

United States Patent

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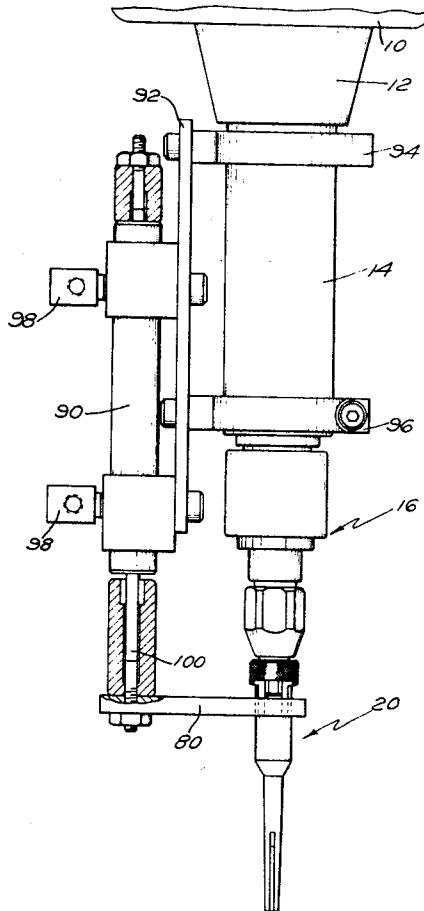
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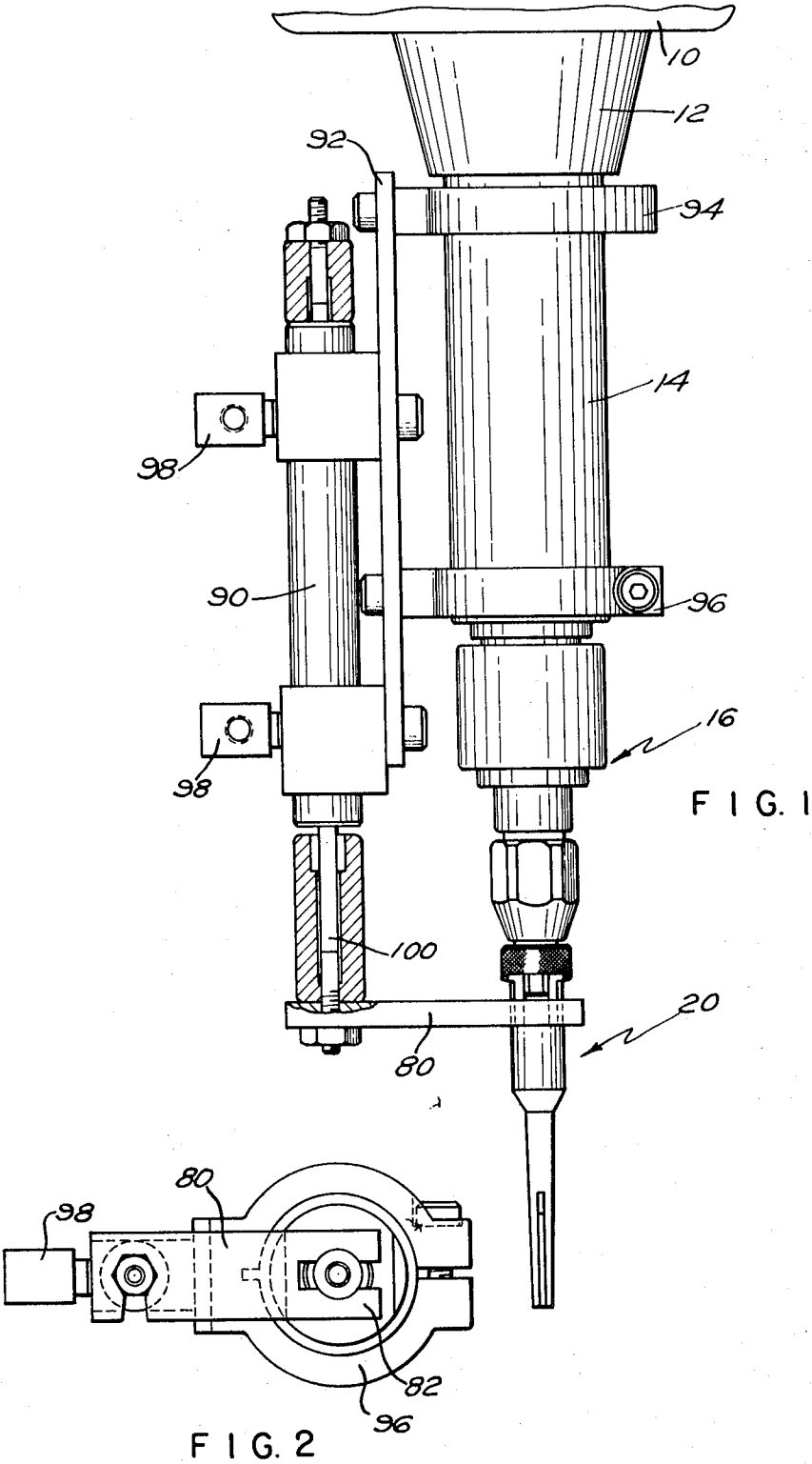
[54] WIRE-WRAPPING TOOL
4 Claims, 9 Drawing Figs.

[52]	U.S. Cl.	140/124, 242/7.17
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[50]	Field of Search	140/115, 122, 124; 29/203; 242/7.06, 7.17, 7.18

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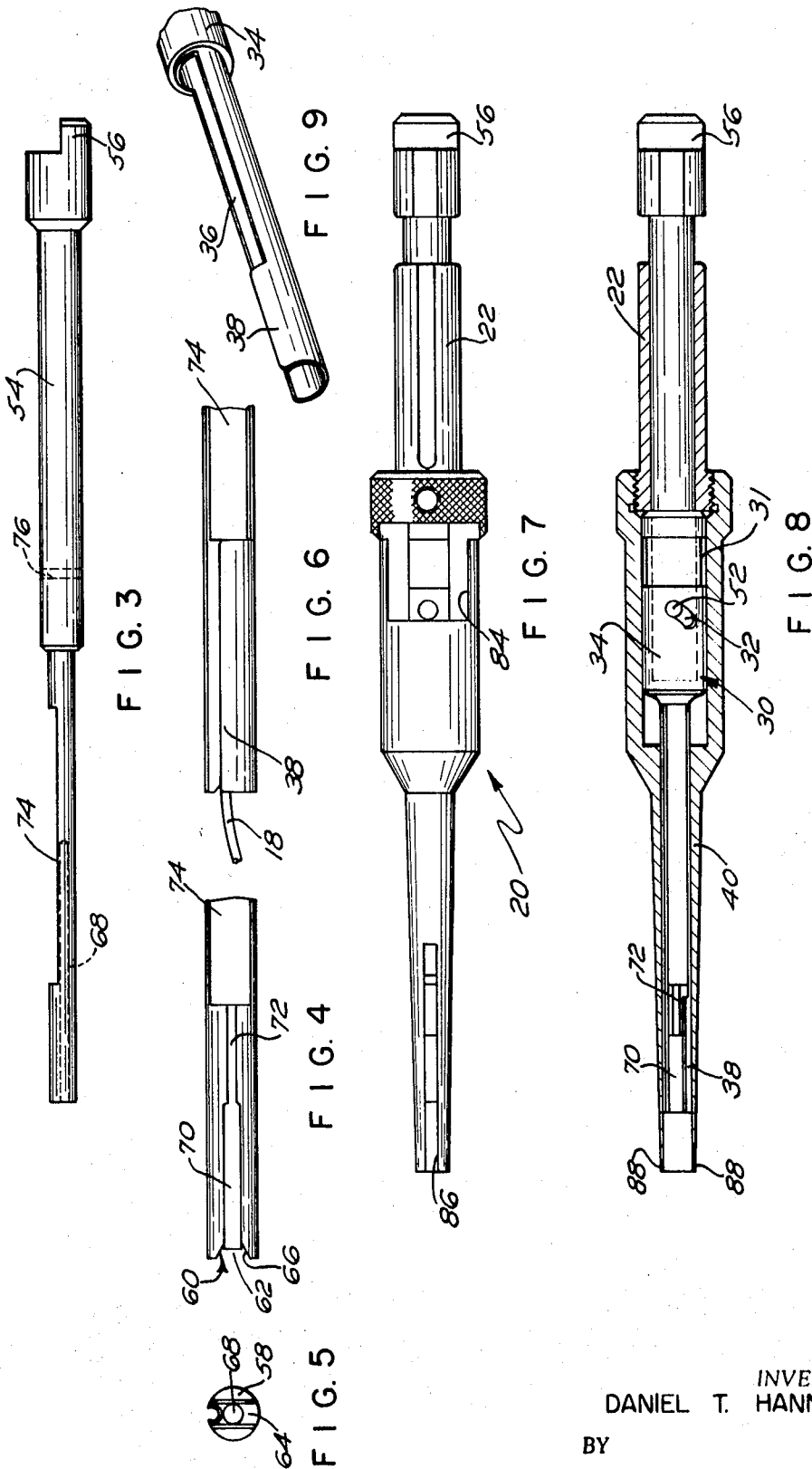
ABSTRACT: A wire-wrapping device having a bit assembly so constructed as to allow the wire to be laterally positioned directly into the radially offset groove that runs axially along the periphery of the bit. An inner sleeve surrounds the bit and has a helical slot into which is keyed a pin extending radially outward from the bit, the lower end of the inner sleeve having an axial slot open at its bottom that aligns with the offset groove of the bit allowing the wire to be laterally positioned therethrough. An outer sleeve surrounds the inner sleeve and also has an axial slot open at its bottom and aligned with the groove in the bit. The outer sleeve is restrained from rotational and axial movement. The inner sleeve is moved axially upward by the drive fork after the wire is placed in the groove. The axial movement causes the inner sleeve to rotate due to the camming action of the pin keyed in the helical slot thereby closing the groove in the bit and clamping the wire therebetween. The bit assembly may then be lowered over a terminal which extends upwardly into the terminal receiving opening of the bit and the wire wrapping device is ready to operate.





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WIRE-WRAPPING TOOL

BACKGROUND OF THE INVENTION

The invention relates to a tool for wrapping wire around a terminal to make an electrical connection.

In the past one of the problems involved in the semiautomatic operation of wrapping the ends of electrical wires around the terminals on a wire panel has involved the difficulty of placing the ends of the wires into the radially offset groove of the bit. The number of terminals on the panels are numerous and may sometimes even run into the thousands causing them to be closely spaced together. As a result, the diameter of the wires attached to the terminals is very small and the placing of the end of the wire into the wire-receiving groove at the end of the bit is much akin to threading a needle. To overcome this problem, newer wire-wrapping tools have been designed to allow the wire to be placed transversely against the bit with the sliding movement of the surrounding sleeve orienting the wire axially in the offset groove of the bit. The operation of these wire wrapper tools have not been entirely satisfactory and also require tiring arm movements by the operator with it sometimes being necessary to continue holding the wire in place even after the sleeve has slidingly covered the wire groove on the bit.

SUMMARY OF THE INVENTION

The operation of the invention involves taking the stripped end of a wire to be wrapped around a terminal and laterally positioning it directly into the radially offset groove that runs axially along the periphery of the bit. This is done by orienting the wire with respect to the axis of the groove and passing the wire laterally through the aligned slots on the bottom ends of the inner and out sleeves. While the end of the wire is being held in the groove a switch would be actuated to upwardly move a drive fork whose arms engage an annular channel on the inner sleeve. As the inner sleeve is raised axially it is also caused to rotate. This is due to the camming action produced by a helical slot in the wall of the inner sleeve which engages a pin extending radially from the stationary bit. The stationary bit at this time is prevented from movement either axially or rotationally. The drive fork also prevents rotational or axial movement of the outer sleeve. The rotation of the inner sleeve closes over the groove opening in the bit and locks the wire therein eliminating the need for the operator to hold the wire in position. The wire-wrapping tool can then be lowered onto the proper terminal which will be engaged in the terminal receiving opening in the bottom of the bit. A switch would then be actuated to rotate the bit and wind the wire on the terminal.

It is an object of the present invention to provide a wire-wrapping tool which will positively lock the wire in the bit assembly prior to being lowered onto the terminal.

Another object of the invention is to provide a uniquely designed bit assembly which allows the operator to place the wire in the bit groove without the necessity of fumbling around trying to thread the tip and also allows the operator to maintain eyesight contact with the groove throughout the whole operation.

A further object of the invention is to provide a bit assembly which can be adapted to conventional wire wrapping tools.

DESCRIPTION OF THE DRAWINGS

- FIG. 1 is a front elevation of the wire-wrapping tool;
 FIG. 2 is a bottom view of the wire-wrapping tool;
 FIG. 3 is a side elevation of the bit;
 FIG. 4 is a top view of the tip of the bit;
 FIG. 5 is an end view of the tip of the bit;
 FIG. 6 is a top view showing a wire clamped in the groove of the bit by the inner sleeve;
 FIG. 7 is a top view of the bit assembly;
 FIG. 8 is a horizontal section taken through the bit assembly; and
 FIG. 9 is a perspective view of the tip of the inner sleeve.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A wire-wrapping tool is generally illustrated in FIG. 1. The wire-wrapping head is designated by numeral 10 and contains a rotary motor which through a conventional drive mechanism would rotate bit 54 in the bit assembly 20. The motor could be any type which produces transferrable rotational movement, for example, a conventional sliding vane motor which is rotated by pressure from a fluid, such as compressed air. The drive mechanism passes downwardly through conical collar 12 and tubular housing 14 to the chuck assembly 16.

Releasably engaged by the chuck assembly is the bit assembly 20 which is illustrated in FIGS. 3-9. A discussion of how the bit is held by the chuck is omitted since it is notoriously old and forms no part of the invention. The bit assembly itself is comprised of a bushing 22, inner sleeve 30, outer sleeve 40, a pin 52 and a bit 54.

The bit has a tongue 56 at one end for engagement with the rotational drive mechanism. At the other end of the bit, end face 58 extends in a plane at right angles to the axis of the bit and is provided with a camming means generally designated 60, which comprises a simple channel 62 of uniform shape extending across the bit at right angles to its axis and having a floor or land area 64. This channel provides sloping walls 66 which serve as the camming means for engaging the conductor 18 and urging the conductor toward a terminal which is received in bore 68 as the bit 54 is rotated to wind the wire or conductor about the terminal. The top surface of the end of the bit has a groove 70 which runs axially along its outer surface and which is just wide enough and deep enough to receive the wire which the tool is intended to wrap. At its inner most end, this groove 70 has a narrowed portion or step 72, whose dimensions are such that it can only receive the wire minus insulation thereon. A flat surface 74 allows varying lengths of bare wire to extend beyond the narrowed portion 72. The exact amount extending therealong would depend upon the number of wraps the wire is to make on the terminal. In the middle area of the bit a bore 76 passes downwardly through the bit and pin 52 is received therein.

Referring now to FIG. 8 it is seen that bit 54 is surrounded by inner sleeve 30 which has a helical slot 32 in the sidewall of midsection 34. Pin 52 passes through this helical slot and is fixedly positioned in bore 76 of the bit. Inner sleeve 30 is thus limited to a combination rotational-axial movement advancing and withdrawing the inner sleeve from the tip end of the stationarily positioned bit. A look to FIG. 9 illustrates the structure at the tip of the inner sleeve. Slot 36 is narrowed at the lower open end by lip 38. In operation the wire may be laterally positioned through slot 36 into groove 70 of the bit. Surrounding the inner sleeve is outer sleeve 40 which is threadedly attached to the bushing 22 and is restricted from rotational movement by drive fork 80 having its arms 82 gripping notched out sections 84 on the outer sleeve. The outer sleeve has a slot 86 which also aligns with slot 36 of the inner sleeve and groove 70 of the bit for placing the wire laterally therein. The tip of the outer sleeve is provided with notches 88 for transversely directing the wire outwardly after it is gripped by the bit and inner sleeve.

FIG. 1 illustrates the means for raising and lowering the drive fork 80. Air cylinder 90 is attached to cylinder mount 92 which in turn is attached to tubular housing 14 by locating yoke 94 and clamping yoke 96. The L-fittings 98 are connected to air hoses (not shown) which supply the force to raise and lower the pistons in the air cylinder. Attached to the lower piston is a rod 100 secured to the fork drive 80 such that when a switch is actuated, the lower piston is raised lifting the fork drive. The arms 82 of the drive fork pass through the notched out sections 84 of the outer sleeve and grip the annular channel 31 causing the inner sleeve to be raised axially. At this same time, the outer sleeve is being prevented from moving axially or rotationally. The continued upward movement of the inner sleeve causes the inner sleeve to rotate because the bit is fixedly held against rotation while pin 52 extending therefrom produces a camming action against the helical slot

32. The preceding movements thereby lock the wire in the groove of the bit as previously discussed and the whole wire wrapping tool is then ready to be lowered upon a terminal for wrapping of the wire therearound.

I claim:

1. A tool for connecting a wire to a terminal comprising
 - a. a rotatable bit assembly having an outer sleeve, an inner sleeve and a bit
 - b. means for preventing rotational movement of said outer sleeve
 - c. means for moving said inner sleeve axially and rotationally with respect to said bit while said bit and said outer sleeve are restrained from axial or rotational movement.
2. A tool for connecting a wire to a terminal as recited in

claim 1 wherein said inner sleeve has a helical slot in its external wall and said bit has a pin extending radially outwardly into said slot.

3. A tool for connecting a wire to a terminal as recited in claim 1 wherein said inner and outer sleeves have axial aligned slots open at their lower ends which are alignable with an external groove in the lower end of said bit whereby a wire may be laterally directly positioned within said groove.

4. A tool for connecting a wire to a terminal as recited in claim 3 wherein the lower end of the slot of said inner sleeve has a lip that restricts the width of the slot whereby when the inner sleeve is rotationally and axially moved the groove in the bit is covered to clamp a wire therebetween.

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