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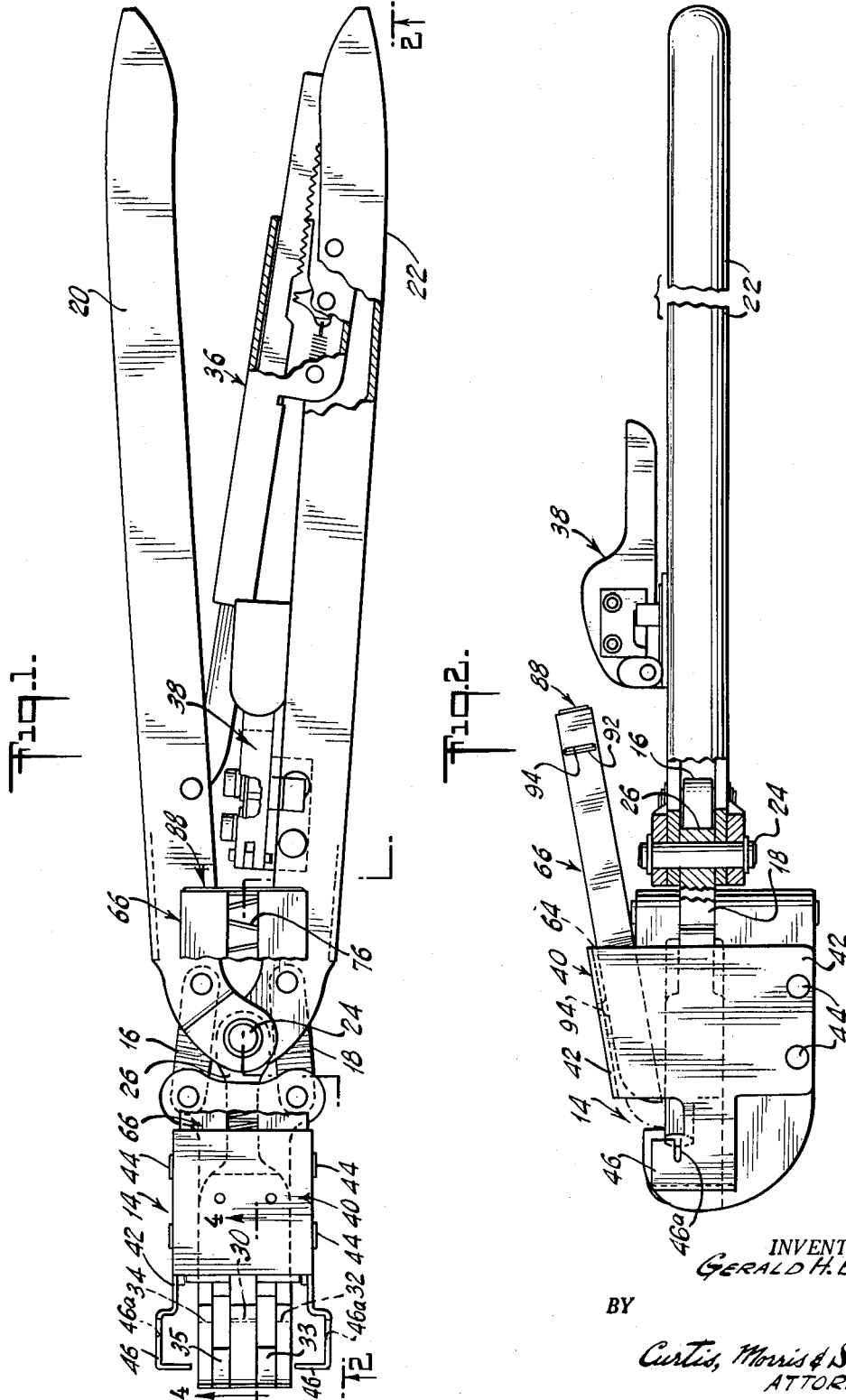
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2,722,146

SEMI-AUTOMATIC CRIMPING TOOL

Filed Aug. 25, 1952

4 Sheets-Sheet 1



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4 Sheets-Sheet 2

Fig. 3.

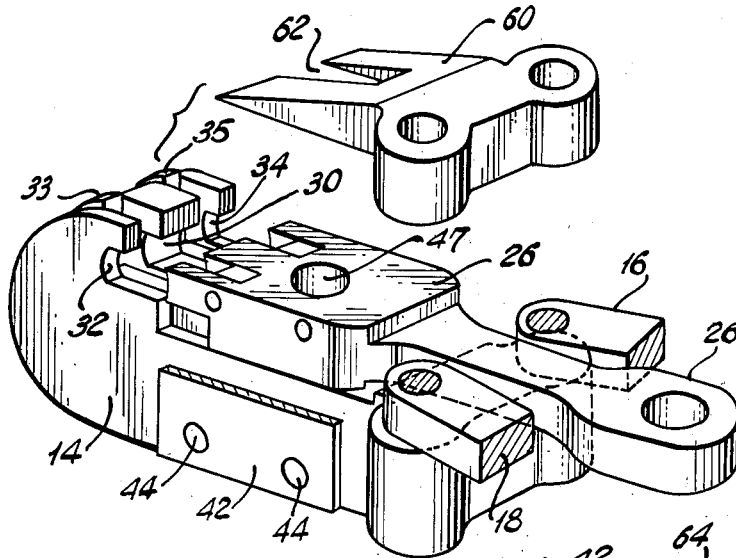


Fig. 4.

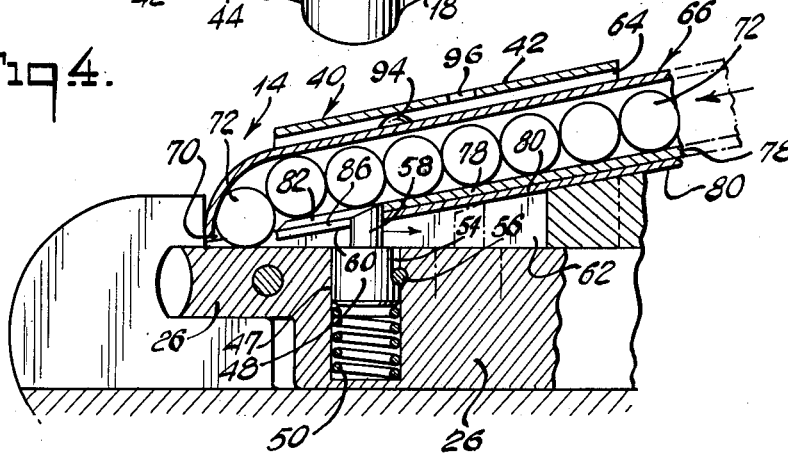
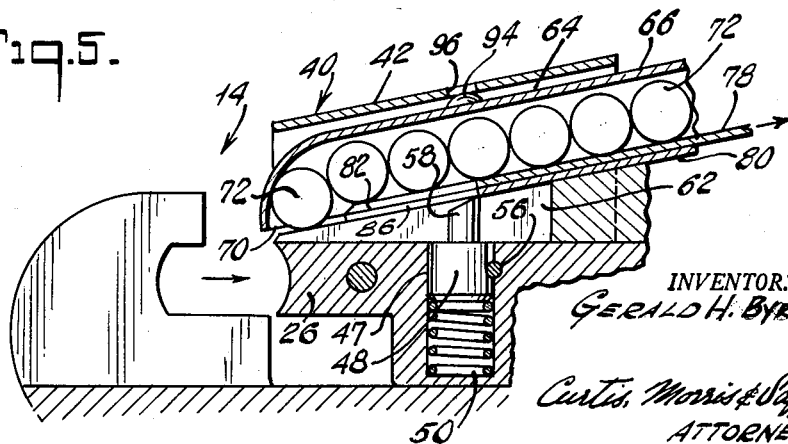


Fig. 5.



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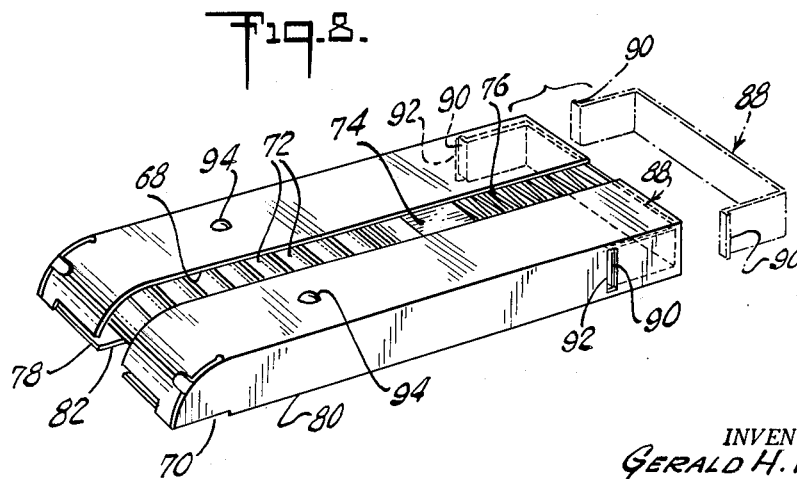
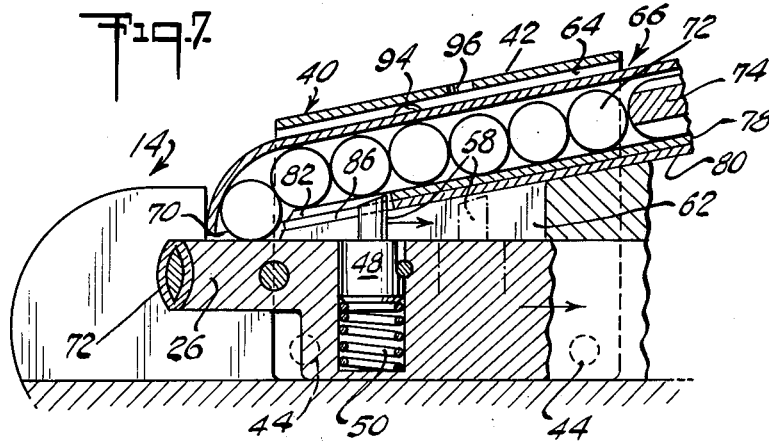
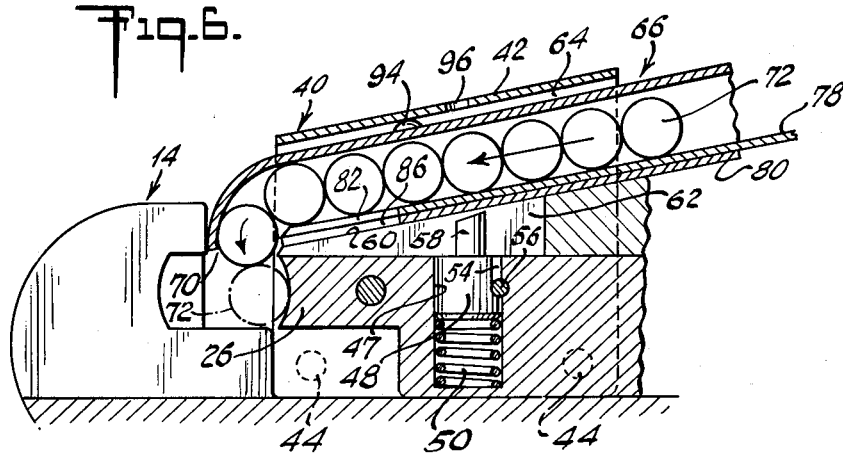
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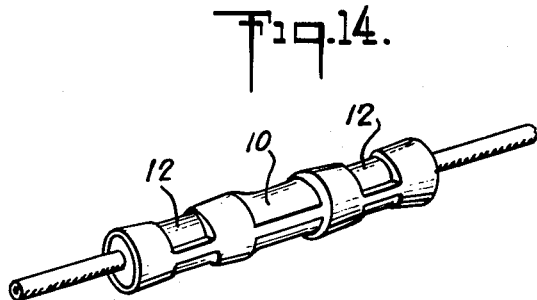
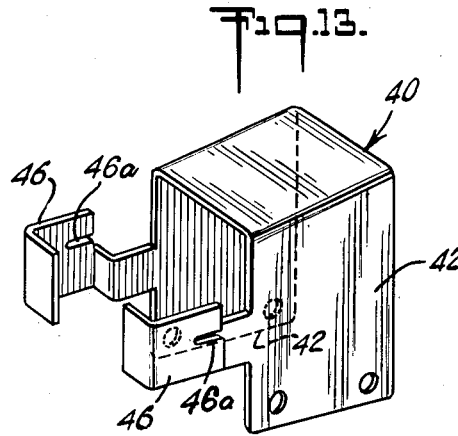
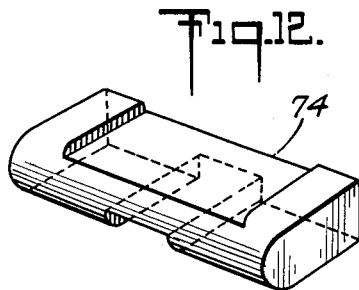
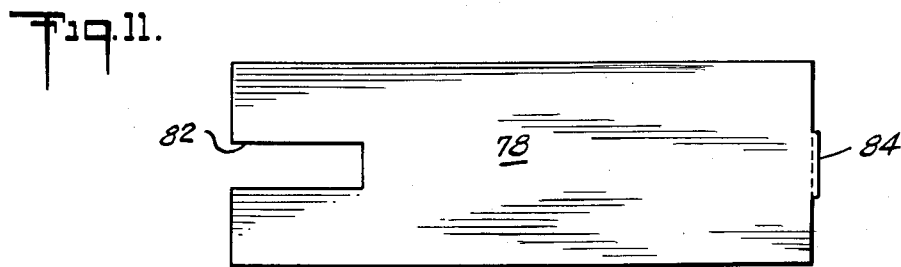
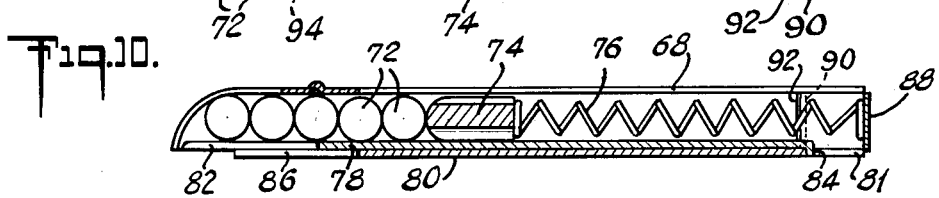
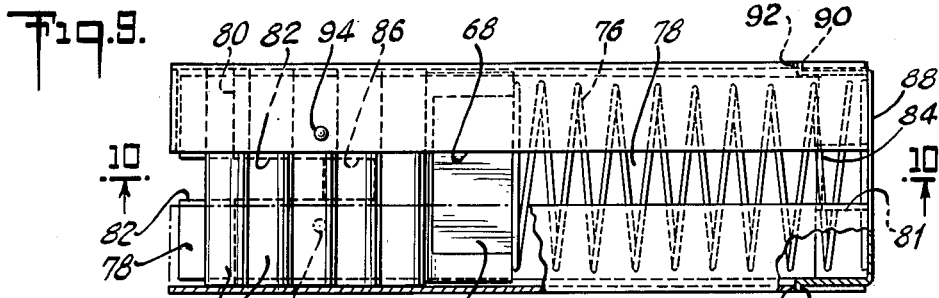
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SEMI-AUTOMATIC CRIMPING TOOL

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4 Sheets-Sheet 4



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SEMI-AUTOMATIC CRIMPING TOOL

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Application August 25, 1952, Serial No. 306,135

9 Claims. (Cl. 81—15)

This invention relates to hand tools for crimping electrical connectors of the type used for joining the ends of electrical conductors to provide an electrically conductive joint therebetween. Hand tools embodying the present invention can be used in a variety of different ways to crimp many different types of connectors. However, the utility of the present hand tool can be most conveniently pointed out by selecting a specific illustrative application for which it is especially useful. Accordingly the tool will be initially described in relation to its use with respect to a sleeve type connector such as that described in the copending application of George T. Ritter, Serial No. 242,850, filed August 21, 1951. A connector of this type is illustrated in Figure 14 of the drawings of the present application.

To effect a joint between two conductors with this type of connector the insulation is stripped from the ends of the conductors to predetermined distances that are proportioned to the wire sizes of the conductors, and the stripped ends are then inserted into the sleeve connector until they are in substantially abutting relation within the connector. Thereafter the connector is crimped with a suitable tool at several points to provide the joint illustrated in Figure 14. Referring to Figure 14 the center crimp 10 engages the stripped ends of the wires to provide an electrical connection therebetween and the two end crimps 12 engage the insulation of the conductors to provide a tight joint.

A hand tool of the general type to which the present invention relates commonly comprises a crimping head provided with one or more crimping molds, a plunger having one or more dies aligned with the molds of the crimping head, a pair of pivoted handles connected to the plunger and operable to force the plunger dies toward the molds to crimp a connector therebetween, and a magazine or the like containing a supply of blank connectors that can be fed to the tool for crimping. It has been previously proposed that such tools be provided with an automatic feed, that is, that they be so constructed that upon retraction of the plunger a connector blank is automatically fed into the path of the plunger and advanced thereby toward the molds of the crimping head. While such an automatic feed is useful for many applications, there are some cases where it is preferable to have a feed that may be called semi-automatic in the sense that feeding of the connectors is effected by manual manipulation of a part of the tool that operates independently of the plunger-operating handles. With such a semi-automatic feed, for example, the operating handles can be actuated a number of times to cause the plunger to re-crimp a given connector without having another connector blank fed into the path of the plunger to interfere with the re-crimping operation.

It is accordingly an object of the present invention to provide a magazine-type hand tool for crimping electrical connectors that is semi-automatic in operation and will permit re-crimping of a connector without feeding of a new connector blank. It is another object of the

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invention to provide a hand tool of this general type wherein connector blanks from a supply of such blanks can be fed into operative position for crimping by a simple manual operation as desired. It is a further object of the invention to provide an improved wire holder for holding a pair of conductors in proper position within a connector blank for crimping action by the hand tool. Other objects of the invention will be in part obvious and in part pointed out hereafter.

The many objects and advantages of the present invention can best be understood and appreciated by reference to the accompanying drawings which illustrate a hand tool incorporating a preferred embodiment of the present invention and wherein:

Figure 1 is a top plan view of the hand tool showing the crimping head and the toggle action of the operating handles;

Figure 2 is an elevation further showing the general organization of the hand tool;

Figure 3 is a perspective view of the crimping head with the upper portion thereof removed to show the manner in which the crimping dies of the plunger cooperate with the crimping molds of the crimping head;

Figure 4 is a vertical section taken substantially on the line 4—4 of Figure 1 and showing the plunger in advanced position and the location of the connector blank magazine just after it has been initially inserted in the hand tool;

Figure 5 is a view similar to Figure 4 showing the plunger and magazine in retracted position.

Figure 6 is a view similar to Figure 5 but with the magazine advanced to feed a connector for crimping;

Figure 7 is a view similar to Figure 6 showing a connector being crimped by the plunger, which is shown in its advanced position;

Figure 8 is a perspective view of the magazine showing its general organization;

Figure 9 is a top plan view of the magazine showing a number of connector blanks therein, the connector follower and the actuating spring of the magazine;

Figure 10 is a vertical section taken on the line 10—10 of Figure 9 further showing the relationship between the connector blanks, their follower and the actuating spring;

Figure 11 is a top plan view of the magazine slide that closes the discharge opening of the magazine prior to its insertion in the hand tool;

Figure 12 is a perspective view of the connector blank follower;

Figure 13 is a perspective view of the wire holder, and

Figure 14 is a perspective view of a typical connector crimped by the present hand tool.

Referring to the drawings and particularly to Figures 1 and 2, the hand tool there shown comprises a crimping head, generally designated 14, that is pivotally connected by the links 16 and 18 to the cooperating handles 20 and 22 respectively. The ends of handles 20 and 22 nearest the crimping head 14 are pivotally connected by a pin 24 to each other and also to a plunger 26 mounted for reciprocating movement within the crimping head 14.

Referring to Figure 3, the crimping head 14 is provided with a central crimping nest or mold 30 flanked by the crimping molds 32 and 34 on each side of the central mold. The end of plunger 26 nearest to the crimping molds is provided with corresponding dies which, when the plunger 26 is advanced toward the crimping molds, cooperate with the molds to crimp a connector therebetween. Mounted between the center mold 30 and the side molds 32 and 34 are a pair of ejectors 33 and 35 that are secured to plunger 26 and operate, when plunger 26 is retracted, to eject a crimped connector from the tool.

Reverting to Figures 1 and 2, the cooperating handles

20 and 22 support a ratchet mechanism 36 that prevents separating of the handles until after they have been closed to the extent necessary to crimp a connector, and an insulation stripper 38 that can be operated to cut and strip a predetermined length of insulation from an insulated conductor. The ratchet mechanism and insulation stripper can be of any suitable and known construction and may be, for example, constructed like the corresponding parts of the hand tool shown in the Klingler application Serial No. 254,117, filed October 31, 1951.

Extending over the top of the crimping head 14 and secured thereto there is a wire holder member 40, the configuration of which is best shown in Figure 13 of the drawing. Referring to Figure 13 as well as to Figures 1 and 2, the wire holder comprises a U-shaped frame 42 secured to the head 14 by rivets 44 and having a pair of forwardly extending arms 46 that extend past the crimping molds of the head 14 on either side thereof. Each of the arms 46 is provided with a slot 46a within which a conductor can be wedged to hold its stripped end properly positioned in a connector within the crimping head.

Referring now to Figure 4 of the drawings, mounted for sliding movement in a vertical bore 47 of plunger 26 there is a magazine actuating plunger 48 that is urged upwardly by a spring 50 interposed between the lower surface of plunger 48 and the bottom surface of the vertical bore 47. Plunger 48 is cut away at one side to form a narrow slot 54. A pin 56 is seated in plunger 26 and extends into slot 54 in such manner as to prevent rotation of plunger 48. Formed integral with the plunger 48 and extending upward therefrom there is a magazine retracting pin 58 having a sloping upper surface, the function of which will be described hereafter.

As indicated in Figure 3, overlying the plunger 26 there is a ramp-like member 60 which in Figure 3 is shown detached from the crimping head 14 but normally forms part of the crimping head. The ramp 60 is cut away to form a notch 62 that registers with the bore 47 of plunger 26 and receives the retracting pin 58 when plunger 26 is withdrawn. The width of notch 62 is less than the diameter of plunger 48 and hence the lower surface of ramp 60 (see Figure 4) provides a stop to limit upward movement of plunger 48.

The ramp 60 cooperates with the top and upper side portions of frame 42 of wire holder 40 to define a channel 64 that is constructed and arranged to receive a connector blank supply magazine. The construction of the magazine, which is generally designated by the numeral 66, is best shown in Figures 8 to 12 of the drawings. The magazine is of hollow, generally rectangular construction with a longitudinal slot 68 at its upper surface and a discharge opening 70 at its left hand end (as viewed in Figs. 8 to 12). As particularly shown in Figure 10, the magazine is adapted to contain a series of connector blanks 72 that are urged to the left by a follower 74 and a spring 76. Prior to use in the hand tool of the discharge opening 70 of the magazine is closed by a slide 78 that is constructed for sliding movement along the bottom wall 80 of the magazine.

Referring to Figure 11, the slide 78 is provided with a notch or slot 82 that cooperates with the retracting pin 58 in a manner described hereafter. At its other end, slide 78 has a downwardly extending lip 84 which (see Figs. 9 and 10) extends through an opening 81 in the bottom wall 80 of the magazine and helps in guiding and positioning the slide 78. The wall 80 of the magazine 66 is provided with a notch 86 having a shape similar to that of the notch 82 of slide 78. The rear end of the magazine 66 is closed by a spring clip closure member 88 (best shown in Fig. 8), which is removable to permit assembly and maintenance of the magazine, and has outwardly extending ears 90 that can be inserted in the openings 92 in the side walls of the magazine 66 to hold the end closure in place. As previously indicated the blanks are urged toward the discharge end of the

magazine by a spring 76 which bears against closure 88 at one end and at its other against follower 74. The configuration of the follower 74 is particularly shown in Figure 12. The top of the magazine 66 is provided with a pair of buttons 94 that cooperate with corresponding holes 96 (see Fig. 5) in the channel 64 to ensure proper positioning of the magazine when it is in its retracted position and also to retain the magazine within the channel 64.

The manner in which connector blanks are fed to the crimping molds for crimping is illustrated in Figures 4 to 7 of the drawings. Referring to Figure 4, the magazine is shown in this figure in the position it occupies when first inserted in channel 64 of the hand tool. As indicated in Figure 4, the plunger 26 is normally in its advanced position with handles 20 and 22 together when a full magazine is first inserted. As the magazine is inserted, retracting pin 58 engages notch 82 of slide 78 and restrains its against further movement to the left. Thus as the magazine approaches the position shown in Fig. 4, the slide 78 is in effect withdrawn to permit connector blanks to be fed from the magazine through discharge opening 70. With the parts positioned as shown in Fig. 4, the notch 82 of slide 78 is aligned with the notch 86 of the lower wall 80 of magazine 66.

When the magazine has been inserted the handles 20 and 22 are separated, whereupon plunger 26 is retracted and the retracting pin or finger 58 retracts the magazine 66 to the position shown in Fig. 5. As shown in Fig. 5, with the magazine in this position, buttons 94 engage the holes 96 in the magazine housing.

When the plunger 26 has been fully retracted, the magazine 66 is manually advanced to the position shown in Figure 6, whereupon a connector blank drops through the magazine discharge opening 70 into the path of plunger 26. The handles 20 and 22 are then brought together to position the connector blank against the molds 30, 32 and 34, the wires to be connected are inserted in the ends of the connector blank and also in the wire holder slots 46a, and the handles are pressed together to crimp the connector as indicated in Figure 7. As the plunger 26 advances from the position of Figure 6 to that of Figure 7, the pin 58 bears against the bottom 80 of magazine 66 and is depressed thereby against the action of spring 50 until it reaches the aligned notches 82 and 86, whereupon it moves upwardly to the position shown in Figure 7.

When the plunger 26 is again retracted, the magazine is withdrawn to the position shown in Figure 5. With the magazine in this position the plunger 26 can be advanced or retracted without feeding another blank from the magazine and thus the connector that is in crimping position can be recrimped, if desired, without interference due to feeding of a second connector blank.

From the foregoing description it should be apparent that the present invention provides a hand tool capable of achieving the several objects set forth at the beginning of the specification. A simple and effective manually operable means is provided for feeding connector blanks for crimping, and the mode of cooperation of the connector blank supply and other parts of the hand tool is such that the plunger can be fully retracted and advanced without feeding a second connector blank for crimping until it is desired to do so. Thus a given connector can be recrimped several times if desired before it is ejected from the tool.

It is, of course, to be understood that the foregoing description is illustrative only and that numerous changes can be made in the embodiment described without departing from the spirit of the invention as set forth in the appended claims.

What I claim as new is:

1. In a tool for crimping electrical connectors, in combination, a crimping head having one or more crimping molds therein, a plunger movably mounted in said head and having one or more crimping dies, each of which is

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positioned to cooperate with one of said molds to crimp a connector positioned in the path of said plunger, means for moving said plunger and associated dies toward and away from said molds and a magazine mounted on said head and adapted to hold a supply of connectors for crimping, said magazine being mounted for manual movement from an inactive position to a connector delivery position for delivery of a connector to be crimped into the path of said plunger and said plunger having a part engageable with said magazine to return said magazine to said inactive position when said plunger is retracted from said molds.

2. In a tool for crimping electrical connectors, in combination, a crimping head having one or more crimping molds therein, a plunger mounted for reciprocating movement in said head and having one or more crimping dies, each of which is positioned to cooperate with one of said molds to crimp a connector positioned in the path of said plunger, means for moving said plunger and associated dies toward and away from said molds and an elongated magazine mounted on said head with its axis forming an acute angle with the path of said plunger, said magazine being mounted for manual movement from an inactive position to a connector delivery position for delivery of a connector into the path of said plunger, and said plunger having a magazine retracting pin positioned to engage said magazine on retraction of said plunger to return said magazine to said inactive position.

3. A tool according to claim 2 and wherein said pin is slidably mounted in said plunger and is spring urged toward said magazine.

4. In a tool for crimping electrical connectors in combination, a crimping head having one or more crimping molds therein, a plunger movably mounted in said head and having one or more crimping dies, each of which is positioned to cooperate with one of said molds to crimp a connector positioned in the path of said plunger, means for moving said plunger and associated dies toward and away from said molds, and a magazine mounted on said head and adapted to hold a supply of connectors for crimping, said magazine being mounted for manual movement from an inactive position to a connector delivery position for delivery of a connector to be crimped into the path of said plunger, said magazine having a delivery opening located near the path of said plunger when said magazine is in its connector delivery position, an internal spring biased to urge said supply of connectors toward said delivery opening and a closure for said delivery opening, said plunger having a part engageable with said closure to open said closure when said magazine is initially moved from said inactive position to said connector delivery position.

5. In a tool for crimping electrical connectors in combination, a crimping head having one or more crimping molds therein, a plunger movably mounted in said head and having one or more crimping dies, each of which is positioned to cooperate with one of said molds to crimp a connector positioned in the path of said plunger, means for moving said plunger and associated dies toward and away from said molds, and a magazine housing mounted on said head with its axis forming an acute angle with the path of said plunger, said housing being adapted to receive a magazine containing a supply of connectors to be crimped and said plunger including a magazine retracting pin positioned to extend into said housing during at least a part of the movement of said plunger.

6. In a tool for crimping electrical connectors in combination, a crimping head having one or more crimping molds therein, a plunger movably mounted in said head and having one or more crimping dies, each of which is positioned to cooperate with one of said molds to crimp a connector positioned in the path of said plunger, means for moving said plunger and associated dies toward and away from said molds, a magazine housing mounted on said head with its axis forming an acute angle with the

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path of said plunger, a magazine adapted to hold a supply of connectors for crimping slidably mounted in said housing, said magazine being mounted for manual movement from an inactive position to a connector-delivery position to deliver a connector to the path of said plunger and said plunger having a part engageable with said magazine to return said magazine to said inactive position when said plunger is retracted from said molds, said housing and said magazine being provided with cooperating detent elements for retaining said magazine at said inactive position.

7. In a tool for crimping electrical connectors, in combination, a crimping head having one or more aligned crimping molds therein, a plunger movably mounted in said head and having one or more crimping dies, each of which is positioned to cooperate with one of said molds to crimp a connector placed in the path of said plunger, means for moving said plunger and associated dies toward and away from said molds, a magazine housing mounted on said head, a magazine slidably in said housing and adapted to mold a supply of connectors for crimping, said magazine having a delivery opening, an internal spring biased to urge connectors toward said delivery opening, a slotted closure for said opening and a slotted base, said magazine being manually slidable from an inactive position to a connector-delivery position for delivery of a connector through said opening to the path of said plunger, said plunger having a part positioned to extend into said housing and engageable with the slots of said closure and base, whereby initial movement of said magazine from its inactive to its connector delivery position retracts said closure to open said delivery opening and subsequent retraction of said plunger causes said part to engage said slotted base to return said magazine to its inactive position.

8. In a tool for crimping electrical connectors in combination, a crimping head having a plurality of aligned crimping molds therein, a plunger mounted for reciprocating movement in said head and having a plurality of crimping dies, each of which is positioned to cooperate with one of said molds to crimp a connector positioned in the path of said plunger, a pair of handles pivotally secured to said head and said plunger for moving said plunger and associated dies toward and away from said molds, a wire-holding member secured to said head and having a pair of wire-holding slots aligned with said molds and laterally spaced from said head, a magazine housing mounted on said head with its axis forming an acute angle with the path of said plunger, and a magazine slidable in said housing and adapted to hold a supply of connectors for crimping, said magazine having a discharge opening, a slotted closure therefor, a slotted base and an internal spring biased to urge connectors toward said delivery opening, said magazine being mounted in said housing for manual movement from an inactive position to a connector-delivery position, said plunger having a magazine retracting pin slidably mounted therein and a spring for urging said pin toward the base of said magazine, said retracting pin being positioned to extend into said housing during at least a part of the movement of said plunger and being engageable with the slots of said closure and base, whereby upon initial movement of said magazine to said connector delivery position said pin retracts said closure to open said delivery opening and upon subsequent retractive movement of said plunger said pin engages the slot of said base to return said magazine to its inactive position.

9. In a tool for crimping electrical connectors, in combination, a crimping head having one or more crimping molds therein, a plunger movably mounted in said head and having one or more crimping dies, each of which is positioned to cooperate with one of said molds to crimp a connector positioned in the path of said plunger, means for moving said plunger and associated dies toward and away from said molds and a magazine mounted on said

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head and adapted to hold a supply of connectors for crimping, said magazine being mounted for manual movement from an inactive position to a connector delivery position for delivery of a connector to be crimped into the path of said plunger and means operative upon retraction of said plunger for returning said magazine to said inactive position.

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