being crimped.

It is, therefore, the primary object of the invention to provide a crimping tool which will consistently form crimped connections of high quality.

Another object is to provide a crimping tool incorporating a connector locating device which will position a relatively wide size range of connectors in such a relation to the crimping punches that the crimp indentations will be symmetrically spaced on the connector barrel, of uniform depth, and formed at the axial center thereof.

Another object resides in the provision of a crimping tool incorporating an overload release mechanism which will prevent undue distortion and rupturing of the connector being crimped, while assuring a depth of crimp indentation which will yield the required electrical and tensile characteristics of the connection.

Another object is to provide a crimping tool wherein a predetermined pressure must be applied to the connector before the punches may be disengaged from the connector.

These and other objects and features of the invention will be more apparent to those skilled in the art upon consideration of the following description of the appended drawings wherein:

FIGURE 1 is an exploded isometric view of the subject crimping tool showing the various components thereof, certain of such components being shown in section to better illustrate their construction;

FIGURE 2 is a side elevation of the tool, with portions removed for clarity, showing the handles thereof in the fully open position;

FIGURE 3 is also a side elevation of the tool showing the handles in the fully closed position;

FIGURE 4 is a view looking into the outer end of the connector locating device, portions of which are shown removed to better illustrate its construction; and

FIGURE 5 is a sectional view taken along line V—V in FIGURE 4 showing the connector locating device in assembled form.

Referring now to FIGURES 1 and 2 of the drawings, the present crimping tool, generally indicated by the numeral 10, includes a pair of handle members 11, 12 adapted for pivotal interconnection at one of their ends. Handle 11 consists of a body portion 13 and a pair of side plates 14, 15 affixed to the body portion by means of a plurality of fasteners 17. Aligned apertures 18 extend through the side plates 14, 15 for receiving the connector to be crimped. Also extending through such side plates are a plurality of slotted apertures 20 which lie on a circle concentric about the openings 18. Handle 12 consists of an enlarged end portion 21 integrally connected with an elongated portion 22. On the elongated portion 22, adjacent the end portion 21, is an integral, medial, raised portion 23, the purpose of which will be explained below, whose width is somewhat less than that of the former. An enlarged opening 24 extends through the enlarged end portion 21 of the handle 12 and is provided with a plurality of equally spaced cam surfaces 25, preferably four in number. A cylindrical punch holder 27, having a central aperture 28 aligned with, and of a slightly smaller diameter than, openings 18 in side plates 14, 15, is disposed within enlarged opening 24 in handle 12. A plurality of equally spaced, transverse grooves 30 are formed in the punch holder. Radial passageways 31 connect the inner surfaces of the grooves 30 with the center aperture 28. Within each of the grooves 30 is positioned a punch member 32 comprising an enlarged head portion 33, having an arcuate outer surface adapted for slidable engagement of the adjacent cam surface 25, and an integral cylindrical body portion 34 which extends into the passageway 31. The inner ends of the body portions 34 of the punches 32 are ground into a substantially pointed shape whereby the crimp indentations are more readily formable. About each of the body portions 34 of the punches is disposed a spring 35 which continually urges the punch head 33 into contact with the corresponding cam surface 25. The punch holder 27 is connected to the side plates 14, 15 of handle 11 by means of bolts 37 which extend through slotted apertures 20 in the latter and through the apertures 38 in such punch holder. It may be readily seen that closure of the handles 11, 12 will cause the punch heads 33 to slide along the cam surfaces 25, thereby forcing the punches 32 to move inwardly against the action of springs 35.

In FIGURES 1, 4 and 5 there is shown the preferred configuration of the device employed in the subject crimping tool for locating the connector to be crimped in the proper position with respect to the punches 32. The con-

nector locating device includes a cylindrical guide plate 40 rigidly connected to the handle 11, by bolts 37 which engage threaded apertures 41 in such a manner that the axis of the guide plate 40 corresponds to the centerline of apertures 18 in handle 11. Extending through the guide plate 40 is an eccentrically located, cylindrical opening 42 having a rearwardly directed flange 44 thereabout. Such flange 44 has a plurality of equally spaced longitudinal slots 45 formed therein, the outer ends of which are open. Attached to the guide plate 40, by means of a bolt 46, is a housing member 47. Such bolt 46 extends through an aperture 49 in the housing 47 and engages threaded aperture 50 in guide plate 40. Housing 47 is formed with a first cylindrical cavity 51 therein, for accommodating the guide 40, and a second, eccentrically located, cylindrical cavity 52 within which is disposed a turret 54. An inwardly directed flange 55 at the outer end of the second cavity 52 serves to retain the turret 54 therein. When the components of the connector locating device are assembled, the cavity 52 in housing 47 and opening 42 in guide plate 40 are axially aligned. The turret 54 consists of a forward portion 56 and a rear portion 57, the latter having a collar 59 formed thereabout. The diameters of the forward portion 56 and collar 59 are slightly smaller than, respectively, the diameters of opening 42 in guide plate 40 and cylindrical cavity 52 in housing 47, such that the plunger 54 is freely rotatable about its axis and movable in an axial direction. Extending through the turret 54 are a plurality of apertures 60, the centerlines of which lie on a common radius about the axis of the turret. Such radius is equal to the distance separating the centerline of aperture 18 in handle 11 and the axis of the turret 54, so that by rotating the turret any one of the apertures 60 may be aligned with the apertures 18. Within each of the apertures 60 are disposed a connector locator 61, a spring 62 and a retainer button 63, the latter preferably being force fitted into the aft end of the aperture until its rear surface is flush with that of the turret 54. At the forward end of each of the locators 61 is a reduced portion 65, the diameter of which is slightly less than the diameter of central aperture 28 in punch holder 27. A shoulder 66 interconnects the reduced portion 65 with the remainder of the locator 61, the diameter of the latter being slightly less than that of apertures 18 in side plate 14. The springs 62 act against the rear surfaces of locators 61 to urge same in a forward direction so that they normally protrude from the front face of the turret 54. The forward movement thereof is limited by an outstanding flange 67 about the rear edge of each locator 61 which abuts a shoulder 69 in each of the apertures 60. Extending through each of the locators is a central, longitudinal aperture 70, the respective diameters of such apertures 70 being different so that a different size connector is accommodated by each locator. Disposed about the turret 54 is a compression type spring 71, the forward end of which abuts the back side of guide plate 40, and the aft end of which abuts the forward side of collar 59, thereby urging the turret 54 in a rearward direction. The turret is held in a forward or "in" position, against the action of spring 71 by means of a trigger 72 which engages the rear side of collar 59. Such trigger 72 is pivotally positioned on a pin 74 within a slot 75 in the side of housing 47, such slot 75 communicating with the cavity 52 wherein turret 54 is disposed. The trigger is urged in a counterclockwise direction (as viewed in FIGURE 4) by means of a spring-loaded plunger 76 disposed within a cavity 77 formed in the housing 47. One end 79 of trigger 72 is formed with a curved outer surface approximating that of the housing 47, while the opposite end 80 extends therebeyond so as to be easily accessible to the tool operator. The trigger 72 is so located that the distance separating its forward face and the outer surface of handle face plate 14 is equal to the distance between the front surface of turret 54 and the rear edge of collar 59. This arrangement is illustrated in FIGURE 5, wherein the plane of the forward face of the trigger 72 is indicated by the broken line at 81.

The trigger 72 also serves as a means of aligning the locators 61 with apertures 18 and 28 in side plate 14 and punch holder 27, respectively. On the inner face of the trigger 72 there is formed a generally V-shaped, transverse protrusion 82 adapted to engage notches 84 formed in collar 59 which are so located that the protrusion will engage one of the notches 84 only when one of the locators 61 is aligned as described above. Additional locator alignment means may be provided by affixing a small pin 85 in the forward portion 56 of the turret 54 at such a position that it will enter one of the slots 45 in flange 44 about opening 42 in guide plate 40 only when one of the locators 61 is properly aligned. In order to indicate visually the proper alignment of the locators, a reference line 86 is scribed on the rear surface of the housing 47 and index marks 87 are scribed radially outward from the locator centers on the rear surface of turret 54.

It is also necessary to indicate to the tool operator which of the locators 61 is aligned in crimping position. This is preferably done by coloring each of the rear surfaces of the spring retainer buttons differently. At some convenient position on the tool, a plate or decal (not shown) is applied thereto upon which the color code is explained.

From the foregoing description of the connector device, it may be seen that in order to crimp a connector of known size, the operator first consults the color code legend to obtain the appropriate setting for turret 54. The operator next depresses the exposed end 80 of trigger 72, which moves the curved end 79 outwardly, thereby disengaging the forward face of the trigger from the rear face of collar 59 and allowing the turret 54 to move rearwardly, under the action of spring 71, to the "out" position as indicated by the broken line at 89 in FIGURE 5. The operator then grasps the protruding rear portion of the turret 54, which is preferably knurled, and rotates same until the index mark 87 adjacent the appropriate locator 61 is aligned with the reference line 86. The turret 54 is then pressed inwardly until the curved end 79 of the trigger 72 engages the collar 59. During such inward motion of the turret 54, the selected locator 61 is maintained in alignment by the protrusion 82 on trigger 72 which is seated in one of the notches 84 in collar 59. The unaligned locators 61, as the turret moves toward the "in" position, abut the outer surface of side plate 14 and are forced back into their respective apertures 60 against the action of springs 62. The aligned locator 61, however moves inwardly until the shoulder 66 contacts the punch holder 27, the reduced forward portion 65 of the locator extending into the latter's central aperture 28. The connector is then inserted into the tool, the probe portion 90 thereof extending into the aperture 70 through the aligned locator 61, until the collar 91 about the connector abuts the forward end of the reduced portion 65 of the locator 61. It may be readily observed that by making the diameter of the aperture 70 only slightly larger than the probe of the connector it is intended to accommodate, the barrel 92 of such connector will be radially centered between the punches 32, and consequently that the crimp indentations will be symmetrically spaced about the connector barrel and of uniform depth. By properly adjusting the longitudinal dimension of the forward reduced portion 65 of the locator 61, the connector may be axially positioned such that the crimp indentations are formed at the center of the barrel 92.

As a result of variations in the materials, or more specifically the hardness of the materials, from which connectors and conductors are made, it is necessary to provide the crimping tool with a mechanism which will compensate for such variations in order to obtain crimped connections of consistently high quality. In the subject

crimping tool there is provided an overload release mechanism which includes a plate assembly **95** comprising a pair of spaced face plates **96**, **97** disposed, respectively, between side plate **14** and punch holder **27**, and between side plate **15** and punch holder **27** (FIGURE 5). As shown in FIGURES 1 and 2 the face plates are provided with central apertures **99**, the diameters of which are substantially the same as apertures **18** through side plates **14**, **15**, to permit a connector to be inserted therethrough, and spaced apertures **100**, which are aligned with apertures **38** in punch holder **27**, through which pass bolts **37**. As may be readily seen, the face plates **96**, **97** and punch holder are affixed together by such bolts **37** and may be considered to be integrally connected. The face plates **96**, **97** extend rearwardly and are interconnected at their terminal ends by a transverse plate **101**. Riding upon such transverse plate **101** are a pair of rollers **102** which are free to rotate about a pin **104** extending through the lower end of a linkage bar **105**. The upper end of such linkage bar **105** is pivotally interconnected to handle **11**, within a clevis **106** formed in body member **13**, by means of a pin **107**, which is located forward (to the left as shown in FIGURE 2) of pin **104**. The lower end of linkage bar **105** is prevented from moving forward from the position shown in FIGURE 2 by a shoulder **108** on the forward face of the linkage bar which abuts the lower surface of body member **13** and thus serves as a position stop. Extending rearwardly from the lower end of linkage bar **105**, and pivotally connected thereto by pin **104**, is a clevis **109** to which is integrally connected a first rod **110** which is telescopically engageable with a second rod **111**, the latter being provided with an end portion **112** having a substantially hemispherical surface **114** which abuts the surface of a conical recess **115** in the end of an adjustment screw **116**. Disposed about the rods **110**, **111** is a spring **117** which continually urges such rod **110** forward and thus results in the rollers **102** being positioned on the forward portion of transverse plate **101**, as shown in FIGURE 2. This position of rollers **102** relative to transverse plate **101** corresponds to the downwardmost position of the latter, and to a clockwise positioning of face plates **96**, **97**. The bolts **37**, which fixedly interconnect the punch holder **27** to such face plates **96**, **97** are thus retained against the clockwise ends **119** of slotted apertures **20** in side plates **14**, **15** of handle **11**.

In crimping a particular connector-conductor combination, the connector having been properly positioned in the crimping tool as explained above, and the conductor having been inserted into the connector barrel, the handle **11**, face plates **96**, **97**, and punch holder **27** are rotated clockwise relative to handle **12** and the punches **32** move inwardly and contact the outer surface of the connector barrel. Continued clockwise rotation of handle **11** causes the punches **32** to indent the connector barrel and the conductor contained therein. As the depth of indentation increases, the resistance to further indentation increases accordingly, such resistance being dependent upon the hardnesses of the connector and the conductor. If this resistance exceeds a certain amount, which is predetermined both by the constant of the spring **117**, and by the initial axial compression thereof, the spring **117** will be compressed, the rollers **102** will move rearwardly on transverse plate **101**, and the face plates **96**, **97** and punch holder **27** will cease clockwise rotation relative to handle **12**, thereby stopping the inward movement of the punches **32**. When this occurs, the punch holder **27** and face plates **96**, **97** are essentially in locked positions relative to handle **12**. Upon continued clockwise rotation of handle **11** the bolts **37** are unseated from the clockwise ends **119** of slotted apertures **20** in side plates **14**, **15** of handle **11** and are moved toward the counterclockwise ends **120** of such apertures, thereby permitting continued handle closure to occur without further inward movement of punches **32**.

The connectors which may be crimped with the present crimping tool range from very small to relatively large sizes. The smaller size connectors are generally made of relatively soft material and have thin barrel wall sections. In order to prevent over-crimping such connectors a set screw **125** is threadably engaged in an aperture **126** through the forward portion of body member **13** of handle **11** and extends below the lower surface of such body member **13**. A jam screw **127** tightened against the upper end of set screw **125** serves to prevent movement of the latter. As the handles **11**, **12** are closed, the raised portion **23** of handle **12** abuts the lower end of the set screw, as shown in FIGURE 3, thereby limiting the closure of such handles **11**, **12** and, hence, the inward movement of the punches **32**. As may be readily seen the set screw **125** also serves as a means of adjusting the maximum depth of the crimp indentations. The larger size connectors, on the other hand, are usually made of harder materials and have relatively thick wall sections. In order to prevent under crimping the larger size connectors, another set screw **130** is threadably engaged in an aperture **131** which extends downwardly and forward through body member **13** at such a position that the lower end of the set screw **130** will abut the rear surface of linkage bar **105** as the latter rotates rearwardly and upwardly. Thus if the resistance to crimping offered by a connector is large enough to impede the inward movement of the punches **32** during the first few degrees of handle closure, thereby actuating the overload release mechanism, the face plates **96**, **97** and linkage bar **105** will rotate upwardly until the latter abuts the set screw **130**. When this occurs, as shown in FIGURE 3, the face plates **96**, **97** can no longer rotate. Hence, continued closure of the handles **11**, **12** will result in further inward movement of the punches and thus a greater depth of identation in the connector barrel. A jam screw **132** is tightened against the upper end of set screw **130** to lock same in place. The set screw **130** may also be used as a means of adjusting the minimum depth of crimp indentation.

In order to prevent premature disengagement of the punches **32** from the connector conductor being crimped, as would occur if the handles were not fully closed before release, a ratchet mechanism is employed in the present crimping tool. Such ratchet mechanism includes a rack **135**, having an arcuate front surface with notches **136** thereon, the lower end of which is pivotally positioned in a clevis **137** at the forward end of body member **13** by means of a pin **139**. The notches **136** are engageable by a triangular pawl **140** formed on the outer surface of the enlarged end **21** portion of handle **12**. Attached to the upper end of the rack **135**, by means of pin **141**, is one end of a rack positioning spring **142**, the other end of which is fastened to the wall of clevis **137** in body member **13**, by pin **144**. The spring **142** is of the compression type and serves to urge rotation of the rack **135**. The lower end of the front surface of such rack **135** is sharply curved as indicated at **145** to form a forwardly extending protrusion **146**. With the handles in the open position the pawl **140** rides upon the sharply curved surface **145**, thereby causing the rack to rotate to the counterclockwise position shown in FIGURE 2. With the rack **135** so disposed the spring **142** exerts a counterclockwise torque thereon, thus retaining the rack in a position such that the notches **136** will be engaged by the pawl **140** upon closure of the handles **11**, **12**. And, since the lower surface of each of the notches **136** is essentially perpendicular to the curvature of the rack in the area of the notches, once the pawl **140** has engaged the lowermost notch, the handles **11**, **12** cannot be reopened without completing the crimping cycle. A few degrees before the handles **11**, **12** reach the fully closed position the raised portion **23** of handle **12** abuts the lower end of a small knob **147** which protrudes from the bottom surface of the rack **135**. The knob **147** is located forward of pivot pin **139**. The rack **135** will therefore be forcibly rotated

to the clockwise position shown in FIGURE 3 when the handles are fully closed. It will be noted that the pawl 140 is disengaged from notches 136. The spring 142 now exerts a clockwise torque on the rack 135, thereby retaining same in the clockwise position. Thus the handles 11, 12 may be reopened without interference between pawl 140 and rack 135. As the handles 11, 12 approach the fully open position, the pawl 140 again contacts the curved surface 145, thereby causing the rack 135 to rotate counterclockwise into position for the next crimping cycle.

In order to prevent double crimping of a connection, as might occur if the handles 11, 12 could be reclosed after being only partially opened, the ratchet mechanism is made double-acting by forming a plurality of transverse notches 148 immediately below pawl 140 on the surface of the enlarged end portion 21 of handle 11. The front surface of the forward protrusion 146 is ground flat so that it will engage the notches 148. As may be observed from FIGURE 2, during closure of the handles 11, 12 the forward protrusion 146 cannot interfere with notches 148, since the two are separated. However, at the fully closed position, the protrusion 146 is rotated forward and engages the lowermost of the notches 148 as shown in FIGURE 3. Since the lower surface of each of the notches 148 is approximately perpendicular to the curvature of the end portion 21 of handle 12, it may be readily seen that the handles 11, 12 must be fully opened before the crimping cycle can be repeated.

As thus described the present invention is characterized as an improved crimping tool for attaching a connector to the end of a conductor which includes means for locating the connector centrally between a set of punches actuated by the closure of a pair of pivotally interconnected handles, means for locating the connector in the proper axial relation to the punches, an overload release mechanism which permits continued closure of the handles without further punch movement when the resistance to crimping offered by the connector-conductor combination exceeds a certain predetermined amount, and a ratchet mechanism for preventing disengagement of the punches before a minimum crimping force has been applied.

Although only the preferred embodiment of the invention has been shown and described herein, it is not to be construed that the invention is limited thereto, as numerous modifications will be apparent to those skilled in the art; and the invention is to be given its broadest possible interpretation within the terms of the following claims.

What we claim is:

1. A crimping tool adapted for attaching a connector to the end of a conductor and comprising in combination:
- a pair of handle members pivotally connected at one of their ends;
- punch means carried by one of said handle members for forming identifications in the barrel of said connector,
- said punch means being adapted for radial movement in response to movement of said handle members;
- locator means for positioning said connector in desired relation to said punch means,
- said locator means including a plurality of connector locating elements for positioning connectors of different size diameters.

2. A crimping tool adapted for attaching a connector to the end of a conductor and comprising in combination:
- at first handle member;
- a second handle member;
- said first and second handle members being pivotally interconnected at one of their ends;
- a punch holder affixed to said first handle member,
- said first handle member and said punch holder having aligned apertures extending therethrough at the pivotal axis of said handle members for receiving said connector;
- a set of punches carried by said punch holder for forming indentations in the barrel of said connector,
- said punches be symmetrically disposed in radial directions about said connector receiving apertures and adapted for inward movement upon closure of said handle members;
- locator means for positioning said connector in desired relation to said punch means,
- said locator means including a housing member fixedly attached to said first handle member behind said connector receiving apertures,
- a rotatable, axially movable turret member disposed in said housing member,
- a plurality of connector locating elements carried by said turret member for positioning connectors having different size diameters,
- each of said connector locating elements being capable of being individually aligned with said connector receiving apertures by rotating said turret member.

3. A crimping tool adapted for attaching a connector to the end of a conductor and comprising in combination:
- first and second handle members,
- said first and second handle members being pivotally interconnected at one of their ends,
- a punch holder attached to said first handle member,
- said first handle member and said punch holder having aligned apertures extending therethrough at the pivotal axis of said handle members for receiving said connector,
- a set of punches carried by said punch holder for forming indentations in the barrel of said connector,
- said punches symmetrically disposed in radial directions about said connector receiving apertures and adapted for inward movement upon closure of said handle members,
- locator means for positioning said connector in desired relation to said punches,
- said locator means including a housing member fixedly attached to said first handle member adjacent said connector receiving apertures,
- a rotatable, axially movable turret member disposed in said housing member,
- a plurality of connector locating element means carried by said turret member for positioning connectors having different diameters,
- each of said locating element means being limited to the maximum size connector the element means can receive and each element means being capable of receiving a different maximum size connector,
- each of said connector locating elements being capable of being individually aligned with said connector receiving apertures by rotating said turret member,
- and means for retaining the one of said locating elements individually aligned with said connector receiving apparatus in abutment with said punch holder.

4. The crimping tool of claim 3 in which the individual locating element means are individually biased away from said turret member and into abutment with said punch holder when aligned with said connector receiving apertures.

5. A crimping tool adapted for attaching a connector to the end of a conductor comprising in combination:
- a first handle member,
- a second handle member,
- said first and second handle members being pivotally interconnected at one of their ends,
- punch means carried by said first handle member for forming indentations in the barrel of said connector,
- said punch means being adapted for radial movement in response to movement of said handle members,
- means for permitting continued closure of said handle members without further movement of said punch means,
- double acting ratchet means associated with said handle members for preventing opening of said handle members until said handle members have been fully closed

and for preventing closure of said handle members until said handle members have been fully opened,

said ratchet means including a pall carried by said second handle member,

a rack pivotally carried by said first handle member adjacent said pall having two normal positions,

said rack having a forwardly protruding lower end engageable by said pall when said handle members are in the fully opened position to rotate said rack from a first position to a second position wherein said rack will be engaged by said pall upon closure of said handles thereby to prevent reopening of said handle members until same have been fully closed,

a rack positioning spring to retain said rack in said first or second positions,

said rack being capable of engaging said second handle member when said handle members are in said closed position and thereby being moved to said first position,

said second handle member having a plurality of transverse notches adjacent said pall for engaging said lower end of said rack when in said first position for preventing closing of said handle members until said handle members are in a substantially fully opened position.

6. A crimping tool for securing a connector to a conductor inserted therein comprising a pair of pivotally conected handles each having enlarged portions at their pivotal ends,

a rotatable punch holder connected to one of said handles and having punches mounted therein adapted for inward radial movement upon closing movement between said handles,

overload release means for permitting continued closing movement between said handles without further movement of said punches when pressure exerted on said punches exceeds a predetermined limit,

said overload release means comprising a release plate secured to said punch holder and rotatable therewith,

resilient compression means engaging said release plate for rotation with one of said handles until force applied to said handle exceeds the force of said resilient compression means,

and means for selectively varying the force of said resilient compression means.

7. A crimping tool of claim 6 in which a stop means is utilized to prevent under crimping of said connector,

said stop means being affixed to said handles and being so positioned to contact said resilient compression means to prevent further movement of said release plate upon said release plate being moved a predetermined distance upon closure of said handles.

8. A crimping tool of claim 6 in which a stop means is utilized to prevent over crimping of said connector,

said stop means being adjustably positioned between said handles for selectively establishing a predetermined distance between said handles when said handles are in the fully closed position.

9. A crimping tool of claim 6 in which a pair of stop means are utilized to prevent under and over crimping of said connector,

one of said stop means being affixed to said handles and being so positioned to contact said resilient compression means to prevent further movement of said release plate upon said release plate being moved a predetermined distance upon closure of said handles,

a second stop means being adjustably positioned between said handles for selectively establishing a predetermined distance between said handles when said handles are in the fully closed position.

10. A crimping tool adapted for attaching a connector to the end of a conductor and comprising in combination;

a first handle member,

a second handle member,

said first and second handle members being pivotally interconnected at one of their ends,

a punch holder attached to said first handle member,

said first handle member and said punch holder having aligned apertures extending therethrough at the pivotal axis of said handle members for receiving said connector,

a set of punches carried by said punch holder for forming indentations in the barrel of said connector upon closure of said handle members,

overload release means for permitting continued closing movement between said first and second handles without further movement of said punches when pressure exerted on said punches in crimping said connector exceeds a predetermined limit,

said overload release means comprising a release plate secured to said punch holder and rotatable therewith,

resilient compression means attached to said first handle member for engaging said release plate and rotating with said second handle until the force applied to said second handle in its movement toward said first handle exceeds the force of said resilient compression means,

means attached to said first handle member for selectively varying the force of said resilient compression means,

first stop means connected to said first handle member and being adjustably positioned to contact said resilient compression means for preventing further release of said overload release means beyond a given movement of said handle members toward each other,

and second stop means for adjustably varying the positive spacing between said first and second handle movements at the point of fully closed position.

11. A crimping tool adapted for attaching a connector to the end of a conductor and comprising in combination:

first and second handle members,

said first and second handle members being pivotally interconnected at one of their ends,

a punch holder attached to said first handle member,

said first handle member and said punch holder having aligned apertures extending therethrough at the pivotal axis of said handle members for receiving said connector,

a set of punches carried by said punch holder for forming indentations in the barrel of said connector,

said punches being symmetrically disposed in radial directions about said connector receiving apertures and adapted for inward movement upon closure of said handle members,

locator means for positioning said connector in desired relation to said punches,

said locator means including a housing member fixedly attached to said first handle member adjacent said connector receiving apertures,

a rotatable, axially movable turret member disposed in said housing member,

a plurality of connector locating element means carried by said turret member for positioning connectors having different size diameters,

each of said locating element means being limited to the maximum size connector the element means can receive and each element means being capable of receiving a different maximum size connector,

each of said connector locating elements being capable of being individually aligned with said connector receiving apertures by rotating said turret member,

and means for retaining one of said locating elements in a biased position away from said turret member

and into abutment with said punch holder when aligned with said connector receiving apertures,

double acting ratchet means associated with said handle members for preventing opening of said handle members until said handle members have been fully closed and for preventing closure of said handle members until said handle members have been fully opened,

said ratchet means including a pall carried by said second handle member,

a rack pivotally carried by said first handle member adjacent said pall having two normal positions,

said rack having a forwardly protuding lower end engageable by said pall when said handle members are in the fully opened position to rotate said rack from a first position to a second position wherein said rack will be engaged by said pall upon closure of said handles thereby to prevent reopening of said handle members until same have been fully closed,

a rack positioning spring to retain said rack in said first or second positions,

said rack being capable of engaging said second handle member when said handle members are in said closed position and thereby being moved to said first position,

said second handle member having a plurality of transverse notches adjacent said pall for engaging said lower end of said rack when in said first position for preventing closing of said handle members until said handle members are in a substantially fully opened position,

overload release means for permitting continued closing movement between said handles without further movement of said punches when pressure exerted on said punches exceeds a predetermined limit,

said overload release means comprising a release plate secured to said punch holder and rotatable therewith,

resilient compression means engaging said release plate for rotation with one of said handles until force applied to said handle exceeds the force of said resilient compression means,

means for selectively varying the force of said resilient compression means,

stop means affixed to said handles and being so positioned to contact said resilient compression means to prevent further movement of said release plate upon said release plate being moved a predetermined distance upon closure of said handles,

and a second stop means being adjustably positioned between said handles for selectively establishing a predetermined distance between said handles when said handles are in the fully closed position.

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