

[54] **WIRE WRAP TOOL**

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 195,252, Nov. 3, 1971, Pat. No. 3,756,522.

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[51] Int. Cl. **B21f 15/00**

[58] Field of Search .. 29/203 H; 140/118, 119, 122, 140/124; 242/7.06, 7.17, 7.18

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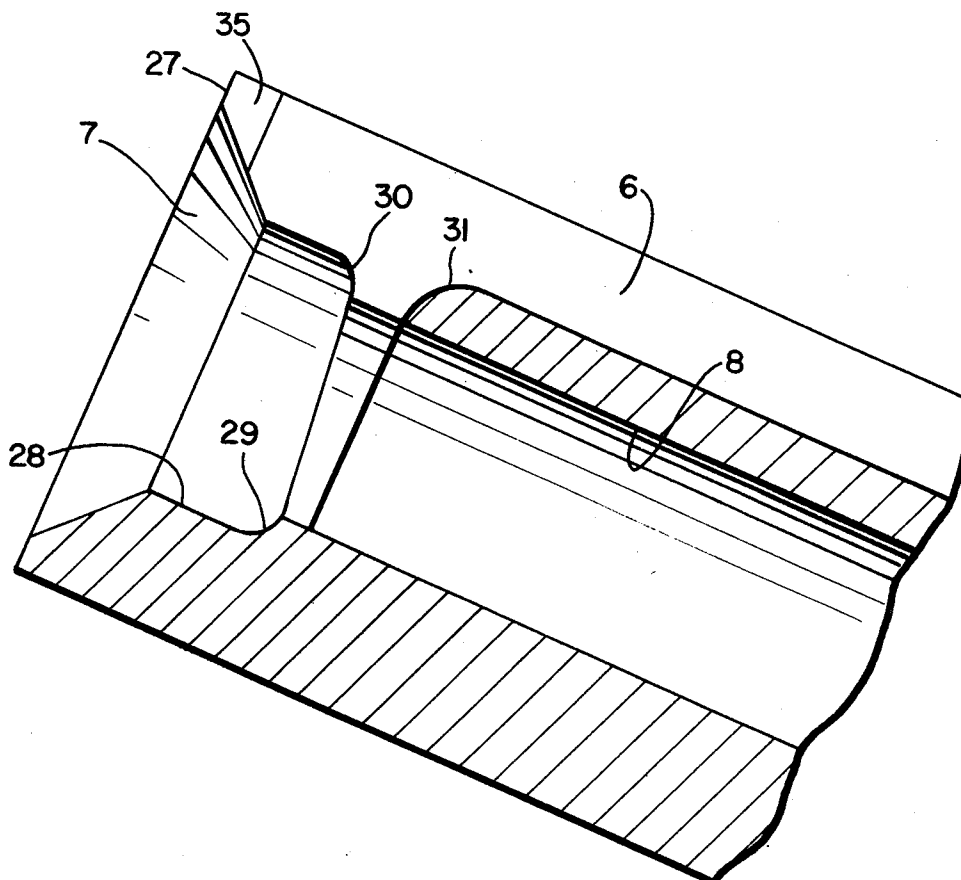
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[57]

ABSTRACT

A wire wrap tool having an elongated cylindrical bit with an aperture in the end thereof for receiving a terminal stud and a wrapping sleeve which telescopes on the bit to lock a length of wire thereon, the telescoping of the bit and sleeve being accomplished on the tool by either a pneumatic, mechanical or similar type mechanism. The area of the bit between the end of the bit and the aperture has a concave conical section and a cylindrical section.

7 Claims, 5 Drawing Figures



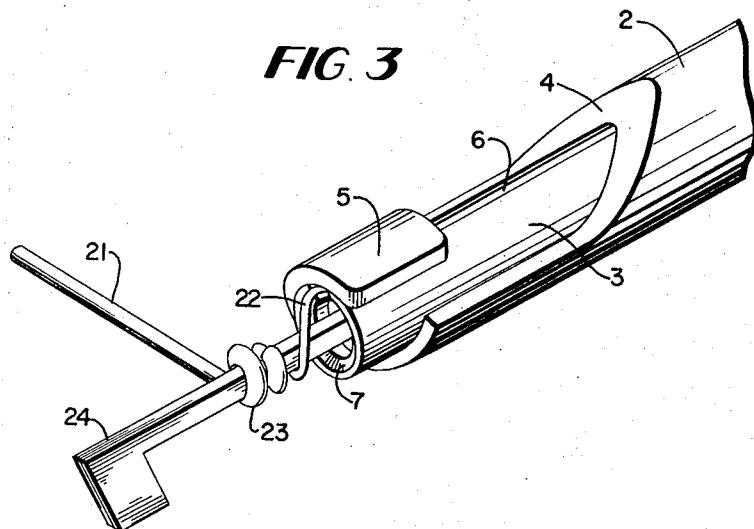
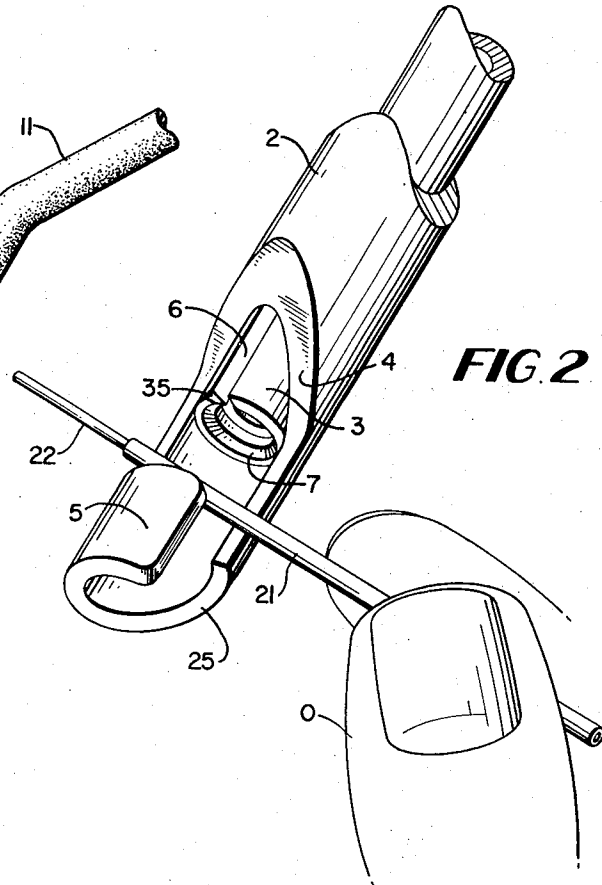
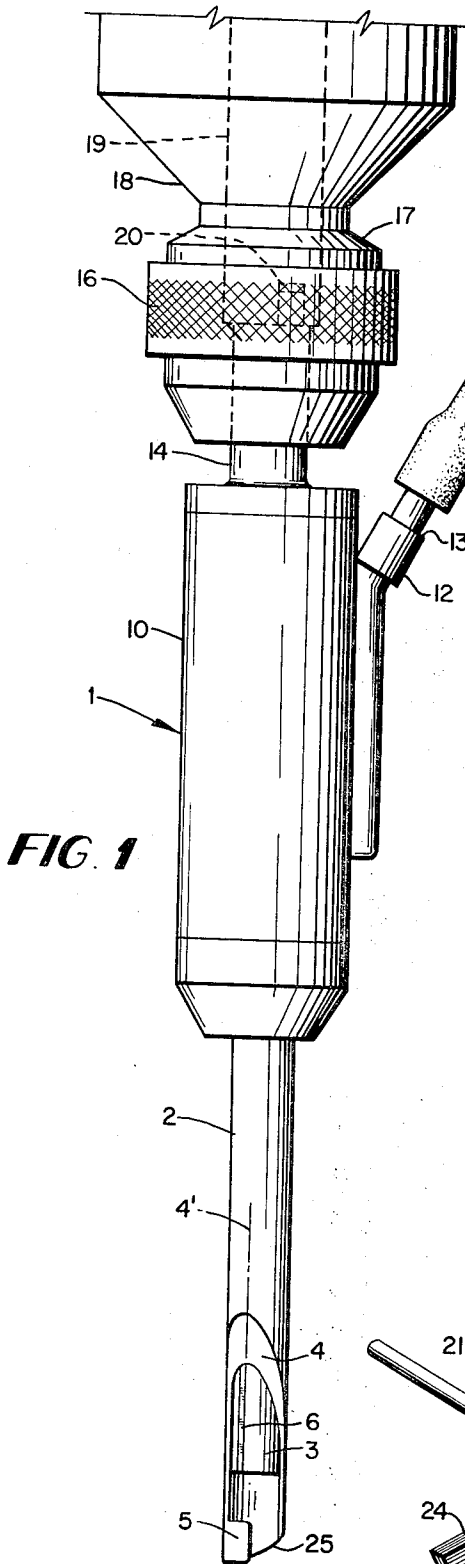


FIG. 4

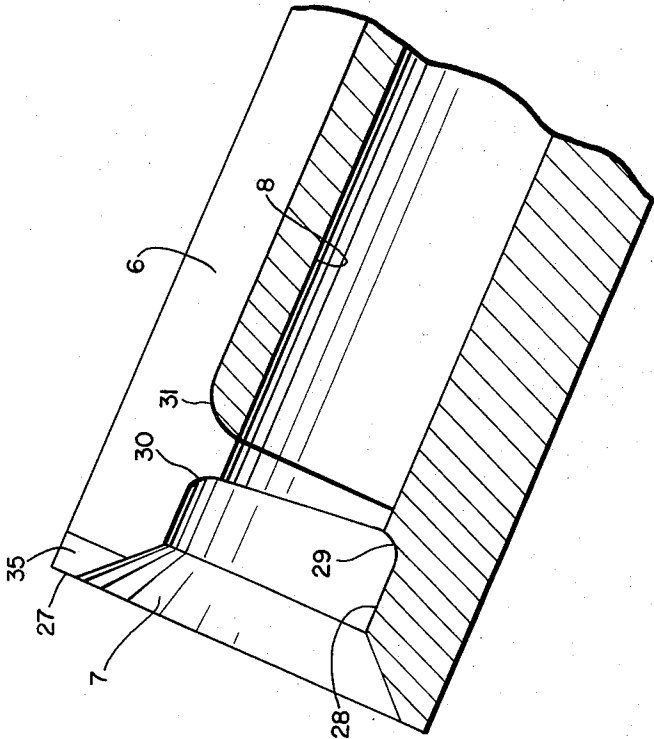
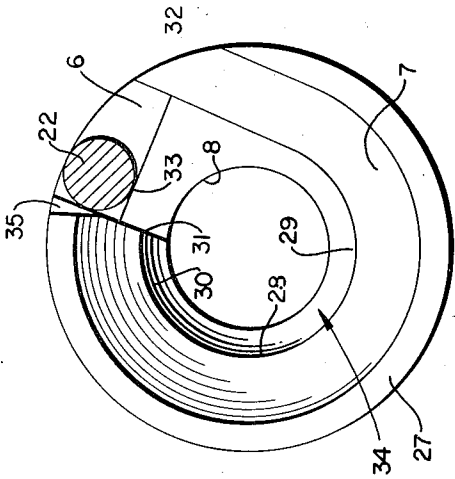


FIG. 5



WIRE WRAP TOOL

The present invention is a Continuation-in-Part of application Ser. No. 195,252, filed Nov. 3, 1971, now U.S. Pat. No. 3,756,522.

This invention relates to a wire wrapping tool for use by an operator in a manual, automatic or semi-automatic operation of wrapping wire leads around terminal studs and constitutes a further improvement of the tool shown and disclosed in my copending application Ser. No. 97,704 filed Dec. 14, 1970, now U.S. Pat. No. 3,701,367 and my copending application Ser. No. 62,825, filed Aug. 11, 1970, now U.S. Pat. No. 3,670,784 both entitled "Wire Wrap Tool" and the contents of those applications are hereby incorporated by reference.

In manufacturing electrical and electronic equipment, it is desirable to interconnect terminals and portions of equipment, for example, on printed circuit boards. This is usually done by wrapping the stripped ends of a measured length of insulated wire strand onto the terminals to form wrapped connections. Most wrapping machines and hand operated wrapping guns today are semi-automatic and such operations can be performed at relatively high speeds.

The instant wire wrap tool comprising this invention achieves a proper wrap while allowing an operator to achieve the proper wrap at a high speed. In previous wire wrap tools, e.g. for hand guns, the operator has had to thread the thin wire into a hole in the bottom of the wrapping tool which resulted in a slow rate of work since such an operation was similar to threading a needle.

The present invention overcomes the loading difficulties discussed and allows an operator to achieve a fast, proper wrap. The bit of the present invention has a convex wire bearing surface containing a relieved wire groove which merges with a wire slot and cooperates with a flange on the sleeve to securely and accurately hold the wire as it is being fed onto the stud as the tool rotates. The slot is of generally U-shaped configuration to properly support the length of the portion of the wire within the slot to insure the proper presentation of the wire to the bit. In other words, to guide the wire into position. The bit is relieved at the end of the slot and a countersunk area merges with the relieved area and the merger is further relieved. The stud to be wrapped is held in place by an axial hole in the end of the bit. The area between the end of the bit and the relatively smaller diameter hole contains a concave conical section and a relatively larger diameter cylindrical section. The concave section merges with the end face of the bit to form two end faces, i.e. a planar face and a concave face. The slot intersects both of these faces, the cylindrical section and the hole, with a beveled edge being provided at the intersection of the slot and the hole. The cylindrical section is slightly deeper in the area opposite the intersection with the slot. The junction between the larger cylindrical section and the hole is in section a curve. By means of this bit and sleeve structure, stud positioning is facilitated and thus improved operation of the wire wrap tool is obtained.

Either pneumatic, electrical, mechanical or other type of linkage providing controlled power can be used to shift the sleeve on the bit to lock the wire into position prior to applying it to a stud to be wrapped. This retraction mechanism can be actuated by the operator

pressing down on a foot pedal, thus causing the sleeve to retract and draw the wire into the wrapping tool. The operator does not have to accurately position the wire since, as the sleeve retracts onto the bit, it will automatically locate the wire in the proper position for presentation to a stud.

Accordingly it is an object of the present invention to provide a new and improved wire wrap tool.

A further object of this invention is to provide an improved wire wrapping tool for insuring proper presentation of the wire to the wrapping bit.

Another object of this invention is to provide a tool which does not necessitate the operator accurately locating the wire on the tool prior to presenting it to a stud to be wrapped.

A further object of this invention is to provide a wrapping tool by which high production rates and low operator fatigue can be achieved.

Another object of this invention is to provide a new and improved wire wrap tool with a sleeve and bit thereon whereby the operator, after he has located the wire within the sleeve, can actuate an improved retraction mechanism to accurately and automatically position the wire within the wrapping bit.

Still another object of this invention is the provision of an improved stud receiving orifice.

With these and other objects in view, reference is had to the accompanying drawings in which:

FIG. 1 is a side view of a tool within the scope of this invention showing the wrapping sleeve and bit and a pneumatic fitting for actuating the retraction mechanism;

FIG. 2 is a perspective view showing the method by which an operator places a wire to be wrapped into the operating end of the hand wire wrap tool;

FIG. 3 is a perspective view showing a wrap achieved by the operating end of a hand wire wrap tool;

FIG. 4 is a cross-section of the bit of the present invention;

FIG. 5 is an end view of the bit of the present invention.

Referring now to FIG. 1, there is shown a side view of the tool and retraction mechanism which forms a part of this invention, generally designated as 1. The tool includes sleeve member 2, a bit member 3 which is adapted to retract within sleeve member 2 and a retraction mechanism generally designated as 10. Sleeve member 2 is cut away as at 4 and has a flange generally designated as 5. Bit 3 has a groove 6 therein adapted to receive a wire as the sleeve member 2 retracts over bit member 3. Sleeve 2 has the end thereof cut at an angle toward the remainder of the unit in a direction away from flange 5. A complete description of the interaction between the end of the sleeve and bit members can be found in application Ser. No. 97,704 filed Dec. 14, 1970, now U.S. Pat. No. 3,701,367, and entitled "Wire Wrap Tool".

Retraction mechanism 10 has a pneumatic fitting 11 thereon terminating in a coupling member 12 which retains a hose fitting 13 on the end thereof. A hose H is fitted over the end of the nipple. Retraction mechanism 10 extends upwardly as at 14 and is engaged within a collet member 17 which may be tightened around portion 14 by an operative tightening knurled ring 16. The collet member 17 is attached to the end of a e.g. hand gun 18, the hand gun having a driving member designated as 19 which engages with the upper end 20 of an

extension portion of bit member 3. The driving member and upper portion of the bit member are shown in dotted lines in FIG. 1. Other attaching means for automatic or semi-automatic mechanisms may, however, be utilized.

As shown in FIG. 2, an operator designated as O grasps an insulated wire 21 having a stripped portion such as 22 extending therefrom and places it within the opening of flange 5 of sleeve member 2 and bit member 3. The sleeve and bit member in FIG. 2 are shown in the open position. As the sleeve member 2 retracts over bit member 3, the wire is forced by flange 5 to engage within slot 6 in the bit member. The bit member has a central aperture 8 thereon which is designed to accommodate a wire receiving stud or terminal and the end face thereof is countersunk as at 7 and has relatively larger cylindrical opening 28 thereon. FIG. 3 shows the end of the wrapping tool applying a wire wrap to terminal stud 24. The lead 22 is shown extending from bit notch 6 and wrapped as at 23 around the terminal stud along with approximately one and a half turns of the insulated portion of the wire.

The cross-sectional view of the bit of the present invention is shown in FIG. 4 and corresponds to the end view shown in FIG. 5. In the Figures, concave conical surface 7 of the bit end is shown in conjunction with the flat end surface 27. The concave conical face 7 merges into cylindrical cut, shown generally as 28, which has a varying depth. Curve 29 of the cylindrical section merger with wall 34 is the deepest point and is shown opposite groove 6. Curve 30 illustrates the shallowest portion of the cylindrical section. The curved surface formed by curves 29 and 30 forms the merger of the larger diameter outer cylindrical section 28 and stud positioning section 8. As can be seen, groove 6 is constructed so that beveled area 31 forms the intersection of the groove and liner cylindrical section 8. In addition, the end of groove 5 is cut-out slightly at 35 to provide ease of wire positioning.

In FIG. 5, wire 22 is shown in position. In addition, groove end cut-out 35 is shown. The wire rests on groove bottom 33 away from cut 32 which is tangential to larger cylindrical section 28. Also, the curved surface formed by arcs 29 and 30 is shown as 34 in FIG. 5.

With the aforescribed tool, faster loading with wire wrapping machines is possible. Previously, where the operator had to thread the thin wire into a hole in the bottom of the tool, the operator now merely has to position the wire in the general area of the end of the tool and the retraction of the sleeve over the bit effects proper positioning prior to wrapping. The operator, additionally, merely places the wire against the lip of the opening in the sleeve and e.g. depresses a foot pedal,

causing the sleeve to retract and draw the wire into the wrapping tool. This makes it much easier to correctly load a wire into the wrapping tool, resulting in less fatigue for the operator and a much faster and higher production rate.

It is also to be noted that the foregoing construction and arrangement is of a relatively simple form, requiring a minimum number of individual components and allowing for easy assembly. The tool is extremely rugged and, due to its relatively simple construction, may be made of minimum size for use in applications where space is at a premium. Furthermore, the tool may be completely power actuated, of simple manipulation and foolproof in operation, enabling use by unskilled operators with optimum results.

The bit of the present invention further is an improvement over prior bits in that the provision of the particular end and groove structure gives further improved operation.

While only one embodiment of the improved bit has been shown and described, it is obvious that many modifications and changes will occur to those of ordinary skill in the art without departing from the scope of the appended claims.

I claim:

1. In a wire wrap mechanism including a cylindrical slotted bit, a tubular sleeve member receiving said bit, sleeve retraction means, stud holding means in said bit, and means to wrap wire around a stud in said holding means, the improvement comprising a recess between the end of said bit and said stud holding means including first a conical section for guiding said stud into said stud holding means, and second a cylindrical section, said slot in said bit intersecting both of said conical and cylindrical sections and the diameter of said cylindrical section being sufficiently larger than the diameter of said holding means so as to receive said wrapped wire without contact.

2. The tool of claim 1 wherein the end of said bit and said conical section form two end faces.

3. The tool of claim 1 wherein said slot is cut out at the intersection with the end of said bit.

4. The tool of claim 1 wherein said cylindrical section varies in depth with its deepest section being opposite said slot.

5. The tool of claim 4 wherein the junction of said cylindrical section and said stud holding means is arcuate.

6. The tool of claim 1 wherein the junction between said slot and said stud holding means is beveled.

7. The tool of claim 1 wherein the end of said sleeve means adjacent said bit end contains a slot and flange means and is cut away at an angle away from said flange means.

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