

[54] WIRE WRAP TOOL

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[58] Field of Search 29/203 H, 203 B,
29/203 D, 203 DG, 203 R

[56] References Cited

UNITED STATES PATENTS

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al.

[57] ABSTRACT

A hand tool for loosening coiled wire wrap electrical connections by engaging the end of the wire wrap, rotating the wrap in a loosening direction and then lifting the loosened wrap off from the terminal pin. For reinstalling the coil of wire, the procedure is reversed with a pair of collet jaws being squeezed together at intervals to form the coil wrap back into position on the terminal.

5 Claims, 5 Drawing Figures

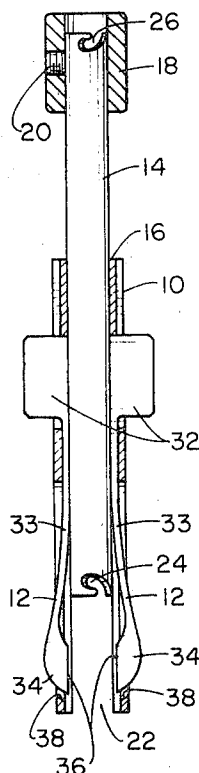


Fig. 1.

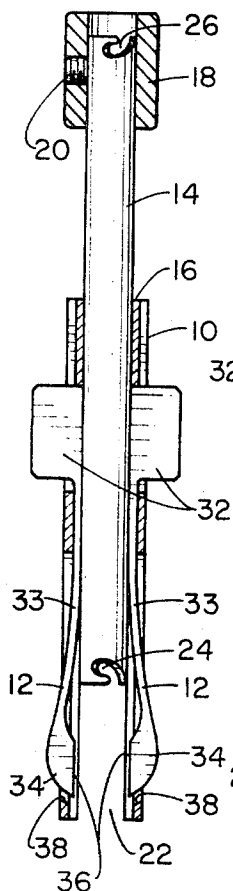


Fig. 2.

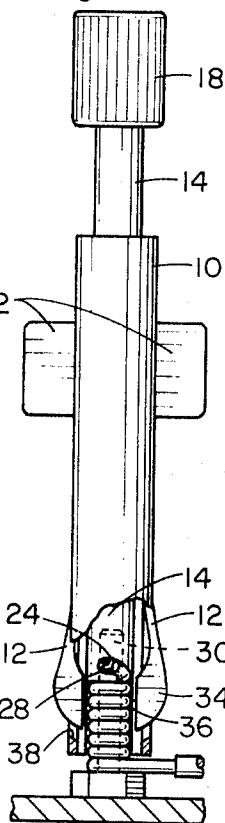


Fig. 4.

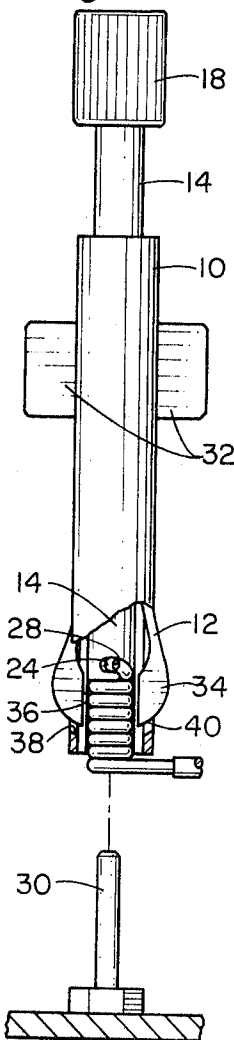


Fig. 3.

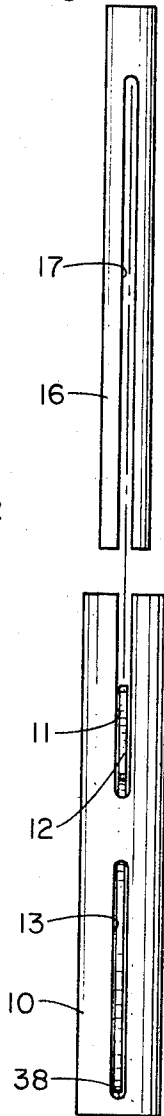
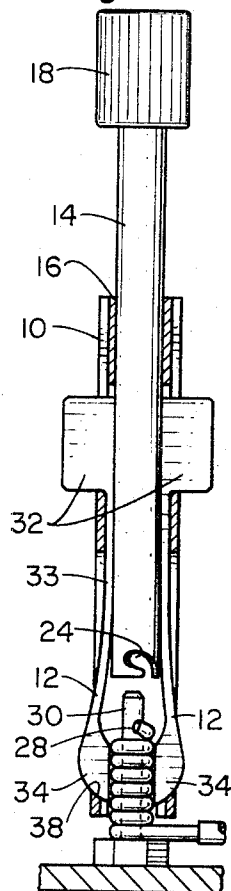


Fig. 5.



WIRE WRAP TOOL

STATEMENT OF GOVERNMENT INTEREST

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

BACKGROUND OF THE INVENTION

The present invention relates to wire wrapping tools and more particularly relates to a tool for removing and replacing coiled wire wrap electrical connections.

Coiled wire wrap electrical connections are being used to replace soldered connections in many electronic assemblies and installations, especially in the field of communications. A very light and fragile coil of wire has several turns wrapped tightly around a square pin with the corners of the pin cutting into the wire for maximum electrical and physical contact.

Frequently, it is necessary to make a change in the connection during the process of assembly and installation. Because of this, a number of tools has been developed to remove and replace this type of connections, however each has its limitations. Many of these special tools peel off the wire by progressively unwinding the coil until the complete wrap is removed from the terminal. This unwrapping of the coil often damages the surface of the wire coil and injures the lightly tinned coating thereon, so as to result in a defective junction if reused. The unwrapping of the coil weakens and frequently breaks the wire also making it unsatisfactory for reuse. Even if reuse of the wire were permitted, the special tools available do not properly rewrap the coil to provide a good electrical connection. Other drawbacks to some of the special tools available are that they are bulky, difficult to manipulate and cannot readily be employed in close or confined quarters.

SUMMARY OF THE INVENTION

The purpose of the present invention is to provide a small light-weight, readily manipulated tool with which coiled wire wrap electrical connections can be easily removed and properly replaced. In all instances, it should be recalled that the coiled wire wrap electrical connections are made with a very light and fragile coil of wire which must be reapplied to the electrical terminal in such a tight fashion as to assure a good electrical connection.

The tool has a tubular spindle slidably engaged in a tubular housing with a semi-helical slot in the end of the spindle. The spindle slot engages the end of the coil wire wrap with the housing sliding down over the terminal and coil. With a slight twisting motion, the coil can be loosened and gently lifted off the terminal.

The tool also has two collet members fitted into slots in the housing and held in place by a tubular retaining sleeve and the spindle. The collet members have an enlarged lower portion which forms a jaw for replacing the coil wire wrap by squeezing the coil to tighten the wire on the terminal.

An additional feature of the invention is the provision of an oppositely inclined slot in the other end of the spindle. Thus, the tool can be used for removing either right hand or left hand wound coils. With the tool assembled to remove right hand wound coils, a left hand wound coil when encountered can be accommodated by the simple process of reversing the spindle.

STATEMENT OF THE OBJECTS OF THE INVENTION

It is an object of the present invention to provide a wire wrap tool for removing and replacing coiled wire wrap electrical connections.

Another object of the present invention is to provide a wire wrap tool which is light-weight and easy to use.

Yet, another object of the present invention is to provide a wire wrap tool for tightly replacing coiled wire wrap electrical connections.

Still another object of the present invention is to provide a wire wrap tool which facilitates removal of either right hand or left hand wound coils.

Other objects, advantages and novel features of the invention will become readily apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a detailed longitudinal sectional view of the assembled wire wrap tool.

FIG. 2 is a view of the wire wrap tool with a portion broken away to show the tool positioned for removing a coil wire wrap.

FIG. 3 is an exploded view of the housing and retainer sleeve.

FIG. 4 illustrates the replacement of a coil wire wrap.

FIG. 5 illustrates tightening of a replaced coil wire wrap.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 illustrates the basic wire wrap tool comprised of a housing 10, two collet members 12, spindle 14, retainer sleeve 16 and knob 18. The tool is approximately 6 inches long and less than one-fourth inch in diameter.

According to the present invention, there is provided a tubular housing 10 which has two pairs of in-line longitudinal slots 11 and 13 (FIG. 3) parallel to the axis of housing 10. The first pair of slots 11 is open at the top and extends to near the center of housing 10. The second pair of slots 13 extends from slightly below center to near the bottom of housing 10. The bottom of slots 13 is inclined at 38° downwardly toward the axis of housing 10.

Collet members 12 are slidably engaged in slots 11 and 13. The collet members 12 each have an ear portion extending outwardly from slot 11 and each collet jaw 34 extends outwardly from slots 13. Each collet jaw 34 is connected to the ear portion 32 by a flexible strip of metal 33. The flexible strip 33 is slightly flexed so that collet jaws 34 will extend outwardly from slots 13 and be slightly larger than the outside diameter of spindle 14. Each collet jaw 34 has a rounded cam surface 40 (FIG. 4) on the outside and a flat face 36 on the inside which is approximately parallel to the axis of the housing.

The collet members 12 are held in place by a retaining sleeve 16 which is shown in greater detail in FIG. 3. The retaining sleeve 16 has a pair of longitudinal slots 17 open at the bottom end which fits over the collet members 12 and thus holds them in place. The retainer snugly fits inside housing 10. After assembly, the retainer sleeve 16 can be held in place by any suitable means such as welding, set screw, etc., if desired.

The spindle 14 is slidably engaged in retaining sleeve 16. The spindle 14 has semi-helical slots 24 and 26 in each end for engaging the end of a coil wire wrap. It should be observed that slots 24 and 26 are oppositely inclined so that the spindle 14 can be used to remove either right hand or left hand wound wire wrap coils. The spindle 14 is illustrated in a position for removing a right hand wound coil wire wrap which is more frequently encountered. A knob 18 is attached to the end of spindle 14 and held in place by set screw 20.

FIG. 2 illustrates the manner in which the tool is operated to remove a coil wire wrap. In use, the housing 10 is held by the fingers of the operator to bring the open end 22 into position over coil 28 which has been tightly wrapped around a terminal pin 30 of an electrical connection. When in this position, the coil 28 may be loosened by engaging the tip thereof within semi-helical slot 24 in the end of spindle 14 which has been suitably dimensioned for this purpose. Once the coil 28 is engaged by the slot 24, spindle 14 is rotated slightly and is lifted upwardly simultaneously with the application of turning movement to spindle 14. Such rotation may be through knob 18. This has the effect of uncoiling the coil 28 so as to slightly increase its internal diameter and permit it to more readily slip off the free end of the pin 30, as shown in FIG. 4.

As an alternative, very light springs could be provided in the slots of housing 10 and retaining sleeve 16 above the ears 32 of collet members 12. The springs would cause the collet member jaws 34 to rest lightly against the coil to assist in retaining the coil 28 in the tool while it is being lifted off terminal 30. Great care would have to be taken in providing springs which would not apply any significant amount of pressure against the coil. The very light wire used for the coils is delicate and could easily be crushed by excessive pressure.

In order to replace the coil 28 to terminal pin 30, it is positioned as shown in FIG. 4 and lowered down into place as shown in FIG. 5. The semi-helical slot 24 in spindle 14 is disengaged from the tip of the coil 28, and through downward pressure on ears 32, the collet members 12 are brought into play. To do this, a downward pressure on laterally extending ears 32 forces cam surface 40 of the collet jaws 34 to bear against inclined surfaces 38. This forces the collet jaws 34 inwardly so that the flat surfaces 36 (FIG. 1) engages the lower part of coil 28 to crimp the coil again about the terminal pin 30.

The foregoing crimping action can be repeated at intervals about the circumference of the coil by intermittently rotating the entire assembly and repeating the crimping action at these points. Alternatively, the jaws may be rotated while in place as long as the friction applied is not so excessive as to disturb the electrical junction being made or damage the wire coil.

Since it is possible that the coil wire wrap 28 may be left hand rather than a right hand formed coil as shown, a similar but reversely inclined semi-helical slot 26 is located at the opposite end of spindle 14. By reversing the tubular spindle 14 a coil of either direction may be accommodated by this tool.

Obviously, many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A hand tool for removing and replacing coiled wire wrap electrical connections comprising:
 - a hollow tubular housing having first and second pair of opposing in-line longitudinally extending slots parallel to the axis of said housing;
 - a hollow tubular spindle slidably engaged in said housing and having a semi-helical slot adapted to engage the end of a coil wire wrap electrical connection when the terminal about which the coil of wire is wrapped is received in the axial opening of said spindle;
 - a knob attached to said spindle at the opposite end from said semi-helical slot;
 - a pair of collet members slidably engaged in said first and second slots of the housing for crimping a coiled wire which has been replaced on a terminal; and
 - a hollow retaining sleeve inserted co-axially between said housing and said spindle for retaining said collet members in the first and second pair of slots in said housing.
2. A hand tool according to claim 1 wherein said spindle has an oppositely inclined semi-helical slot in either end and said knob is detachable whereby the spindle may be reversed to accommodate either right hand or left hand wound coil wire wrap electrical connections.
3. A hand tool according to claim 2 wherein said pair of collet members has ears extending laterally from said first pair of slots and jaws engaged in said second pair of slots; said ears and jaws being connected by a flexible strip of metal.
4. A hand tool according to claim 3 wherein said second pair of slots has a downwardly inclined surface at one end and said collet jaws have a rounded cam surface which bears against said inclined surface when a downward pressure is exerted on said collet ears forcing said collet jaws inward.
5. A hand tool according to claim 4 including a pair of springs in each of said first slots which applies a light downward pressure on said collet ears whereby said collet jaws grip the coil wire wrap when the tool is positioned over the terminal.

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