Wire Unwrap Tool


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3 Claims

ABSTRACT OF THE DISCLOSURE

A rotatable wire unwrapping tool includes a bit having a longitudinal bore for receiving the extremity of a terminal and a projection for engaging the extremity of a wrapped wire on the terminal to loosen the wrapped wire. A split sleeve encompasses the wrapped wire and has an inward extending lip for engaging the loosened wrapped wire to remove the loosened wrapped wire from the terminal. Facilities open the split sleeve to release the removed wrapped wire.

GOVERNMENT CONTRACT

The invention herein claimed was made in the course of or under contract with the United States Army.

BACKGROUND OF THE INVENTION

Field of the invention

In the manufacture of electronic equipment, electrical wire connections are made to terminals by tightly wrapping a wire on the terminal. Sometimes an error is made in wrapping a wire on a wrong terminal or in a change in the design of the equipment may necessitate the removal of a wrapped wire. This invention relates to a tool for removing a wire which has been wrapped on a terminal.

Description of the prior art

There are a plurality of prior art tools for unwrapping a wire from a terminal. The prior art unwrapping tools are characterized in that they are difficult to handle and require considerable time in the manual manipulation required to remove a wrapped wire from a terminal. One prior art tool utilizes a bit having a bore for receiving the extremity of the terminal and a projection for engaging the extremity of the wrapped wire to loosen the wrapped wire as the bit is rotated. The unloosened wrapped wire must then be manually removed from the terminal. An improvement over this wire unwrapping tool incorporates a sleeve surrounding the wrapped wire in which the wrap expands as it is loosened to be gripped by ridges formed on the inside surface of the sleeve. Thus, the loosened wrap is removed when the tool is raised from the terminal. The loosened wrap is then ejected by moving the bit relative to the sleeve. This tool is generally unreliable in that when the ridges are large enough to reliably grip the loosened wrap, the wire becomes jammed between the bit and the sleeve.

SUMMARY OF THE INVENTION

An object of the present invention is a new and improved tool for removing a wire from a terminal. In accordance with this and other objects, a tool for removing a wire wrapped on a terminal includes a rotatable bit having facilities for receiving the extremity of the terminal and facilities for engaging the extremity of the wire to loosen the wrapped wire. The tool also includes a split sleeve for encompassing at least a portion of the wrap with facilities for holding a loosened wrapped wire to pull the wrapped wire from the terminal. The split sleeve is then opened to release the removed wrapped wire.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a cross-sectional view of a tool for removing a wire wrapped on a terminal.

FIG. 2 is a cross-sectional view of a portion of the unwrapping tool shown in FIG. 1, particularly showing a terminal with a wire wrapped thereto received in the end of the unwrapping tool.

FIG. 3 is a cross-sectional view of the tool shown in FIG. 1, particularly showing the relative position of the parts of the tool during the ejection of a wrap from the tool.

FIG. 4 is an isometric view of an automatic apparatus in which the tool of FIG. 1 may be used.

FIG. 5 is an isometric drawing, partially shown in cross-section, of the unwrapping head of the apparatus shown in FIG. 4.

DETAILED DESCRIPTION

Referring to FIG. 2, there is shown a wire 45 wrapped on a terminal 44. Referring now to FIG. 1, there is shown a detailed cross-sectional view of a tool 50 for removing the wrapped wire 45 from the terminal 44. The tool 50 has a housing 62 in which a holding member 63 is slidably mounted for relative vertical movement. The two halves of a split wire wrap stripping sleeve 64 are loosely mounted on a pin 65 which is secured to the housing 62. The holding member 63 has an inwardly extending annular ring 86 which cooperates with an annular rib 87 on the split sleeve 64 for normally holding the split sleeve 64 in a closed position. When the holding member 63 is raised, as shown in FIG. 3, the annular ring 86 is raised from the rib 87 to allow the two halves of the split sleeve 64 to open.

Referring back to FIG. 1, a wire unwrapping bit 75 is secured by the set screw 76 to the holding member 63. The vertical position of the wire unwrapping bit 75, relative to the holding member 63, may be adjusted by loosening the set screw 76 and moving the bit 75 with the tool 50. As illustrated in FIG. 2, the wire unwrapping bit 75 has a bore 79 for receiving the upper extremity of the terminal 44 and a projection 80 for engaging the upper portion of the wrapped wire 45 on the terminal 44. When the tool 50 is rotated, the projection 80 engages the end of the wire 45 which is wrapped on the terminal to loosen the wrapped wire.

The lower end of the split sleeve 64 extends over the bit 75 and terminates in a beveled opening 77 for receiving the terminal 44 around which the wire 44 is wrapped. The opening 77 has an inwardly extending annular lip 78. The inside diameter of the lip 78 allows the wrapped wire 45, while still tightly wound on the terminal 44, to enter the sleeve 64. When the wrapped wire 45 is loosened by rotation of the tool 50, the wrapped wire 45 expands within the split sleeve 64. Thus, when the tool 50 is raised from the terminal 44, the loosened wrap 45 is pulled from the terminal 44.

Referring back to FIG. 1, an ejecting sleeve 67 is slidably mounted within the split sleeve 64 by a pair of pins 68 and 69 which extend inward from a collar 70 slidably mounted on the housing 62. A spring 71 is interposed between the collar 70 and a lower lip 72 of the housing 62 for normally urging the collar 70 and the wrap ejecting sleeve 67 in an upward direction. When the collar 70 is depressed, as shown in FIG. 3, the lower edge of the ejecting sleeve 67 cooperates with a camming surface 73 of the split sleeve 64 to open the two halves of the split sleeve 64 and eject the wrapped wire which has been pulled from a terminal.

Referring now to FIG. 4, there is shown a base 10 sup-
A pair of bars 11 and 12 on the base 10 support a frame 13 for movement in the first horizontal direction over the chassis 43. A plurality of serially connected air cylinders 15, 16, 17 and 18 are connected at one end to the base 10 and at the other end to a projection 14 of the frame 13 for moving the frame 13 to a selected horizontal position along the bars 11 and 12. The cylinders 15–18 have different lengths of movement of provide for a plurality of indexing positions along the bars 11 and 12. While only four cylinders 15–18 are shown, more air cylinders would be needed where the terminal boards being operated on contain many rows of terminals.

A platform 20 is slidably mounted on a pair of bars 21 and 22 connected to the frame 13 for movement in the second horizontal direction X. A plurality of air cylinders 23, 24, 25 and 26 are serially connected between the frame 13 and a projection 27 of the platform 20 for moving the platform 20 to a desired horizontal position along the bars 21 and 22. Again, the number of air cylinders 23–26 and their lengths of movement depends upon the number and spacing of desired columns of terminals to be reached by the unwrapping apparatus.

Similarly, a plate 30 is slidably mounted on a pair of bars 31 and 32 mounted on the platform 20 for movement in a vertical direction Y. Three air cylinders 34, 35 and 36 are serially connected between the platform 20 and a projection 38 of the plate 30 for moving the plate 30 to a selected vertical position. More vertical positions may be provided by additional air cylinders. The plate 30 supports an unwrapping head 40.

Referring now to FIG. 5, there are shown the details of the wire unwrapping head 40. The wire unwrapping tool 50 is supported by a beveled bearing surface in a base 51 of the wire unwrapping head 40. A reversible motor 52 is mounted on a support 53 in the head 40 for rotating a shaft 54. The motor 52 may be a commercial air motor which rotates in a direction determined by the air pressures applied to two inlets thereto. A gear 55 is secured to the shaft 54 and meshes with a pinion 57 secured to a shaft 58. The shaft 58 is connected by a universal joint 59 to the tool 50. Thus, the motor 52 through the shaft 54, gear 55, pinion 57 and shaft 58, rotates the tool 50 either clockwise or counterclockwise.

An air cylinder 82 is mounted on a platform 83 in the head 40. The air cylinder 82 has a projectable piston rod 84 for engaging the lower surface of the pinion 57 to raise the pinion 57, the shaft 58, the universal joint 59, and the holding member 63 relative to the housing 62 and split sleeve 64 of the tool 50 to the raised position shown in FIG. 3. An air cylinder 96 attached to the head 40 is positioned over and in alignment with the shaft 58 such that when a piston rod 97 is extended, the shaft 58 is moved downward to return the holding member 63 to its closed position shown in FIG. 1.

An air cylinder 89 has a piston rod 90 fastened to a depressing member 91 which is slidable upon a rod 92 secured to the head 40. The member 91 overlaps the collar 70 of the tool 50 such that when the piston rod 90 is extended, the member 91 depresses the collar downward against the normal upward force of the spring 71 to the position shown in FIG. 3 to eject a removed wrapped wire from the split sleeve 64. The air cylinder 89 is operated after the air cylinder 96 so that the holding member 63 releases the split sleeve 64 before the ejecting sleeve 67 is lowered to open the split sleeve 64. After the wire has been ejected, the air cylinder 89 is released and the member 91 is returned to its upward position by the force of a spring 93 interposed between the member 91 and the base 51 of the head 40.

It is to be understood that the above-described embodiments are simply illustrative of the principles of the invention and that many other embodiments may be devised without departing from the scope and spirit of the invention.

What is claimed is:

1. A tool for removing a wire wrapped on a terminal, comprising:
   a rotatable bit having at one end thereof means for receiving the extremity of the terminal and means for engaging the extremity of the wrapped wire to loosen the wrapped wire;
   a split sleeve extending over the one end of the bit for encompassing at least a portion of the wrapped wire as it is engaged by the bit and having means for holding a loosened wrapped wire to pull the wrapped wire from the terminal when the bit and split sleeve are raised from the terminal; and
   means to open the split sleeve to release the removed wrapped wire.

2. A tool for removing a wire wrapped on a terminal as defined in claim 1, which includes:
   a stripping member interposed between the bit and the split sleeve for ejecting the removed wrapped wire from the opened split sleeve.

3. A tool for removing a wire wrapped on a terminal, comprising:
   a rotatable bit having at one end thereof means for receiving the extremity of the terminal and means for engaging the extremity of the wrapped wire to loosen the wrapped wire;
   a split sleeve extending over the one end of the bit for encompassing at least a portion of the wrapped wire as it is engaged by the bit and having an inwardly extending projection for engaging the loosened wrapped wire to pull the loosened wrapped wire from the terminal when the bit and split sleeve are raised from the terminal; and
   means to open the split sleeve to disengage the projection from the removed wrapped wire and to release the removed wrapped wire.

4. A tool for removing a wire wrapped on a terminal as defined in claim 3 which includes:
   a stripping member interposed between the bit and the split sleeve for ejecting the removed wrapped wire from the opened split sleeve.

5. A tool for removing a wire wrapped on a terminal as defined in claim 3, wherein the inwardly extending projection is an inwardly extending annular lip;
   said lip having an inside diameter such that a wire wrapped on a terminal may be received within a closed split sleeve; and
   said diameter of the lip being sufficiently small to engage a wrapped wire which has been loosened by the rotatable bit.

References Cited

UNITED STATES PATENTS

2,898,952 8/1959 Lovecky 140—124
2,998,034 8/1961 Mann et al. 140—123
3,019,517 2/1962 Lovecky 29—203
3,378,906 4/1968 Dorsey 140—124

LOWELL A. LARSON, Primary Examiner

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