

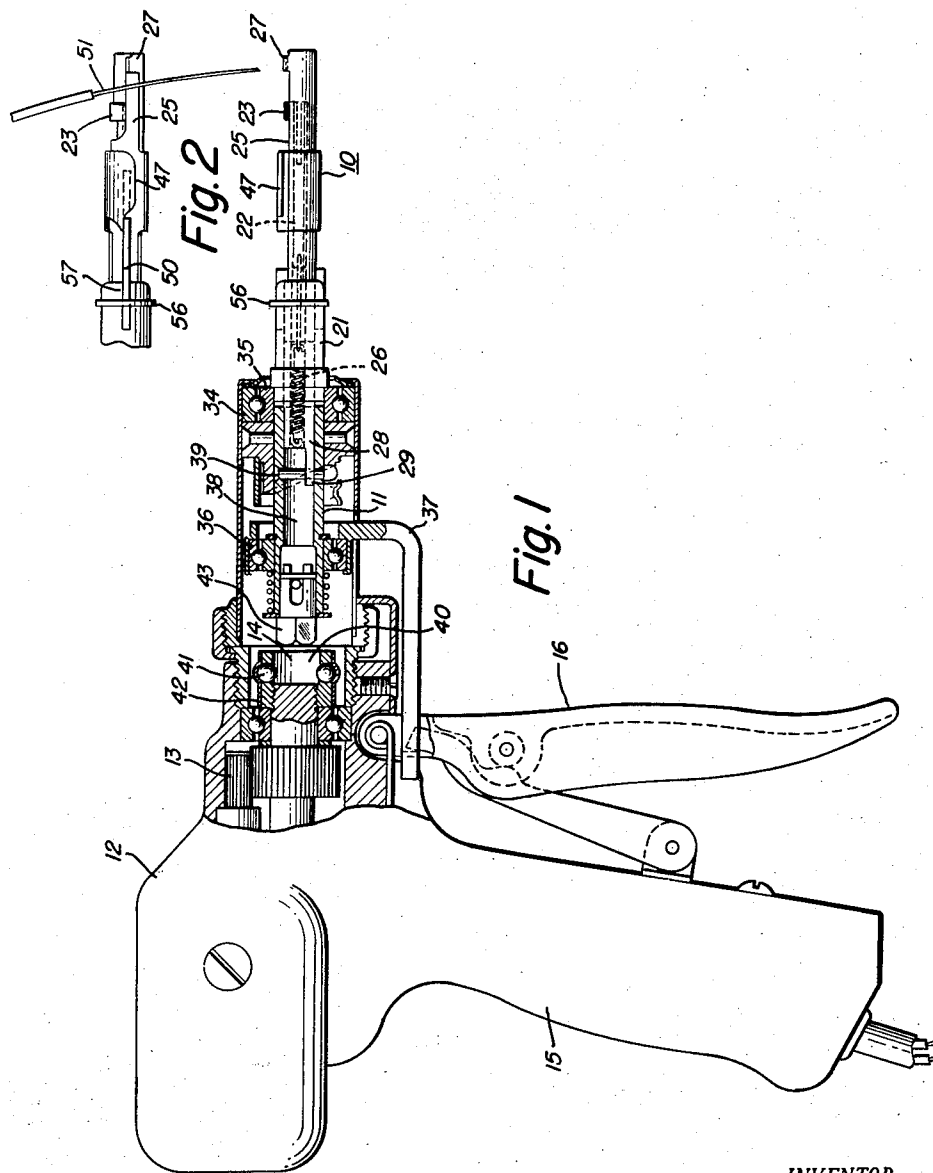
Nov. 24, 1959

W. A. BARNES
WIRE WRAPPING TOOL

2,914,261

Filed March 4, 1955

3 Sheets-Sheet 1



INVENTOR.
BY *William A Barnes*
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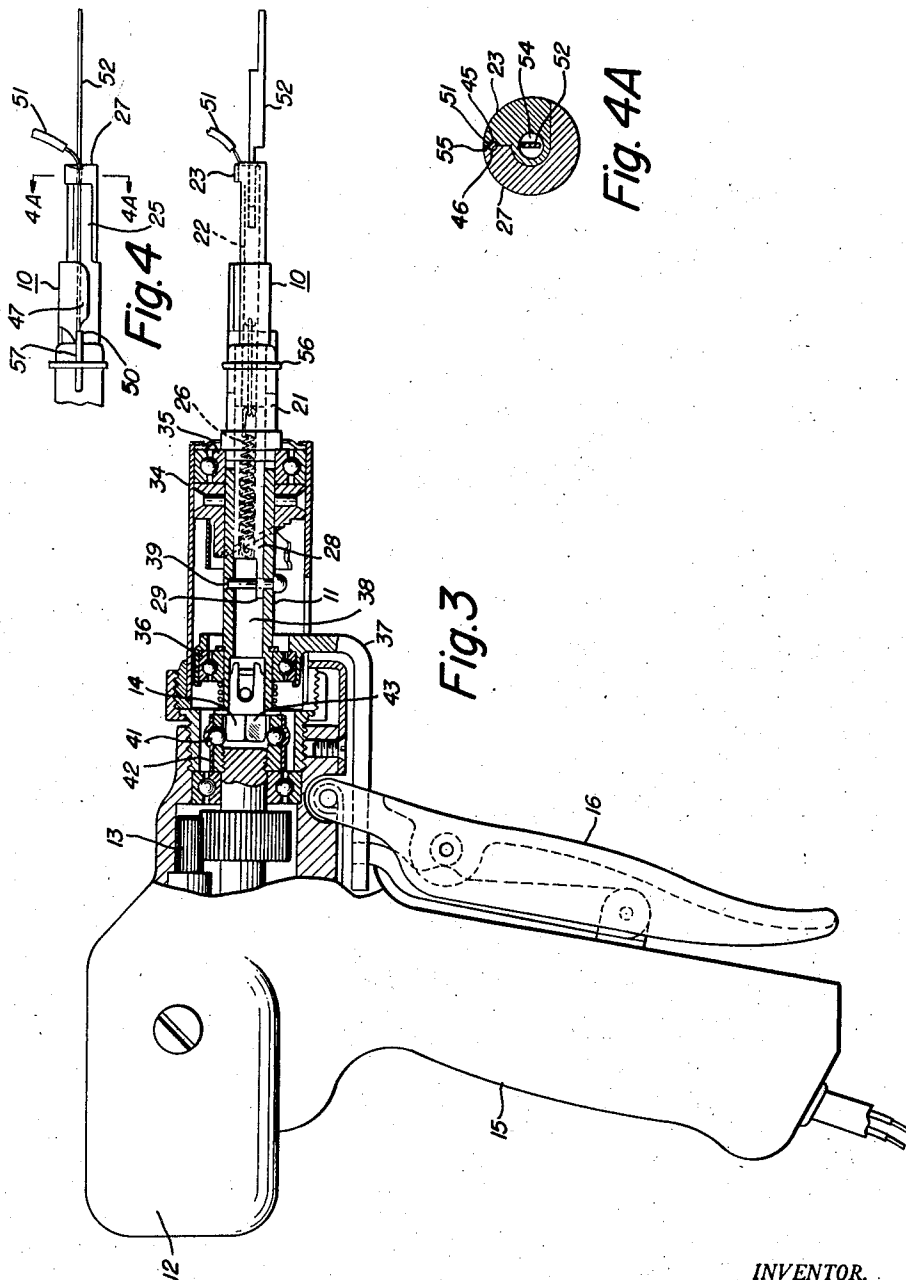
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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

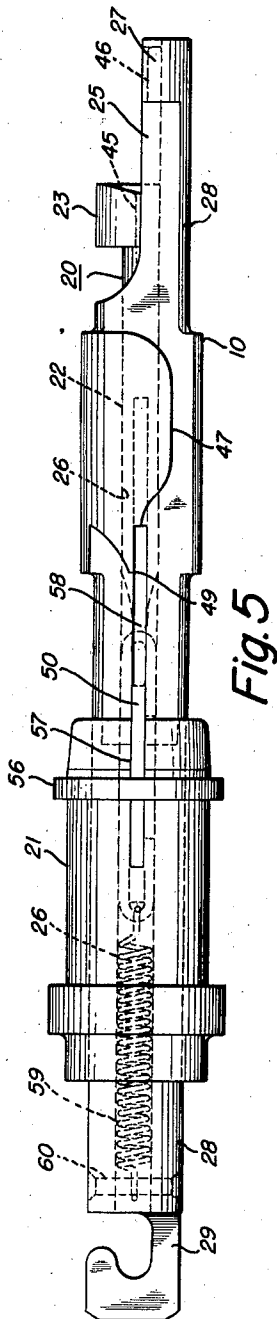


Fig. 5

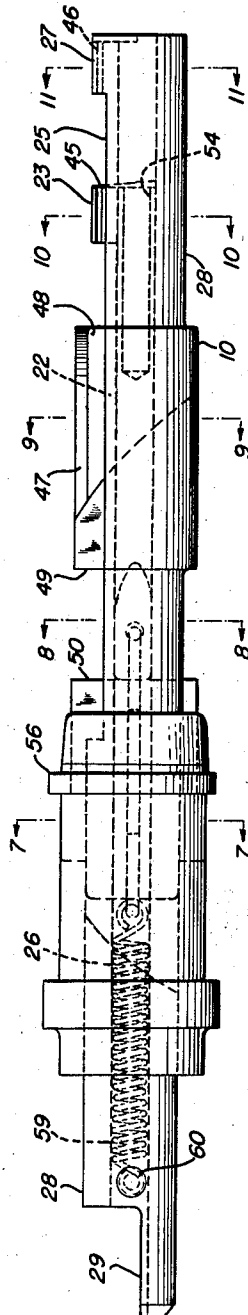


Fig. 6

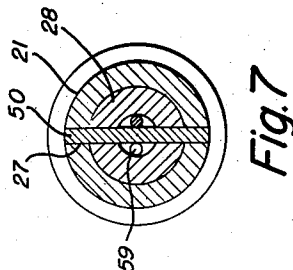


Fig. 7

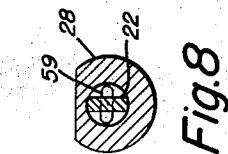


Fig. 8

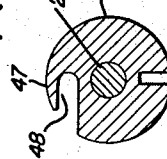


Fig. 9

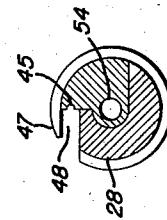


Fig. 10

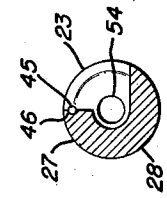


Fig. 11

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2,914,261

WIRE WRAPPING TOOL

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Application March 4, 1955, Serial No. 492,246

2 Claims. (Cl. 242-7)

This invention relates in general to wiring tools and more specifically to a tool for effecting solderless connections between connecting wires and terminals of the type used, for example, in electrical apparatus.

Attention is directed to Patent No. 2,826,920, issued March 18, 1958. This patent issued to the inventor of this device, and describes in some detail a retractive and rotation transmission which is suitable for use with the wire wrapping tool of this invention.

An object of this invention is to provide an improved bit for wrapping a wire around another object, such as a terminal.

Another object of this invention is to provide such bit with closable receiving socket means whereby the members to be loaded therein may be positioned and the sockets closed thereon, rather than to require inserting of the members into the sockets.

Another object of this invention is to provide a compound bit structure having a longitudinally reciprocable member which extends forward of the normal work position and is retractable therefrom to produce such socket closing operation, such retraction compensating for the normal human tendency to push a tool toward a work position.

Other objects and a fuller understanding of this invention may be had by referring to the following description and claims, taken in conjunction with the accompanying drawings, in which:

Figure 1 is a side view partially in section of a complete tool, including the improved bit of this invention, employed to wrap a wire around a terminal;

Figure 2 is a top view of the bit portion only as shown in Figure 1 and with a wire placed in the loading position;

Figure 3 is a view of the bit and spindle portion of the tool in the retracted position of the bit slide ready to perform the wire wrapping operation;

Figure 4 is a top view of the bit portion only, with the wire and terminal member in operative positions;

Figure 4A is a section taken along line 4A-4A of Figure 4;

Figure 5 is an enlarged top view of the preferred compound bit of the invention;

Figure 6 is an enlarged side view of the preferred compound bit of the invention; and,

Figures 7 to 11 are sectional views taken along the indicated section lines of Figure 6.

The construction of tools for effecting solderless connections between a wire and a terminal is illustrated by such patents as No. 2,649,121, issued to Frank Reck, August 18, 1953. This prior art device provides a motor driven construction with various features claimed by the inventor in that patent, but insofar as the bit portion is concerned, there is provided a fixed spindle having at its free end portion an opening such as a drilled hole longitudinally thereof for receiving the terminal of an electrical device such as that of a relay, for example, and having at its periphery a socket recess extending longi-

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tudinally thereof for receiving the end of the wire to be wound or wrapped around the terminal. Thus, the prior art teaches the use of a rotary shaft having a central opening and a laterally spaced opening which requires hand feeding of the wire and the terminal into the bit before the bit shaft begins the rotational winding operation. Such hand feeding requires considerable finger dexterity on the part of the operator, and accordingly requires considerable training and practice before the operator can become efficient. Furthermore, the threading of a fine wire into the equally small lateral opening provided for the wire is time consuming and tiring even for the skilled and trained operator. Likewise, it is the usual tendency for an operator to press forward with such a pistol grip tool and accordingly terminals are often bent or pushed out of their proper location by excessive pressing of the tool against the terminal.

The present invention illustrates a mechanism for rotatably driving a composite shaft bit, and for actuating the composite portions of the bit with respect to one another. The illustrated associated mechanism is shown as one means for operating the composite bit structure of this invention.

In the drawings the composite bit illustrating the principles of this invention is referred to by the reference character 10. A spindle 11 is employed to longitudinally shift and rotatably drive the bit 10. A motor is enclosed within the motor housing 12. The driving motor within the housing 12 may be electric or fluid as desired. A gear train 13 interconnects the motor with the spindle 11 through a releasable overload clutch 14. A pistol grip type of handle 15 is provided for ease in handling the tool, and the longitudinal shifting force is applied to the spindle 11 by means of a trigger lever 16. A separate switch, or a switch operated through movement of the trigger lever 16, may be employed to control energy to the motor device within the housing 12.

Referring to the Figure 5 of the drawings, the illustrated bit of this invention may be more readily observed. This improved bit embodies a longitudinally fixed but rotatable bed member 20 and a longitudinally reciprocable and rotatable slide 25. The bed 20 and the slide 25 cooperate to define a composite shaft of relatively movable sections rotatable about a longitudinal axis. In the illustrated embodiment of the invention, the bed member 20 is provided with a rotatable sleeve 21 with a stem 22 extending therefrom to a head end 23.

The slide member 25 has a longitudinal axial opening 26 therethrough to accept the stem 22 of bed member 20. The slide 25 has a stem portion 28 extending through the rotatable sleeve 21 of the bed member 20 to a head portion 27. A hook end 29 on the stem 28 provides for attachment of the stem 28 to a retracting means.

The construction of the bed member 20 is a functional feature contributing to the construction of the desired reverse closing feature wherein the bit retracts from a terminal in closing. As may be seen best in Figures 5 and 6, the stem 22 is a separate part from the sleeve 21. An anvil plate 50, more fully explained hereinafter, serves also as a locking key to hold bed 20 and slide 25 relatively non-rotatable, but longitudinally slidable. A clamp ring 56 holds plate 50 in a slot 57 in sleeve 21. A slot or keyway 58 in slide 25 allows longitudinal movement of slide 25 over plate 50, but prevents relative rotational movement. A spring 59 is attached to stem 22 and extends through sleeve 21 to a pin 60. The bed 20 and slide 25 are thus constrained to the normally open position illustrated in Figures 5 and 6.

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In the illustrated bit construction, the slide 25 is more massive than the bed 20. The parts are named for their respective sliding and stationary characteristics, rather than their appearance.

In the relaxed position of the bit 10 prior to beginning of the operation of the bit, the slide 25 is in an extended position as illustrated in Figure 2, wherein the head 27 thereof is longitudinally advanced beyond the head 23 of the bed 20. By providing a pulling force on the hook 29, the slide 25 is retracted to the position illustrated in the Figure 4, wherein the head members 23 and 27 are registered and form a work end of the composite shaft. In the retracted position as illustrated in Figure 4, the bit is functionally quite similar to the bit of the prior art Reck patent. As shown best in Figure 4A the composite bit provides a terminal receiving socket 54 opening longitudinally thereof for receiving the terminal of an electrical device such as that of a relay, for example. At the periphery of the bit there is a socket 55 opening longitudinally thereof for receiving the end of the wire to be wound or wrapped around the terminal. Thus, there is provided a terminal receiving socket opening from the work end inwardly of the shaft positioned on the axis of the bit shaft, and a wire receiving socket opening from the work end inwardly of the bit shaft laterally spaced from the axis. However, according to this invention and differing from the prior art Reck patent, the wire receiving socket 55 is defined by separate recess walls in the relatively movable head sections 23 and 27 of the bed and slide members. Recess walls 45 in head 23 and recess walls 46 in the head 27 are formed to mate in the retracted position of the slide member to define the wire receiving socket 55. Thus, instead of being required to feed a fine wire into a fine wire receiving opening, the operator can thread a wire into the bit of the present invention by laying the wire laterally across the bit between heads 23 and 27 and then retracting the slide 25 back to the registering position of the recess walls 45 and 46. Thus, lateral entrance into the socket 55 by a wire is provided and the socket is subsequently closed by movement of relatively movable parts upon the wire. Such method of loading the wire in the recess is considerably more easy and requires less practice than with a permanently formed socket member into which a wire must be carefully extended. In fact, the relative movement of the recess walls from the initial position into the aligned position will move the wire into correct placement position in the event that exact proper placement has not been accomplished before the movement is begun. On the other hand, threading of a fine wire into a socket recess requires very steady hands and keen eyesight. Repeated insertion of wires in such a recess throughout the day usually is quite deteriorating on such steady nerves and keen eyesight, with the result that efficiency decreases. The lateral loading provided by the present invention reduces weariness and error due to operator fatigue.

Another feature of the improved bit 10 is the provision of the overhanging guide surface portion 47 which produces a slot 48 substantially aligned with the longitudinal axis of the compositely defined recess 55. Thus, a further aid to guiding of the wire into the proper relationship with respect to the socket recess 55 is acquired, but a further advantage is obtained in that the wire is held against whipping when the actual winding operation is begun. Furthermore, the exact length of the wire portion extending into and through the recess 45 is important in that this length determines the amount of the wire wrapped around the terminal in the completed wrapped connection. Accordingly, the necessity for separate measurement of an exact length of a wire may be eliminated by providing a cutter edge 49 and a co-operating anvil 50 on the relatively movable slide and bed members. In the illustrated embodiment the cutter edge 49 is carried by the slide and the anvil by the ro-

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tatable sleeve 21 of the bed member. Reversal of these parts is, of course, a matter of choice. Further, the cutting action need not be an integrated part of the wrapping operation, and in fact is often used separately.

As thus far described, the improved bit of the present invention has been fully set forth. However, the general environment of the bit is further illustrated in the drawings in the provision of a housing 34 extending from the tool generally. This housing 34 carries a bearing 35 on the end thereof adapted to support the rotatable sleeve 21 for rotary movement and to hold the bed member 20 against longitudinal reciprocation. On the other hand, the spindle 11 is reciprocally mounted within the housing 34 upon a support arm 37 extending back to associated mechanism supporting the arm 37 and interconnecting the arm 37 with the trigger 16. Thus, the spindle 11 may be longitudinally reciprocated between the idle position shown in the Figure 1 of the drawings and the drive position shown in Figure 3 of the drawings. The spindle 11 carries a bearing 36 for rotatably supporting the spindle upon the arm 37.

There are various ways in which the spindle 11 may be brought to a stop in one fixed position of its rotation. The prior art Reck patent suggests one such method. In any event, there are means for bringing the spindle to a selected rotary position upon cessation of driving power. In view of the fact that the spindle can be brought to one fixed position, it is desirable that the bit be secured thereto and thus return to a given rotary position upon the release of driving power. Thus, the wire may always be inserted into the bit from the same relative position with respect to the tool in its entirety. However, it is desirable that the bit be removed from the tool for changing of bits to serve various size wires and for repairs. A socket 38 in the end of the spindle provides a unique and desirable means for attaching the bit 10 to the spindle. A pin 39 is extended laterally through the socket 38 in the spindle 11. The pin 39 is positioned off-center with respect to the cross section of the socket. The hook 29 is therefore placed at one side of the stem 28 and is dimensioned to pass through the socket 38 past the pin 39 on the side thereof that provides the greater area of clearance. Then the hook may be extended back of the pin and rotated to hook the hook 29 behind and around the pin. However, the dimension of the hook and the clearance space will not permit the hook to pass on the opposite side of the pin. Thus, the hook 29 can engage the pin 39 in socket 38 in only one relative position. Accordingly, when the spindle is brought to a stop in one fixed rotary position, the bit 10 will likewise always be in a given rotary position. Accordingly, the position of stopping may be selected to provide the most suitable access for insertion of the wire into the mating recess walls 45 and 46.

The reciprocable nature of the spindle 11 provides for the clutching of the drive mechanism for the invention. As illustrated, a clutch socket is provided with a plurality of ball members 41 radially around the socket 40. A spring 42 urges the balls 41 inwardly toward the center of the clutch socket 40. The spindle 11 is provided with a head member 43 of hexagonal shape very similar to the hexagonal head of a carriage bolt. Thus, the corners of the head 43 will engage the balls 41 and a driving force will be imparted from the power driven clutch socket 40 to the head 43. In the event that the driving force exceeds the maximum desired resistance, the balls 41 may pass over the corners of the hexagonal head 43 and drop into the land areas to relieve the overload and allow relative rotation between the driver and the driven parts.

In the Figure 4 of the drawings, a wire 51 and a terminal 52 are illustrated in the relative positions of the bit preparatory for wrapping of the wire 51 upon the terminal. The terminal member is a typical type of terminal employed in telephone and other electronic

work. The terminal is quite thin and flexible. Accordingly, it cannot be unduly mishandled. The operator is able to load the wire 51 into the bit 10 with exceptional ease as previously described, and furthermore, it has been found that the wire may be inserted into the tool and the relatively movable parts partially closed while the tool is lifted toward the terminal 52. Thus, there is a retraction of the end of the tool away from the terminal as the natural tendency of the operator exerts a force forward upon the tool toward the terminal. Such retraction of the slide 25 is both a psychological and an actual aid against ramming the tool too tightly upon the terminal 52.

Although the closable nature of the surface to form socket 55 is very desirable, the apparently simple feature of having the slide retract, rather than advance, must not be given less consideration. This retraction feature has been found to be fundamental to most successful operation. A retracting closing movement has proven to be surprisingly superior in efficiency and proper location of the beginning wrap of the wire for better connections.

Although the invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

I claim:

1. A wrapping device for winding wire upon a terminal, comprising, a holding and driving device, a composite bit having a longitudinal bed member rotatably carried by said holding device and extending therefrom, a slide member shiftable longitudinally relative to said bed member, said bed member having a forward end, said slide member having a forward end, said slide member having a retracted position wherein the forward end thereof and the forward end of the bed member define a work end of the bit, and having an advanced position wherein the forward end of the slide member is positioned forwardly of the forward end of the bed member, said bed member and slide member constituting a composite shaft rotatable about a longitudinal axis, a terminal receiving socket opening from said work end inwardly of said shaft on the said axis, a wire receiving socket opening from said work end inwardly of said shaft at a laterally spaced position from said axis, said wire receiving socket defined by separate external mateable recess walls in said bed and slide members, each of said separate recess walls being laterally accessible from the exterior of the bit, said mateable recess walls being longitudinally spaced in said advanced position of the slide member to provide lateral entrance of a wire thereinto, said mateable recesses being mated and defining said wire receiving socket in said retracted position of the slide member, whereby a wire may be positioned laterally into the area of the wire receiving socket and the wire receiving socket closed therearound by

shifting of the composite shaft components, and anti-whip guide surface means rearwardly of said work end aligned with said wire receiving socket.

2. A wrapping device for winding wire upon a terminal, comprising, a holding and drive device, said holding and drive device having a bit holder socket, drive means to rotatably drive said bit holder socket, a composite bit having a longitudinal bed member, a slide member shiftable longitudinally relative to said bed member, said bed member being non-reciprocally and rotatably bearing on said holding and drive device for rotary movement only with respect to said holding and drive device, a transverse pin through said bit holder socket at a position off-center thereof, a hook member on said slide member insertable into said bit holder socket and engageable with said off-center pin by passing thereby on the side thereof having the greater clearance space by reason of the off-center position, means to longitudinally reciprocate said bit holder socket and attached slide member with respect to said bed member, said bed member having a forward end, said slide member having a forward end, said slide member having a retracted position wherein the forward end thereof and the forward end of the bed member define a work end of the bit, and having an advanced position wherein the forward end of the slide member is positioned forwardly of the forward end of the bed member, said bed member and slide member constituting a composite shaft rotatable about a longitudinal axis, a terminal receiving socket opening from said work end inwardly of said shaft on the said axis, a wire receiving socket opening from said work end inwardly of said shaft at a laterally spaced position from said axis, said wire receiving socket defined by mateable recess walls in said bed and slide members, said mateable recess walls being longitudinally spaced in said advanced position of the slide member to provide lateral entrance of a wire thereinto, said mateable recesses being mated and defining said wire receiving socket in said retracted position of the slide member, whereby a wire may be positioned laterally into the area of the wire receiving socket and the wire receiving socket closed therearound by shifting of the composite shaft components.

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