

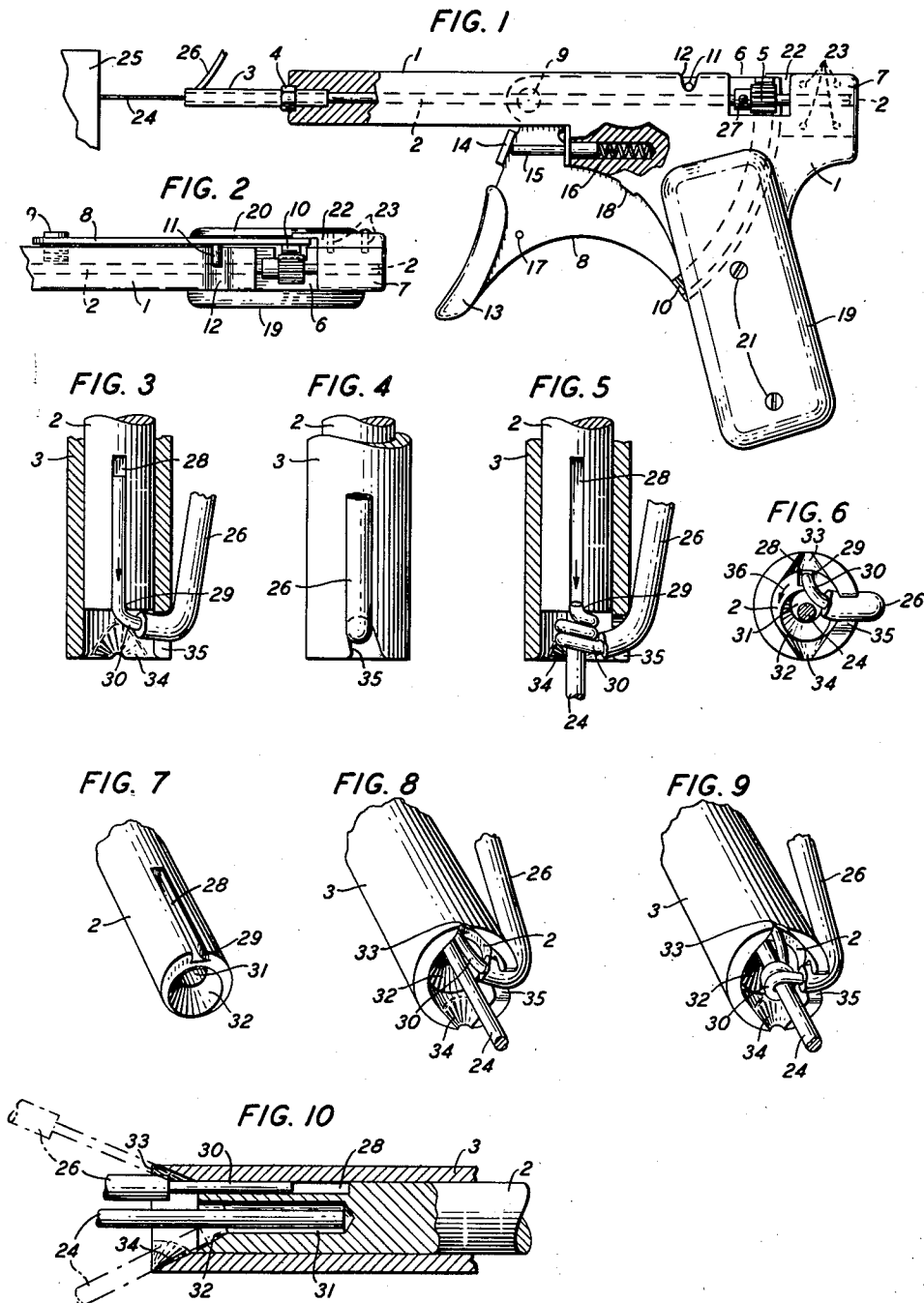
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C. N. HICKMAN ET AL

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WIRE CONNECTING TOOL

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INVENTORS: C. N. HICKMAN
R. F. MALLINA
F. RECK

BY *P. C. Smith*

ATTORNEY

UNITED STATES PATENT OFFICE

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WIRE CONNECTING TOOL

Clarence N. Hickman, Jackson Heights, Rudolph F. Mallina, Hastings on Hudson, and Frank Reck, Flushing, N. Y., assignors to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York

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4 Claims. (Cl. 140—122)

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This invention relates to tools for connecting wire to electrical terminals and is specifically directed to certain structural details thereof which effect advantageous functioning of such a tool.

According to the invention a hand tool is provided having a body member which houses a rotatable shaft. Means is provided associated with said body member and with said shaft for rotating said shaft. The operating or forward portion of said shaft is confined within a sleeve which is attached to said body member and which, among other functions, affords a sleeve bearing surface for said shaft. The forward portion of said shaft has an axial opening therein adapted to accommodate one end of an electrical terminal to which it is desired to connect a wire. It is not necessary, as will be appreciated by skilled persons from a reading of subsequent description, that the opening be exactly symmetrical with respect to the axis of the shaft. It is necessary only that such opening be substantially axial. A groove is provided in the surface of said shaft opening on the forward end thereof and extending along said shaft substantially parallel to said axial opening. The end edges, or one end edge, of said groove are, or is, purposefully made smooth or rounded in order to provide an edge over which a wire will readily slide without undue frictional obstruction. This groove is adapted to accommodate freely one end of the wire which is to be connected to said terminal. The forward end of said sleeve, which may extend beyond the forward end of said shaft, is provided with cut-out portions or notches or other suitable aperture or apertures, which aperture or apertures are used to secure the said wire against any substantial movement other than the wrapping thereof about said terminal by said tool. The end face of said shaft is provided with an offset countersink to facilitate the entry of said terminal into said axial opening. The inner end surfaces of said sleeve are beveled to facilitate the positioning of said wire and said terminal prior to entry thereof into respective groove and axial opening. The broad aspects of such a tool as briefly described above are disclosed and claimed in a copending application of H. A. Miloché, Serial No. 752,895, filed June 6, 1947.

Other advantageous structural features will be apparent from the subsequent detailed description of one embodiment of the invention. General descriptions of the various figures comprising the drawing, which is a part of this disclosure, are as follows:

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Fig. 1 is a side elevation of a pistol grip type of tool embodying features of this invention;

Figure 2 is a top view of the rearward, or handle portion of the tool shown in Fig. 1;

Figs. 3 through 10 are enlarged views of the forward end of such a tool as shown in Fig. 1 and are referred to in the subsequent description to illustrate various structural and functional aspects of the invention.

Referring to Figs. 1 and 2, an exemplary embodiment of the invention is disclosed as follows. A body member 1 has housed therein a rotatable shaft 2, the forward portion of which shaft 2 is provided with a sleeve bearing 3 which is rigidly fastened to the forward end of body member 1 by means of a soldered joint 4 or other well-known securing means. Near the rearward end of shaft 2 a pinion 5 is secured by means of set screw 27 to said shaft 2 and said pinion resides in a recess 6 in body member 1, the rearward end of shaft 2 being freely rotatable within the rearward portion 7 of body 1 as a bearing. A sector plate 8 is freely pivoted to body 1 at 9. This sector plate is provided with a rack 10 which cooperates with pinion 5, a stop pin 11 cooperating with slot 12 in body member 1, a finger grip 13, a projecting tang 14 cooperating with plunger 15 and a stop pin 17 cooperating with a stop surface 18 on body 1. Hand grips 19 and 20 are provided and are secured to body 1 by means of screws 21. Hand grip 20 assists in confining sector plate 8 against body 1 such that rack 10 will satisfactorily engage pinion 5. A spring 16, housed in a hole in body 1 urges the plunger 15 into the position disclosed in Fig. 1. A removable plate 22 is secured to the rearward portion 7 of body 1 by means of screws 23. Plate 22 assists hand grip 20 in confining the motion of sector plate 8. The normal position of sector plate 8 is as shown in Fig. 1 wherein stop pin 11 and slot 12 determine the normal rotary position of shaft 2 under the biasing action of spring 16 on sector plate 8. In Fig. 1 the tool is shown in operating position relative to an electrical terminal 24 of an electrical apparatus unit, such as a relay 25, and relative to a wire 26 to be attached to terminal 24.

The following discussion is directed to the structure and functioning of the combination shaft 2 and sleeve 3 on the forward or left-hand end of the tool of Fig. 1. It will be appreciated that when finger grip 13 is actuated in a manner similar to trigger action of a pistol that rack 10 will rotate shaft 2 by means of pinion 5. The direction of rotation of shaft 2 is de-

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terminated by the position of rack 10 with reference to pinion 5. In other words, referring to Figs. 1 and 2, if the rack 10 is on the back of pinion 5 (Fig. 1) or above pinion 5 (Fig. 2) the shaft 2 will, then rotated by operation of finger grip 13, rotate clockwise when viewed from the left of Figs. 1 and 2. The structure may very well be arranged such that sector plate 8 is confined by hand grip 19 instead of by hand grip 20 and thus be positioned such that rack 10 would be in front of pinion 5 (Fig. 1) or below pinion 5 (Fig. 2), whereupon, upon actuation of finger grip 13, shaft 2 would be rotated counterclockwise when viewed from the left of Figs. 1 and 2. In the following description with reference to Figs. 3 through 10 a direction of shaft rotation has been assumed as shown by arrow 36 of Fig. 6 and it will be readily appreciated that for the opposite rotation, such as would be consistent with Figs. 1 and 2, the horizontal dissymmetry of Fig. 6 would be reversed, with similar changes to the structure of others of Figs. 3 through 10.

Fig. 7 illustrates the configuration of the forward portion of shaft 2, an end view thereof being shown most clearly in Fig. 6 and other partial views being shown in Figs. 3, 4, 5, 8, 9 and 10. A slot or groove 28 is provided opening on the surface of shaft 2 and on the forward end thereof. The forward edge 29 of said slot 28 is rounded or beveled to permit the bare end 30 of wire 26 to slide thereover without undue frictional resistance. A circular substantially axial bore 31 in shaft 2 is provided on the end of shaft 2 with an offset countersink 32. The sleeve 3 provides a free bearing surface for shaft 2. The upper and lower inner end surfaces (see Fig. 6) of sleeve 3 are beveled or grooved at 33 and 34. The normal position of sector plate 8, and thus shaft 2, is arranged such that these beveled inner end surfaces 33 and 34 of sleeve 3 are vertically aligned with the offset countersink 32 and slot 28 of shaft 2 as shown in Fig. 6. On the right side of the end edge of sleeve 3 of Fig. 6, an aperture such as notch 35 is provided as a means of securing wire 26 against movement thereof during operation of the tool.

To use the tool the following procedure is preferred. Finger grip 13 is released to allow spring 16 to return sector plate 8 to normal, as determined by stop pin 11 and slot 12. This normal position of shaft 2 will align the bevels 33 and 34 with slot 28 and countersink 32 respectively (see Fig. 6). Wire 26 is now positioned such that the bare end 30 thereof is guided by means of bevel 33 in accordance with the dotted position of wire 26 shown in Fig. 10, into slot 28 to assume therein such a position as shown in Fig. 3. The insulated portion of wire 26 is now twisted about notch 35 of sleeve 3, similarly to the representation of Figs. 4 and 8. The tool is then moved to the apparatus, such as to relay 25, upon which is mounted an electrical terminal 24 to which wire 26 is to be connected. In order to facilitate the entry of terminal 24 into bore 31 of shaft 2, the tool is tilted to take advantage of the natural guideway created by bevel 34 of sleeve 3 and by countersink 32 of shaft 2. The tool is readily correctly positioned, as indicated by the dotted position of terminal 24 in Fig. 10, such that terminal 24 may be quickly inserted into bore 31.

Actuation of finger grip 13 will impart rotary motion to shaft 2 in the direction as has been assumed, of arrow 36 of Fig. 6 whereupon, since wire 26 is securely held in fixed position and

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since the bare wire 30 may easily slide over rounded edge 29 of slot 28, as shaft 2 rotates, the slot 28 will wrap bare wire 30 about terminal 24 as bare wire 30 slides out of slot 28. The stop pin 17 on sector plate 8 may be so positioned that it will engage stop surface 18 on body 1 after shaft 2 has made approximately three turns, as indicated by Figs. 5 and 9. The tool may now be disengaged from terminal 24 leaving wire 26 securely attached thereto in the form of a neat, tight spiral wrapping.

It will be apparent that bore 31 of shaft 2 may be arranged to accommodate flat, round, square or any cross-sectional configuration of terminal to which it is desired to connect a wire such as 26.

It is not intended that the scope of this invention be limited to the embodiments disclosed. Therefore, claims are appended which alone define the scope of this invention.

What is claimed is:

1. A hand tool for securing wire to electrical terminals comprising a body member housing a rotatable shaft therein, means for rotating said shaft, the forward portion of said shaft supported within a sleeve attached to said body member, said forward portion of said shaft provided with a substantially axial opening adapted to accommodate therein one end of an electrical terminal, said forward portion of said shaft also provided with a groove opening on the surface of said shaft and on the forward end thereof, said groove having a smooth forward edge and adapted to have inserted therein one end of a wire, the forward end of said sleeve providing holding means for said wire and guiding means for said wire and said terminal, said tool adapted when said shaft is rotated to hold said wire by said holding means and by means of said smooth forward edge of said groove to permit said one end of said wire to slide out of said groove while being secured about said one end of said terminal.

2. A hand tool for securing wire to electrical terminals comprising a body member housing a rotatable shaft therein, means for rotating said shaft, the forward portion of said shaft housed by a sleeve attached to said body member, said forward portion of said shaft provided with a substantially axial opening adapted to accommodate therein one end of an electrical terminal, said forward portion of said shaft also provided with a groove opening on the surface of said shaft and on the forward end thereof and located substantially parallel to said axial opening, said groove having a curved forward edge and adapted to have inserted therein one end of a wire, the forward end of said sleeve having an aperture therein to provide holding means for said wire and having its inner end surfaces formed to provide guiding means for said wire and said terminal, said tool adapted when said shaft is rotated to hold said wire to said forward end of said sleeve and by means of said curved edged groove to permit said one end of said wire to slide out of said groove while being wrapped about said one end of said terminal.

3. A hand tool for securing wire to electrical terminals comprising a body member housing a rotatable shaft therein, rack and pinion means for rotating said shaft, the forward portion of said shaft housed by a sleeve attached to said body member, the forward end of said sleeve extending beyond the forward end of said shaft, said forward portion of said shaft provided with a substantially axial bore adapted to accommodate therein one end of an electrical terminal,

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said forward portion of said shaft also provided with a slot opening on the surface of said shaft and on said forward end thereof and located substantially parallel to said axial bore, said slot having a rounded forward edge and adapted to have inserted therein one end of a wire, said forward end of said sleeve having an aperture in its periphery to provide holding means for said wire and having its inner end surfaces beveled to provide guiding means for said wire and said terminal, said tool adapted when said shaft is rotated to securely hold said wire to said forward end of said sleeve and by means of said round edged slot to permit said one end of said wire to slide out of said slot while being wrapped about said one end of said terminal.

4. A hand tool for securing wire to electrical terminals comprising a body member housing a rotatable shaft therein, manually operated rack and pinion means for rotating said shaft, the forward portion of said shaft circumferentially surrounded by a sleeve rigidly secured to said body member, the forward end of said sleeve extending beyond the forward end of said shaft, said forward portion of said shaft provided with a substantially axial bore adapted to accommodate freely therein one end of an electrical terminal, said forward portion of said shaft also provided with a slot opening on the surface of said shaft and on said forward end thereof and located substantially parallel to said axial bore, said slot having a rounded forward edge and adapted to have in-

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serted therein one end of a wire, said forward end of said sleeve having its periphery notched to provide holding means for said wire and having its inner end surface beveled to provide guiding means for said wire and for said terminal, said tool adapted when said shaft is rotated to securely hold said wire in fixed relation to said forward end of said sleeve and by means of said round edged slot to permit said one end of said wire to slide out of said slot while being wrapped spirally about said one end of said terminal.

CLARENCE N. HICKMAN.
 RUDOLPH F. MALLINA.
 FRANK RECK.

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