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B. B. MANN ET AL

2,998,034

WIRE UNWRAPPING TOOL

Filed June 2, 1958

FIG. 1

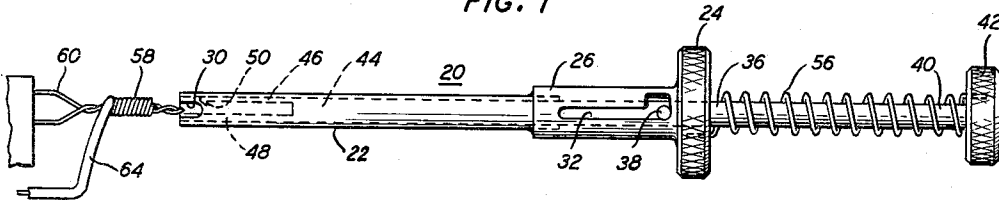


FIG. 2

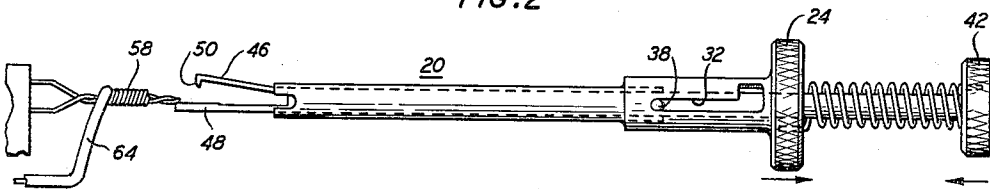


FIG. 3

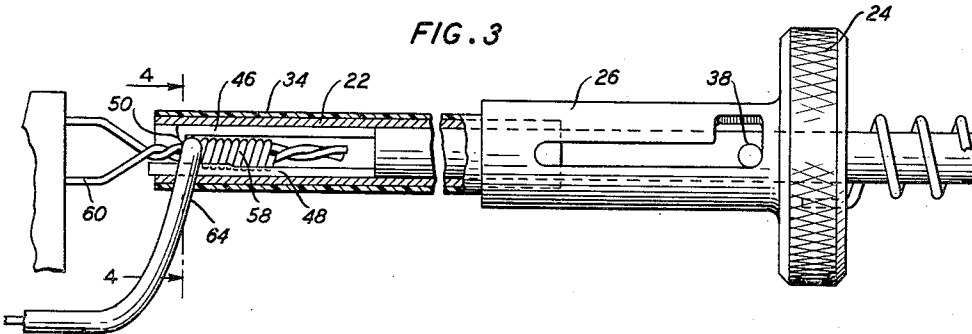


FIG. 4

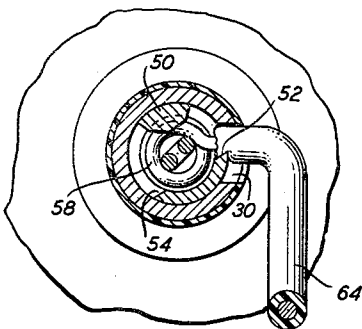
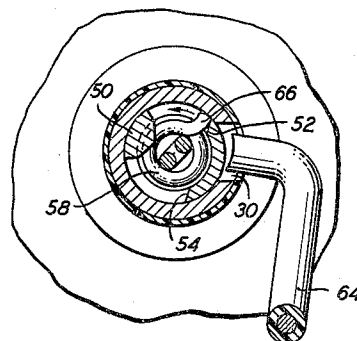


FIG. 5



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WIRE UNWRAPPING TOOL

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This invention relates to wire handling tools and more particularly to tools of the type disclosed in Patent 2,804,887, to F. Reck, issued September 3, 1957, for removing wrapped wire connections from terminals.

Due to their many advantages, wrapped wire connections find use in connecting leads to the terminals of relays included, for example, in switching equipment of telephone systems. One relay used in considerable quantity in telephone systems is the wire spring relay which is described in United States Patent 2,608,630, to H. C. Harrison, issued August 26, 1952. The terminals of this relay are pairs of wires which are twisted in order to accommodate wrapped wire connections. For rapid removal of wrapped connections from twisted pair terminals, it is desirable that the connection be severed from the lead and withdrawn from the terminal after the connection is loosened. It is important that the wrapped connection be loosened in such a manner that the terminal is not untwisted and damaged in the removal of the connection therefrom.

An object of the invention is the removal of a wrapped wire connection from a twisted pair terminal without damage to the terminal.

Another object of the invention is the severing of the lead to a wrapped connection and the loosening thereof by canceling the tension therein.

A feature of this invention resides in a tool which when brought into contact with a wrapped wire connection and appropriately manipulated causes severing of the lead from the connection as it is loosened in the direction of wrapping and stored within the tool.

A feature of the tool is a coaxially arranged cutter sleeve and spindle which cooperate to sever the lead to a wrapped connection and loosen the connection in the direction of wrapping.

Another feature of the tool is a spindle including means for removing and storing a loosened connection within the surrounding cutter sleeve.

In an illustrative embodiment a cutter sleeve notched at one end is secured at the other end to a slotted shank that is part of an apertured knob. A spindle positioned within the sleeve and the knob is keyed in the slotted shank. The sleeve and the spindle are adapted for longitudinal and rotational relative movement, the extent of movement being limited by the travel of a key or pin in the slotted shank. One end of the spindle extends beyond the knob and includes rotating means attached thereto. The other end of the spindle is bifurcated into a cutter member and a hook member. Biasing means normally urge apart the knob and rotating means to withdraw the other end of the spindle within the sleeve.

These and other objects and features of the invention will be more fully apprehended from the following detailed description taken in conjunction with the appended drawing in which:

FIG. 1 is an elevational view of one embodiment of the present invention;

FIG. 2 illustrates the first position of the tool of FIG.

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1 prior to removing a wrapped connection from a terminal;

FIG. 3 is the tool of FIG. 1 with parts broken away to show a wrapped wire connection as it is held within the tool;

FIG. 4 is an end view of the tool of FIG. 3 along the line 4-4 to show the cutting action of the tool; and

FIG. 5 is another end view along the line 4-4 to show the unwrapping action of the tool.

As shown in FIG. 1 the unwrapping tool 20 of the present invention includes a cutter sleeve 22 secured to an apertured knob 24 which is knurled and includes a slotted shank 26. The sleeve also includes a notch 30 for accommodating a wire of preselected diameter. The slot 32 in the shank 26 is L-shaped with a longitudinal portion extending along the length thereof and a leg portion intersecting and being perpendicular to the longitudinal portion. The knob and sleeve are of metal, for example, steel, with the sleeve being covered with nylon 34 (see FIG. 3) to prevent the tool from short circuiting to adjacent terminals when in operation.

A spindle 36, also of metal, is positioned within the sleeve and the knob and keyed in the slot 32 by means of a pin 38. One end 40 of the spindle, designated the outer end, extends beyond the knob 24 and has a knurled rotating means or knob 42 attached thereto. The other end 44 of the spindle is bifurcated into a pair of tines 46 and 48 which are of unequal length and pretensioned to spread apart when unrestrained. The tine 46 which is the shorter in length includes a hook 50 for reasons outlined hereinbelow. The longer tine 48 is hemispherical in cross section with the edges 52 and 54 (see FIG. 4) each forming a knife surface along the length of the tine. The spindle is adapted to slide longitudinally and rotationally with respect to the sleeve and the knob. The movement of the spindle is limited by the travel of the pin 38 in the slot 32.

A helical spring 56 is mounted in a coaxial arrangement with the extended end 40 of the spindle. Each end of the spring is secured to a different knob. The spring urges apart the knobs so as to withdraw the end 44 within the sleeve 22. The knife edges 52 and 54 are oriented so as to be in line with the cutter notch 30 by appropriately winding the spring 56 during the assembly of the tool to bias the pin 38 against the outer end of the slot 32.

The tool 20 is shown in FIGS. 1 and 2 in alignment with a wrapped wire connection 58 which is to be removed from a twisted pair terminal 60, for example, part of a wire spring relay, terminal strip, et cetera (not shown). The connection is wrapped on the terminal in the right hand or clockwise direction (as viewed from the tool and looking toward the terminal) which is the same direction in which the terminal is twisted. The lead portion 64 of the connection will be severed therefrom during the operation of the tool.

The operation of the tool will now be explained with the aid of FIGS. 2, 3, 4 and 5. The tool is shown hand operated but it should be understood that it may be readily modified to allow the operation thereof to be performed by motor means.

On the first operation the knobs 24 and 42 are squeezed, as shown in FIG. 2, the spindle moving relative to the sleeve along the axis thereof until the pin 38 reaches the end opposite the outer end of the slot 32. The longitudinal length of the slot is selected to prevent the knobs

24 and 42 from contacting each other when squeezed. In this position of the tool the tines 46 and 48 of the spindle extend beyond the sleeve and spread apart due to the pretensioning previously described.

The tines are placed over the connection 58 and the terminal 60 so that upon release of the knobs 24 and 42 the sleeve 22 will enclose these elements, as shown in FIG. 3. The hook 50 engages the first installed or innermost convolution of the connection on the terminal for reasons more apparent hereinafter. The cutter notch 30 encloses the lead 64 extending from the connection.

The cutting and unwrapping of the connection 58 from the lead and terminal are next described in conjunction with FIGS. 4 and 5. The knife surface 52 of spindle 36 is urged into contact with the lead 64 by rotating knob 42 relative to knob 24 (see FIG. 1) in the wrapping or clockwise direction of the connection. As the knife surface rotates it cooperates with the cutter notch 30 holding the lead to slice therethrough and thereby separate the lead and the connection. The rotational movement of the knife edge is limited by the travel of the pin 38 in the leg portion of the slot 32. The lead drops away as the cutter deflects connection tail 66 away from the cutter notch as shown in FIG. 5. The loosening of the connection then proceeds by rotating knobs 24 and 42 together in the clockwise direction. As a result of this action, the connection tail, which is in direct contact with the cutter, is rotated about the terminal in the wrapping direction of the connection. The pressure applied by the cutter to the tail is transmitted to the successive convolutions of the connection. This pressure cancels or nullifies the tension placed in each convolution during the wrapping processes thereby loosening the connection from the terminal. Since the pressure is in the wrapping direction of the connection, it further twists the terminal pair permitting the connection to be removed from the terminal without damage thereto. Experience has indicated that only three or four turns of the knobs are required to loosen the connection from the terminal. The loosened connection is picked up by the hook 50 as the tool is withdrawn from the terminal.

It should be understood that the tool is not limited solely to the removal of right hand wrapped connections from twisted wire terminals, but with modifications believed readily apparent, may be employed to remove the opposite or left hand wrapped connections.

To eject the connection from the tool, the knobs 24 and 42 are squeezed thereby projecting the tines 46 and 48 beyond the sleeve. The connection drops away from the tines as they spread apart from their pretensioning.

Thus, it can be seen that the tool is of simple and reliable construction. Further, the tool quickly and efficiently removes a wrapped connection from a twisted pair terminal with minimum effort on the part of an operator and without damage to the terminal. Although the tool has been described for removing wrapped connections from twisted pair terminals, it may also be employed with equal effectiveness to removing connections mounted on a conventional post terminal.

Numerous other embodiments of the present invention may be made by those skilled in the art without departing from the spirit and scope in the present invention.

What is claimed is:

1. A wire unwrapping tool for loosening a wrapped wire connection in the direction of wrapping and removing the connection from a terminal comprising a cutter sleeve including a wire receiving notch at one end, the other end being secured to an apertured knob, a spindle positioned within the sleeve and the knob, said spindle including at one end a cutting edge and means for removing a wrapped wire connection from a terminal, the other end of the spindle extending beyond the knob and having rotating means attached thereto, means for limiting longitudinal and rotational relative movement of the spindle with respect to the sleeve, and biasing means for

normally urging apart the apertured knob and the rotating means to house the one end of the spindle within the sleeve.

2. A wire unwrapping tool for loosening a wrapped wire connection in the direction of wrapping and removing the connection from a terminal comprising a cutter sleeve including a wire receiving notch at one end, the other end being secured to an apertured knob, a spindle positioned within the sleeve and the knob, one end of the spindle extending beyond the knob and having rotating means attached thereto, the other end of the spindle being bifurcated into a pair of tines, one tine including a cutting edge for severing a wrapped wire connection from the lead portion thereof held in the wire receiving notch on relative movement of the sleeve and spindle and loosening the connection from the terminal on simultaneous rotation of the knob and rotating means, the other tine including means for removing the loosened connection from the terminal, means for limiting longitudinal and rotational relative movement of the spindle with respect to the sleeve, and biasing means for normally urging apart the apertured knob and the rotating means to house the other end within the sleeve.

3. A wire unwrapping tool for loosening a wrapped wire connection in the direction of wrapping and removing the connection from a terminal comprising a cutter sleeve including a wire receiving notch at one end, the other end being secured to an apertured knob, a spindle positioned within the sleeve and the knob, one end of the spindle extending beyond the knob and having rotating means attached thereto, the other end of the spindle being bifurcated into a pair of tines for accommodating in the space between the tines a wrapped wire connection to be removed from a terminal, one tine including cutting means which severs a wrapped wire connection from the lead thereof held in the wire receiving notch on relative movement of the sleeve and spindle, said cutting means engaging the severed end of the connection and untwisting the connection in the wrapping direction on simultaneous rotation of the knob and the rotating means, the other tine including a hook member to remove the loosened connection from the terminal, means for limiting longitudinal and rotational relative movement of the spindle with respect to the sleeve, and biasing means for normally urging apart the apertured knob and the rotating means to house the other end within the sleeve.

4. A wire unwrapping tool as described in claim 3 wherein the tines are pretensioned to spring apart when ejected from the sleeve by the urging together of the knob and the rotating means.

5. A wire unwrapping tool for loosening a wrapped wire connection in the direction of the wrapping and removing the connection from a terminal comprising a cutter sleeve including a wire receiving notch at one end, the other end being secured to an apertured knob including a slotted shank, a spindle positioned within the sleeve and the knob, said spindle being keyed in the slotted shank, the longitudinal and rotational relative movement of the spindle and sleeve being limited by the movement of the key in the slot, said spindle including at one end thereof hook means for removing a wrapped wire connection from a terminal and cutting means which severs a wrapped wire connection from the lead thereof on relative movement of the spindle and sleeve, the other end of the spindle extending beyond the knob and having rotating means attached thereto, and biasing means for normally urging apart the apertured knob and rotating means to house the one end of the spindle within the sleeve.

6. The wire unwrapping tool as defined in claim 5 wherein the biasing means comprises a helical spring concentrically mounted on the spindle, one end secured to the knob and the other end secured to the rotating means, a preselected tension included in the spring to align the one end of the spindle with the wire receiving notch.

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7. A wire unwrapping tool for loosening a wrapped wire connection in the direction of wrapping and removing the connection from a terminal comprising a slotted cutter sleeve, a spindle biased within the slotted cutter sleeve and keyed into the slotted portion of the cutter sleeve, said spindle including a cutting blade for severing a wrapped wire connection from the lead thereof on relative movement of the sleeve and spindle, said cutting blade loosening the connection from the terminal on

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simultaneous rotation of the sleeve and spindle, and means also included in said spindle for removing the loosened connection from the terminal.

References Cited in the file of this patent

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