June 19, 1962 R. J. LINDEMANN ET AL 3,040,159

HOT IRON INSULATION STRIPPING TOOL

Filed Jan. 6, 1960

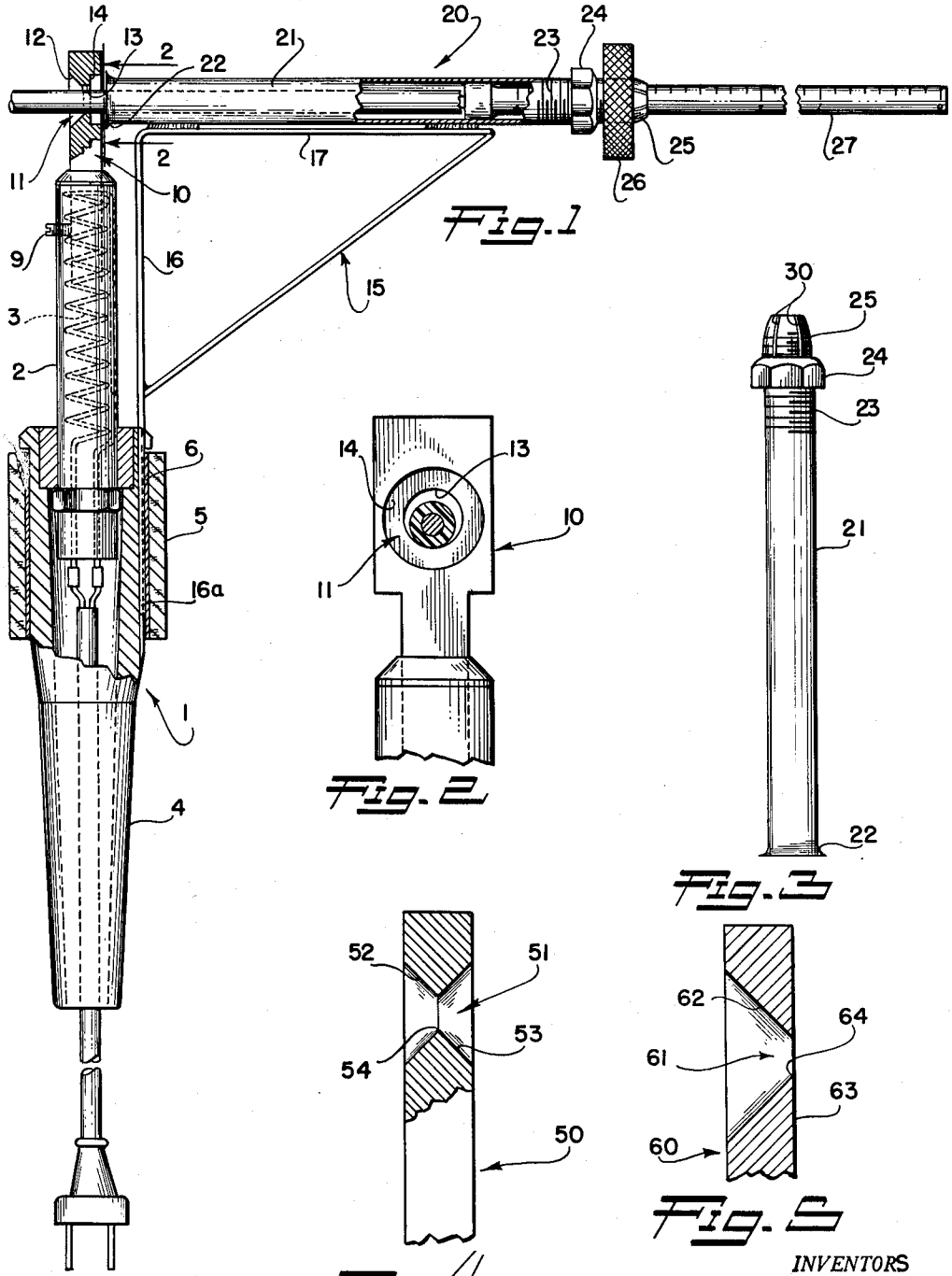


Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

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United States Patent Office

3,040,159

Patented June 19, 1962

3,040,159

HOT IRON INSULATION STRIPPING TOOL

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Filed Jan. 6, 1960, Ser. No. 795

6 Claims. (Cl. 219—29)

This invention relates to a device for removing heat softenable covering from elongated articles and is specifically directed to a device for removing insulation from electric wires, cables, and the like in the process of preparing them for electrical circuit connection.

Those engaged in the field of electrical wiring will appreciate the tedious and time consuming requirements of properly removing insulation from the surfaces of wires to be connected. The task becomes aggravated when there are a large number of such wires or cables, and especially so when these members are in practically inaccessible positions within a chassis or mechanical enclosure which houses a completed electrical instrument. The development of missiles and satellites in recent years with their heavy dependence on complex electronic and electric circuits in as small a physical surrounding as possible, has made wire stripping tools of the prior art obsolete.

There have been many purely mechanical devices provided with sharp cutting jaws heretofore utilized to remove the insulation from electric wires and the like. While most of these are an improvement over the manual utilization of a pocket knife, these methods have all been subject to difficulty. Many electronic systems customers are acutely aware of the problems which may be created or heightened by the presence of nicks or abrasions in electric wires incurred in the process of removing the insulation therefrom. In the case of Government services especially, such is the cause for outright rejection of a manufactured article.

It is a primary object of the present invention to provide a tool which may be utilized in removing heat softenable outer covering from elongated articles which does not in any way damage the underlying article.

It is a further object of the present invention to provide such a tool which may easily be utilized in narrow or tight physical surroundings in which conventional tools of the prior art would not be useable.

Additionally, an object of this invention is to provide a tool for removing the insulation from electric wires and the like which is substantially faster and more efficient in operation than prior art devices.

A still further object of this invention is to provide a device which is simple and inexpensive to maintain, due to the elimination of mechanical shearing edges which must be sharpened and often replaced.

These and other objects of the present invention will be apparent to those familiar with the subject art upon consideration of the following description in combination with the appended drawings wherein like numbers denote like parts throughout and in which

FIG. 1 is a side-elevational view shown partly in section of an insulation stripping device constructed in accordance with the present invention,

FIG. 2 is a front-elevational view of one modification of a "cutting" tip utilizable with the present invention,

FIG. 3 is an enlarged view showing the adjustable means for securing the abutment shaft in desired position,

FIG. 4 is a side-elevational view of a second modification of the cutting tip, and

FIG. 5 is a side-elevational view of a third modification of the cutting tip.

Referring to FIG. 1, it will be seen that a handle assembly is shown generally at 1 which contains an elongated

preferably metallic barrel 2 having an electrical resistance heating element 3 therein. On the lower end of handle assembly 1 is an insulative member 4 of wood or the like which insulates the hand of a holder from the heat produced by element 3 in barrel portion 2. Desirably, the mid portion of handle member assembly 1 is provided with a sleeve 5 of cork, or other porous material. Located just beneath sleeve 5 is a keeper sleeve 6 preferably formed of metal or the like, the purpose of which will be described below. With the exception of keeper sleeve 6, handle assemblies similar to that described are commercially available in various forms.

To such a handle assembly, the inventor has provided a heatable "cutting" tip 10 which consists of a generally rectangular or elongated block of metal or other highly heat conductive material which may be interchangeably secured within barrel 2 by means of a set screw 9. Obviously, other means of securing tip 10 into barrel 2 may be utilized such as threads, spring biased ball detents, and the like, all of which are known in the mechanical connector art. It should be understood that the use of the word "cutting" in connection with tip 10 refers to its characteristic of providing softening heat at a concentrated portion within aperture 11 and does not refer to any actual shearing or lacerating ability which it is a feature of this invention to omit.

Extending through cutting tip 10 is an aperture 11 which may be of any suitable diameter for receiving electric wires and the like. I have found that a diameter substantially larger than the wire diameter to be cleaned of insulation is desirable. The front walls of aperture 11 have a bevel 12 therein extending almost to the transverse center of the opening, and terminating in a shoulder 13 the face 14 of which is substantially normal to the axis of aperture 11. The outer periphery of shoulder face 14 connects with the inner surface of aperture 11 and thus forms what amounts substantially to an annular embossment on the inner surface of aperture 11.

Preferably removably mounted upon handle assembly 1 is a mounting bracket 15 which may desirably be of triangular shape and formed of a flat strip metal material. It should be noted that one leg 16 of mounting bracket 15 extends beyond the body of the triangle portion of the bracket and affords a bayonet leg 16*a* which may be inserted beneath the inner surface of keeper sleeve 6 between that sleeve and a suitably hollowed out portion in handle 4.

One leg 17 of mounting bracket 15 is in substantially parallel relation with the axis of aperture 11 in cutting tip 10. Secured to the upper surface of leg 17 of mounting bracket 15 is a stop assembly generally indicated at 20 and which is seen to consist of a hollow tube 21 which is preferably soldered to the upper surface of leg 17, and which has a flare 22 at the receiving end thereof adjacent tip 10. At the opposite end 23 are threads which are adapted to receive a nut member 24 which has a threaded extension 25 thereon which is segmented into at least three longitudinal segments. A knurled shaft lock washer 26 having a threaded internal diameter slightly less than the threaded outer diameter of extension 25 is threaded thereon. Inserted through threaded extension 25, adjustment washer 26 and into hollow tube member 21 is an abutment shaft 27 which is preferably calibrated so as to indicate the difference in distance between the end 22 of tube member 21 and the end of the abutment shaft 27 within said tube.

Obviously, mounting bracket 15 and stop assembly 20 is removable so that, as various cutting tips 10 are inserted within metallic barrel 2 to receive different sized wires, stop assembly 20 may be interchanged to provide a hollow tube 21 of sufficient diameter. While the diameter of tubular member 21 is not critical, it has been found

that it should be somewhat greater than the internal diameter of aperture 11 in cutting tip 10.

FIGURE 2 shows a rear-elevational view of the cutting tip 10 shown in connection with FIGURE 1. In this view, shoulder 13 may be clearly seen in relation to the outer extreme periphery of the aperture 11 and the inner diameter of the embossment 14. It should be obvious that more than one aperture can be provided within a given cutting tip, the number to be limited only by the effective heating of the member at a point remote from the electrical resistance heating coil 3.

Referring to FIGURE 3, a somewhat enlarged view of that portion of tube member 21 having threads 23 thereon is shown on which the nut member 24 is threadably secured. Extending from nut member 24 is threaded extension 25 which is adapted to receive knurled shaft lock washer 26. It will be seen that threaded extension 25 has slits or interruptions 30 therein, and as the knurled shaft lock washer 26 is threadably inserted onto extension 25, the segments of extension 25 separated by said slits will be forced into intimate contact with abutment shaft 27 placed therein (not shown in this figure) to maintain the same in secured adjustable relation within tube member 21.

FIGURE 4 shows a modification of the shape of the aperture in cutting tip 10. In this modification, an elongated cutting tip 50 is provided with an aperture generally indicated at 51 the cross sectional inner surface of which is seen to have an "hour-glass" type configuration. This is created by a bevel 52 and 53 in the front and rear wall surfaces, respectively, of the aperture 51 which coterminate in an embossment 54, the "sharpness" of which will be determined by the degree of slope of the bevels 52 and 53. It has been found that this modification works especially well in connection with smaller wires or wires having relatively thin layers of insulation thereon. Obviously, one such bevel could be used with a similar efficiency, and this modification has been illustrated in connection with FIG. 5, wherein a cutting tip 60 is shown having an aperture 61 therein. The walls of this aperture 61 are beveled from the front opening toward the rear portion thereof in a converging manner as indicated at 62 which bevel terminates at the rear surface 63 of said tip in a relatively blunt shoulder 64. It has been found bevel 62 should form an angle of preferably at least 45° with the axis of said aperture in order to eliminate any possibility of overheating the insulation remaining on a wire to be cleaned.

In operation, a wire or other elongated article to be cleaned of insulation or the like is inserted through aperture 11 in cutting tip 10 to a depth which has been predetermined by setting the abutment shaft 27 within tube 21. Presuming the heating element 3 has been previously actuated, metallic barrel 2 has become heated, and the heat is transferred into cutting tip 10 so that as the cutting tip is rotated about the periphery of heat softenable material maintaining at least a portion of embossment 14 or 54 in contact therewith, the insulation or heat softenable material will become softened at that particular annular position and can easily be removed either by hand or by exerting a stripping force against the insulation to be removed by way of the shoulder 13 or embossment 54. In this manner, the insulation may be removed from a wire without utilizing a knife or sharp mechanical cutting jaws, thus eliminating the possibility of nicks, abrasions, and scratches in the wire. Additionally, it has been found that the operation may be performed in corners or other practically inaccessible positions as long as enough room is present to allow insertion of the wire into tube 21. One feature of this invention resides in the fact that such wires may be cleaned of insulation in an "eccentric" motion of the heated stripping tool without having to rotate the entire handle 360° around the wire.

It should be noted that mounting bracket 15 and stop assembly 20 are physically attached to handle assembly 1 at a point remote from the highest heat concentration of metallic barrel 2 and its contained cutting tip 10. Thus the stop means 20 does not heat up so that it constitutes a danger to the user. In fact, it has been found that what little heat is transferred to the stop assembly 20 is dissipated so rapidly that it may be used as a handle or as a supporting device when the tool is laid on a bench or the like.

The tool has been found to have little or no adverse effect upon the dielectric characteristics of the insulation or covering material removed from elongated bodies, and this is especially attributed to the fact that a low amount of heat is actually necessary to soften most insulations. The underlying wires from which insulation has been removed are relatively cool to the touch and may be handled immediately after insulation is removed therefrom. As each wire requires only a few seconds for insulation removal, a large number of wires may be cleaned and readied for later connection in a fraction of the time heretofore required, and with the elimination of any possibility of nicking, scraping, or otherwise rendering unacceptable the bared conductor.

While certain preferred embodiments of the invention have been shown and described, it should be understood that the invention is not to be limited thereto as further modifications will be apparent to those skilled in this particular art. My invention, therefore, is to be limited only by the terms of the following claims.

What is claimed is:

1. A device for removing heat softenable covering from elongated articles comprising a handle member, an interchangeable, heated "cutting" means removably secured to said handle member, said cutting means comprising a singular heat conductive body having at least one elongated article receiving circular aperture in an end portion thereof, at least one of said apertures being conically beveled on both the front and rear faces of said heat conductive body, the inner diameters of said bevels being substantially coterminative, and an adjustable stop means adjacent said "cutting" means and attached to said handle member for predetermining the length of covering removed from an elongated article.

2. A device for removing heat softenable covering from elongated articles comprising a handle member, an interchangeable, heated "cutting" means removably secured to said handle member, said cutting means comprising a singular heat conductive body having at least one elongated article receiving circular aperture in an end portion thereof, the peripheral surface of at least one of said apertures containing a shoulder which is substantially normal to the axis of said aperture, and an adjustable stop means adjacent said "cutting" means and attached to said handle member for predetermining the length of covering removed from an elongated article.

3. A device for removing heat softenable insulation from electric wires comprising a handle member containing a heating element in an end portion thereof, a circular aperture in said end portion adapted to receive insulated wires therethrough, and stop means adjacent said aperture for predetermining the distance a wire may be inserted through said aperture, said stop means being attached to said handle member at a point remote from said end portion, said stop means comprising a tubular member coaxially related to said aperture, an abutment shaft slidably, adjustably secured therein, the wall forming the peripheral surface of said aperture being provided with a shoulder facing said tubular member which is substantially normal to the axis of said aperture.

4. A device for removing heat softenable insulation from electric wires as claimed in claim 3 in which said aperture has generally conically beveled walls converging toward the rear surface of said end portion.

5. A device for removing heat softenable insulation from electric wires as claimed in claim 4 in which said beveled walls approach said rear surface at an angle of at least forty-five degrees from the axis of said aperture.

6. A device for removing heat softenable covering from elongated articles comprising a handle member, a singular interchangeable heated "cutting" means removably secured to said handle member, at least one elongated article receiving circular aperture in said "cutting" means, an adjustable stop means adjacent said "cutting" means and attached to said handle member at a point remote from said heated "cutting" means, said stop means comprising a tubular member having a common axis with said aperture, and an adjustable abutment means slidably journaled within said tubular member for limiting the distance an elongated article may be inserted thereinto, said abutment means comprising a stop shaft journaled within said tubular member, said stop shaft being externally graduated, the end of said tubular member opposite said cutting means being provided with a threaded portion of diminishing diameter, at least two longitudinal slots in the threaded portion thereof, and a nut threaded upon said threaded portion, whereby, as said nut is tightened, said portion of diminishing diameter clamps said stop shaft in a preselected position.

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