This invention relates to wire wrapping guns, particularly bits thereof.

Conventional wire wrapping guns have motor driven shafts for driving rigid bits in stationary outer sleeves to wrap a length of wire about a terminal. With the one piece bit now used in our wire wrapping guns, the operator, being on piece work, sometimes has a tendency to withdraw the gun too soon thereby producing an open (defective) spiral wrap on the terminal. In such cases the end of the bit may be pressed against the wrap to close the spiral but this loosen the grip of the wire on the terminal leaving the connection defective. Conversely, if the bit is forced too hard against the terminal, the wire will be laid on in overlapping turns.

An object of the invention is to eliminate these difficulties by providing a bit for a wire wrapping gun which will cause the convolutions of the wire to be wrapped uniformly with even tightness on a terminal and to build up in the sleeve without changing the position of the gun.

In accordance with the object, the invention comprises a bit for a wire wrapping gun disposed in the stationary sleeve and composed of an inner member rotatably secured to the motor shaft and an outer member having spaced apertures respectively receiving a terminal about which a length of wire is to be wound and the length of wire, and means connecting the members of the bit so that they will rotate with the shaft and so that the outer member may be moved inwardly by convolutions of the inner member by convolutions of the length of wire wound on the terminal.

More specifically, the bit includes a hollow inner member which receives the inner end of the outer member and also a spring, normally urging the outer member into its starting or normal position, but compressible by the successive convolutions of the wire wound on the terminal to permit the component and terminal to be held against movement and a portion of the wire to remain in a starting groove of the sleeve while the complete winding of the length of wire takes place in the sleeve. The spring further serves to move the outer member of the bit outward its normal position at the completion of the winding operation.

Other objects and advantages will be apparent from the following detailed description when considered in conjunction with the accompanying drawing wherein:

FIG. 1 is an enlarged longitudinal sectional view of a wire wrapping gun embodying the invention illustrating the relative positions of the bit during a winding operation; and

FIG. 2 is a smaller longitudinal sectional view of the gun and bit.

In the present embodiment of the invention, a suitable wire wrapping gun, indicated generally at 10, having a motor shaft 11 disposed in a housing 12, has an offset portion 14 adapted for interengagement with a wire wrapping bit. A sleeve 15 removably fixed to the housing 12 has a reduced portion 16 with a cylindrical shape. The face 17 of a determined diameter. A notch 18 is formed in the outer end of the sleeve to receive the starting portion of a stripped or bared length 19 of an insulated wire 20 to be wound about a terminal 21 of a component, not shown.

The bit, indicated generally at 23, has an inner member 24 formed with an offset member 25 for interengagement with the offset member 14 of the motor shaft 11 to provide a positive connection with the motor shaft. A retaining ring 26, mounted in an annular groove 27 of the inner member 24 and positioned adjacent an inner end 28 of the sleeve 15, serves to maintain interconnection between the inner member 24 of the bit and the motor shaft 11.

The inner member 24 is hollow or has an axial aperture 29 to receive an inner end 30 of an outer member 31. A pin 32, extending through the inner end 30 of the outer member 31, has its ends slidable disposed in diametrically opposed elongated apertures 33 of the inner member 24 serving, when the pin is at the extreme right, to locate the outer member 31 in its normal or starting position and to maintain driving connection between the members at all times. A spring 34 disposed in the aperture 29 of the inner member and exerting its force against the inner end of the outer member, holds the outer member in its normal position but permits the outer member to move inwardly as convolutions 36 of the wire 19 are formed on the terminal 21.

The inner portion of the outer member 31 is reduced in size at 38 for the major portion of its length to minimize frictional contact with the inner surface 17 of the sleeve, but the outermost portion 39 is enlarged to engage the surface 17 to eliminate vibration of the terminal. To bring about accurate wrapping of the wire about the terminal. This portion of the bit has a central aperture 40 for the terminal 21 and a smaller aperture 41 for the wire, the smaller aperture, in the present instance, being a longitudinally extending groove of a length sufficient for the length of wire 19 to be wound on the terminal. In this instance, the inner surface 17 of the sleeve closes the groove to provide a controlling aperture in the bit for the wire. The bit is also provided with a groove 42 in the outer end thereof connecting the apertures 40 and 41, the groove being enlarged at 43 to assist in forming the convolutions about the terminal and to assure a controlled tight wrapping of the convolutions of the wire thereon.

**Operation**

During each operation of the gun with the bit therein, it will be apparent that at the start of each operation, the outer member 31 of the bit will be in its normal position, shown in FIG. 2, ready to receive a terminal 21 in the aperture 40 and a length of wire 19 in the aperture 41. Prior to the starting operation of the gun, the length of wire 19 and 20 is fed into the aperture 41 and a portion of the wire 20 is located in the groove 18 where it may be held without disturbance during the winding operation. The force embodied in the spring 34 is sufficient to return the member 31 of the bit to its normal position, but is insufficient to prevent movement of the outer member 31 inwardly during the forming of each convolution of the wire 19 about the terminal, until the winding operation has been completed. Through this action, the convolutions may be formed more accurately securely in that there are various guiding means for the terminal, one, the aperture 40, another the forming portion 43, the groove 18, assisting uniform winding of the convolutions on the terminal under uniform wrapping pressure and preventing the terminal from being tilted which would result in uneven windings of the convolutions of the wire thereon.

When one winding operation is completed, the insulated portion of the wire may be released and the wound terminal may be removed from the gun or the gun moved free of the wound terminal. This action is followed by the return of the outer member 31 by the spring 34 to its normal position.

It is to be understood that the above described arrangements are simply illustrative of the application of the principles of the invention. Numerous other arrange-
ments may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. A bit for a wire wrapping gun having a motor shaft and a stationary sleeve having an open outer end, the bit comprising an inner member disposed in the sleeve and having one end thereof removably fixed to the motor shaft, an outer member disposed in the sleeve and having spaced apertures positioned in an outer end thereof to respectively receive a terminal, about which a length of wire is to be wound, and the length of the wire, and means connecting the outer member to the inner member so that they will rotate with the shaft and so that the outer member may be moved inwardly axially of the inner member by convolutions of the length of wire wound on the terminal.

2. A bit for a wire wrapping gun according to claim 1 in which power means is actuable to force the outer member outwardly to a starting position thereafter for the length of wire is wrapped on the terminal.

3. A bit for a wire wrapping gun having a motor shaft and a stationary sleeve having an open outer end, the bit comprising an inner member disposed in the sleeve and one end thereof removably fixed to the motor shaft, an outer member disposed in the sleeve and having spaced apertures positioned in an outer end thereof to respectively receive a terminal, about which a length of wire is to be wound in spiral convolutions, and the length of wire, adjacent ends of the members disposed in telescoping relations with each other, means interconnecting the members to cause rotation of the members simultaneously with the shaft and to allow axial movement of the outer member from a starting position relative to the inner member by convolutions of the length of wire wound on the terminal.

4. A bit for a wire wrapping gun according to claim 3 in which a spring is carried by the inner member and is positioned to be compressed by movement of the outer member during wrapping of the convolutions away from its starting position to return the outer member to its starting position after the length of wire is wrapped on the terminal.

5. A bit for a wire wrapping gun according to claim 4 in which a wire guide interposed between outer ends of the apertures in the outer member wraps the length of wire about the terminal.

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