

Oct. 31, 1961

J. R. BOS ET AL

3,006,563

TOOL FOR CONNECTING WIRES TO TERMINALS

Filed April 18, 1955

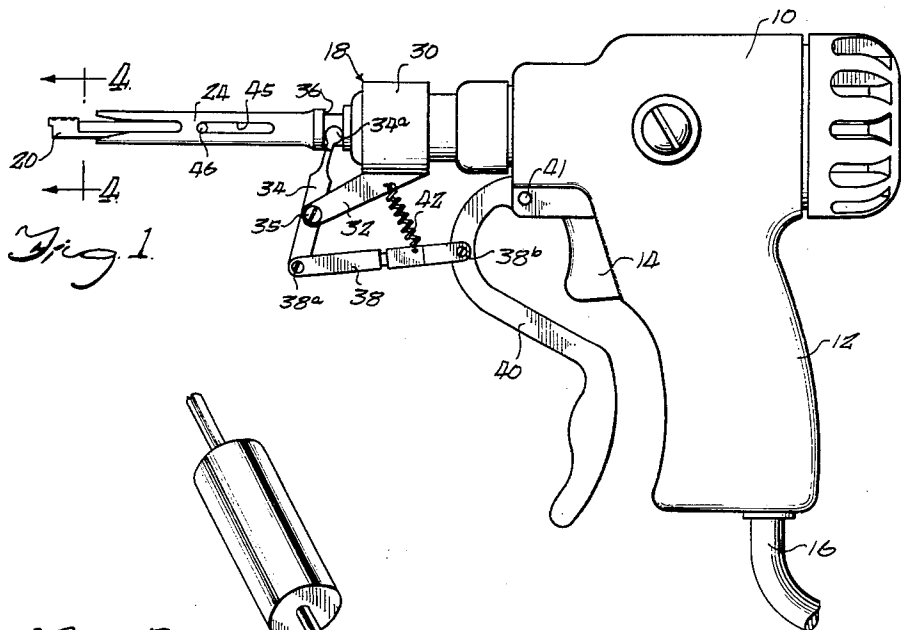


Fig. 1

Fig. 2

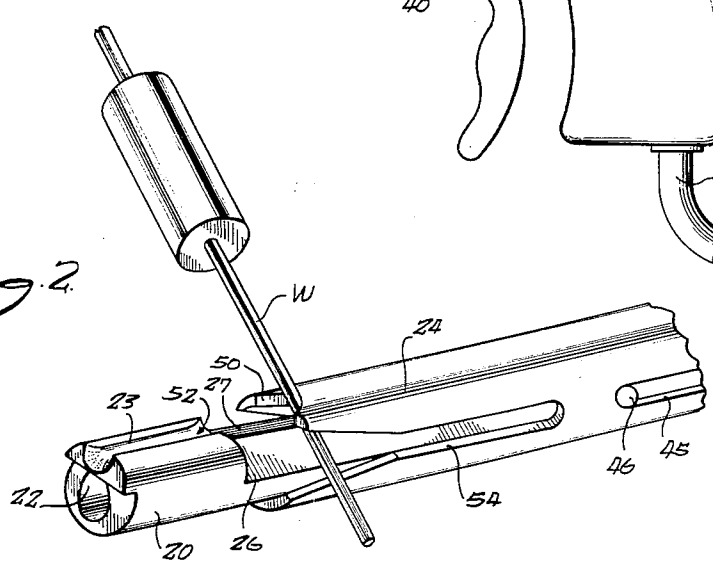


Fig. 3

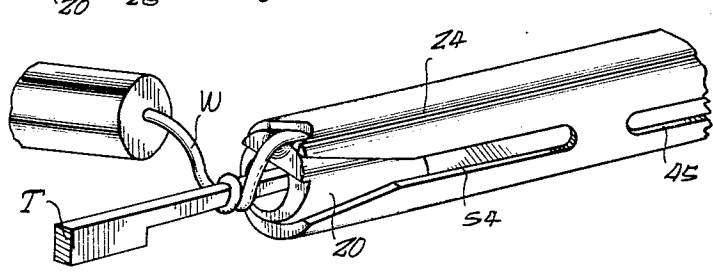


Fig. 4

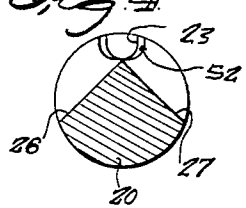
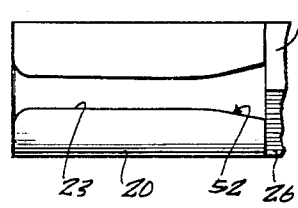


Fig. 5



Inventors
 John R. Bos
 Robert B. Shulteis
 By: Carlson, Pitzner, Hubbard & Wolfe
 Attorneys

1

3,006,563
**TOOL FOR CONNECTING WIRES
TO TERMINALS**

John R. Bos, Grand Haven, and Robert B. Shulters,
Spring Lake, Mich., assignors to Gardner-Denver Com-
pany, Quincy, Ill., a corporation of Delaware
Filed Apr. 18, 1955, Ser. No. 501,967
4 Claims. (Cl. 242—7)

The present invention relates generally to the effecting of a connection between a wire and an electrical terminal and more particularly to a tool which is operative to form such a connection by winding the wire helically in successive convolutions about and in intimate engagement with the terminal.

Tools of this general character conventionally include a rotary shaft or bit which is disposed within a guide or sleeve. The bit is provided adjacent its forward end with a longitudinal recess for the reception of the terminal and a radially-offset, longitudinally disposed groove for the reception of the wire so that the wire is wound about the terminal upon rotation of the bit. For an example of a tool incorporating such a device, reference is made to United States Patent No. 2,585,010 issued February 12, 1952, to Bell Telephone Laboratories, Incorporated, as assignee of C. N. Hickman et al.

In tools of the type shown in the afore-mentioned patent the external sleeve cooperates with the bit that is journaled therein so that the wire receiving groove formed in the bit is closed by the contiguous inner surface of the sleeve and only its forward end is open for the reception of the wire which is to be wound thereby. With such devices experience has shown that the actual insertion of wires into the wire receiving groove is a relatively delicate operation. As such it is time consuming.

Accordingly, it is the general object of the present invention to provide an improved tool for connecting wires to terminals in which insertion of the wire is facilitated to the end that the loading time is substantially reduced. A more specific object is to reduce the loading time of tools of the foregoing character by providing an improved construction and arrangement for positioning the wire which is to be wound by the tool by a mechanical rather than a manual operation.

The objects of the invention thus generally set forth together with other objects and ancillary advantages are attained by the construction and arrangement shown by way of illustration in the accompanying drawing, in which:

FIGURE 1 is a side elevation of a tool embodying the features of the present invention.

FIG. 2 is a perspective view, on an enlarged scale of the forward end portion of the tool shown in FIG. 1 illustrating the same in loading position.

FIG. 3 is a perspective view similar to FIG. 2, but illustrating the parts in operating position.

FIG. 4 is a transverse section taken substantially in the plane of line 4—4 in FIG. 1.

FIG. 5 is a fragmentary plan view of the forward end of the bit shown in the preceding figures.

While the invention is susceptible of various modifications and alternative constructions, there is shown in the drawings and will herein be described in detail one presently preferred embodiment, but it is to be understood that it is not thereby intended to limit the invention to the form disclosed, but it is intended to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

Referring more particularly to the drawing, there shown in FIG. 1 is a power operated tool for effecting a connection between a wire and a terminal. In general, this

2

exemplary tool includes a body 10 which is equipped with a pistol-grip type handle 12 mounting a triggerlike finger piece 14 by means of which power supply to the tool is controlled. The illustrative tool is of the type adapted for electrical operation and, suffice it to say for present purposes, it incorporates within the body 10 a rotary electrical motor to which electrical power is supplied by way of a suitable cable 16 attached to the tool at the base of the handle 12. In the illustrative tool the finger piece 14 is operatively associated with a switch (not shown) disposed within the handle 12 for controlling the application of electrical power to the motor that is disposed within the body 10.

At its forward end the tool terminates in a nose assembly, generally designated 18, which may incorporate suitable speed reduction gearing and a clutch mechanism for coupling the tool's motor to its wire winding bit 20.

As shown in FIG. 2, the bit 20 is provided with a longitudinal recess 22 for the reception of a terminal T about which a wire W is to be wound so as to effect an electrical connection therebetween. For purposes of illustration the wire W has been shown as comprising a pigtail lead such as is commonly employed as the means for connecting an electrical resistor, capacitor, or the like. It will be apparent to one skilled in the art that with connecting leads of this type, particularly when the lead from the other end of such a device has already been connected, usually space in which to work is limited, and it is frequently inconvenient to manipulate the device or its lead so that the lead can be inserted axially into the wire receiving groove 23 of the tool by means of which it is to be connected to the intended terminal.

In accordance with the present invention, therefore, the bit 20 and its cooperating sleeve 24 are especially formed so as to permit what might be termed side loading, as distinguished from axial insertion of the wire W into the groove 23. More particularly, the bit and the sleeve are constructed and arranged so that the wire W can be loaded into the tool by simply laying it across the bit and subsequent operation causes the wire to be automatically laid in the wire receiving groove of the bit by these elements.

In carrying out the invention, the sleeve 24 is mounted for relative longitudinal movement with respect to the bit 20 to the end that the forward end of the bit is exposed in one position of the sleeve and the bit is relieved intermediate its end to expose the rear end of the wire receiving groove. Further, the relieved portion of the bit and the sleeve are especially formed to define positioning surfaces to guide the wire W toward and to lay it in the wire receiving groove 23 of the bit.

As shown in the drawing, the bit 20 is of generally cylindrical form and the wire receiving groove 23 is formed longitudinally in its peripheral surface. Spaced inwardly from the outer end of the bit 20, the illustrative bit is relieved so as to define surfaces 26 and 27. These surfaces in the exemplary device are disposed at approximately 90° to each other and terminate along a radial plane which extends centrally through the wire receiving groove 23, the line of intersection being disposed adjacent the bottom of the groove 23. It will be seen in FIG. 4 that the surfaces 26 and 27 are respectively disposed at an angle somewhat greater than 90° from the groove 23.

It is apparent, therefore, that the wire W, if laid across one or the other of the positioning surfaces 26 or 27 is, when moved longitudinally outward along such surface, guided toward the wire receiving groove 23.

The sleeve 24 is normally positioned so that the surfaces 26 and 27 are exposed to receive the wire W, as shown in FIG. 2, and means is provided for moving the sleeve 24 longitudinally forward with respect to the bit 20

toward the operating position shown in FIG. 3. In the present instance, manually operable means has been provided for this purpose. As shown, the nose assembly 18 is equipped with a collar 30 mounting a stationary arm 32. A lever 34 is pivoted intermediate its ends at 35 on the outer end of the arm 32. The upper end 34a of the lever 34 is received in a peripheral channel 36 formed adjacent the rear end of the sleeve 24. To permit relative movement of the lever end 34a in the channel 36, the end 34a is rounded and adjacent the end 34a the lever 34 is relieved. This construction and arrangement permits free fore and aft rocking movement of the lever, which movement similarly causes forward and rearward movement of the sleeve 24 with respect to the bit 20. To produce such movement the lower end of the lever 34 is connected by means of a link 38 to a finger piece 40. At its upper end the finger piece 40 is pivotally connected to the body 10 at 41. The lower end of the finger piece 40 is formed and disposed for convenient manipulation by the fingers of an operator holding the illustrative tool. It will be seen from this construction and arrangement that a squeezing of the finger piece 40, so as to move its lower end toward the pistol-grip handle 12 of the tool, causes rearward motion of the lower end of the lever 34 by means of its connection thereto by the link 38, the latter being pivotally connected at 38a to the lever 34 and at 38b to the lever 40. Since it is desirable that the sleeve 24 be in retracted position with respect to the bit 20 when the tool is at rest so that the wire W can be readily inserted therein, a biasing spring 42 is provided. The spring 42 normally holds the lever 34 and the finger piece 40 in the position shown in FIG. 1, and thus is interposed in a tensioned condition between the stationary arm 32 and the link 38 adjacent the rear of the latter so that it exerts a pulling force thereon.

To guide longitudinal movement of the sleeve 24 with respect to the bit 20, the sleeve 24 is provided with a longitudinal slot 45 for the reception of a pin 46 which extends radially outward from the bit 20. Thus, it will also be seen that this pin and slot connection causes the sleeve 24 to rotate with the bit 20 when power is applied to the tool, such rotary movement of the sleeve 24 with respect to the lever 34 being permitted by the form of the connection 34a, 36 as previously described.

With the sleeve 24 in retracted position and the wire W laid upon the surface 26 or the surface 27, force applied to the finger piece 40, acting through the linkage 38, 34 causes forward movement of the sleeve 24 with respect to the bit 20. Thus, the forward end of the sleeve 24 engages the wire W and moves it toward the inner end of the wire receiving groove 23 in the bit 20. To guide the wire into the groove 23 the forward end of the sleeve is provided with a V-notch 50 located in aligned relation with the groove 23. Thus, upon forward movement of the sleeve 24 with respect to the bit 20 the wire W is engaged in the notch 50 and is guided toward the open rear end of the groove 23. To facilitate entry of the wire into the groove 23, the latter is provided with a slight outward flare adjacent its rear end as indicated at 52.

To permit the outer end of the wire W to extend beyond the bit so that its length need not be critically predetermined the sleeve 24 is provided with a longitudinal slot 54, the forward end of which is outwardly flared.

From the foregoing and upon reference particularly to FIGS. 2 and 3 of the drawings it will be seen that the loading of a tool embodying the features of the present invention is readily accomplished. The wire W is simply laid across the bit and against either the surface 26 or the surface 27 as may be convenient. The finger piece 40 is then squeezed with the result that the sleeve 24 is moved forwardly along the bit 20 and in so doing engages the wire W in the notch 50 and moves it toward the inner end of the slot 23. Further forward movement of the

sleeve 24 so that its outer end traverses the outer end of the bit 20 causes the wire W to be laid into the groove 23. The outer end of the wire W can project through the slot 54 and feeds therethrough into and through the groove 23 when the tool is applied to a terminal and the trigger 14 is operated to apply power to the tool so as to produce rotation of the bit. Thus the wire W is wound about and in intimate engagement with the terminal T, the wire being withdrawn completely from the groove 23 upon completion of the operation.

We claim as our invention:

1. In a tool for connecting a wire to a terminal the combination comprising a bit for winding the wire about the terminal and comprising a generally cylindrical member having a longitudinally disposed terminal receiving recess in the outer end thereof and having a longitudinally disposed wire receiving groove in its peripheral surface in the outer end thereof, said bit being transversely relieved to define two longitudinally disposed guide surfaces terminating along a line in a radial plane passing through said groove, the line of termination being located adjacent the bottom of said groove and said surfaces being disposed at an angle to said plane of greater than 90° measured from said groove, a sleeve disposed about said bit and mounted for relative longitudinal movement with respect thereto between a retracted position wherein said bit guide surfaces are exposed so that the wire can be laid across one of them and a forward position wherein the outer end of the sleeve overlies the outer end of said bit, means for moving said sleeve with respect to said bit, and means on said sleeve for engaging the wire and laying it in said groove as an incident to forward movement of the sleeve with respect to said bit.

2. In a tool for connecting a wire to a terminal the combination comprising a bit for winding the wire about the terminal and comprising a generally cylindrical member having a longitudinally disposed terminal receiving recess in the outer end thereof and having a longitudinally disposed wire receiving groove in its peripheral surface of the outer end portion thereof, said bit being transversely relieved to define a longitudinally disposed positioning surface intersecting a radial plane passing through said groove along a line adjacent the bottom of said groove at an angle of greater than 90° measured from said groove, a sleeve disposed about said bit and mounted for relative longitudinal movement with respect thereto between a retracted position wherein said bit positioning surface is exposed so that the wire can be laid thereacross and a forward position wherein the outer end of the sleeve overlies the outer end portion of said bit, and means for moving said sleeve with respect to said bit, said sleeve having a guide surface thereon for laying the wire in said groove as an incident to its forward movement with respect to said bit.

3. In a tool for connecting a wire to a terminal, the combination comprising, a bit for winding the wire about the terminal and comprising a generally cylindrical member having a longitudinally disposed terminal receiving recess in the outer end portion thereof and having a longitudinally extending wire receiving groove in the peripheral surface of said outer end portion, and extending axially thereof, said bit being transversely relieved intermediate its ends to define at least one longitudinally extending substantially planar guide surface intersecting a radial plane passing through said groove adjacent the bottom of said groove, a sleeve disposed about said bit and mounted for relative longitudinal movement with respect thereto between a retracted position wherein said substantially planar guide surface is exposed so that the wire can be laid thereacross and a forward position wherein the outer end of the sleeve overlies the outer end portion of said bit, and said sleeve having a guide surface on the forward end thereof for engaging the wire upon forward movement of said sleeve, said substantially

5

planar guide surface and said sleeve guide surface cooperating during the forward movement of said sleeve to guide the wire into and along said groove.

4. In a tool for connecting a wire to a terminal, the combination comprising, a bit for winding the wire about the terminal and comprising a generally cylindrical member having a longitudinally disposed terminal receiving recess in the outer end portion thereof and having a longitudinally extending wire receiving groove in the peripheral surface of said outer end portion and extending axially thereof, said bit being transversely relieved intermediate its ends to define at least one longitudinally extending substantially planar guide surface intersecting a radial plane passing through said groove adjacent the bottom of said groove, a sleeve disposed about said bit and mounted for relative movement with respect thereto between a retracted position wherein said substantially planar guide surface is exposed so that the wire can be laid thereacross and a forward position wherein the outer end of the sleeve overlies the outer end portion of said

5

10

15

20

25

30

35

40

45

50

6

bit, said sleeve having a guide surface on the forward end thereof for engaging the wire upon forward movement of said sleeve, said substantially planar guide surface and said sleeve guide surface cooperating during the forward movement of said sleeve to guide the wire into and along said groove, and said sleeve having a longitudinal elongated slot opening adjacent said guide surfaces for receiving and permitting outward projection of the portion of the wire beyond that received in said groove.

References Cited in the file of this patent

UNITED STATES PATENTS

2,655,953	Miloche	Oct. 20, 1953
2,682,063	Miloche	June 29, 1954
2,688,449	Haagensen	Sept. 7, 1954
2,696,656	Madden	Dec. 14, 1954
2,743,502	Reck	May 1, 1956
2,746,124	Belek	May 22, 1956