

Dec. 28, 1965

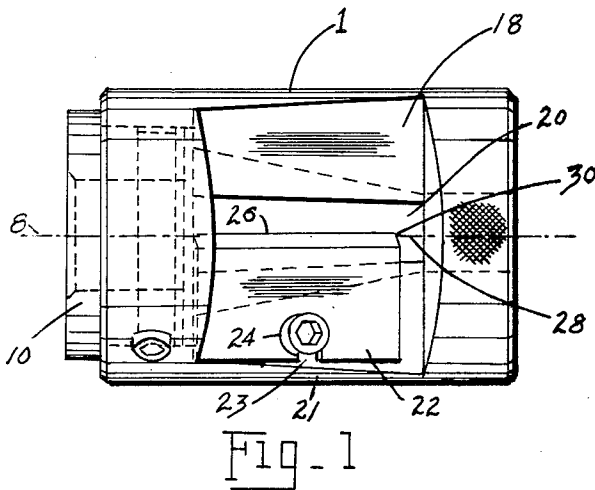
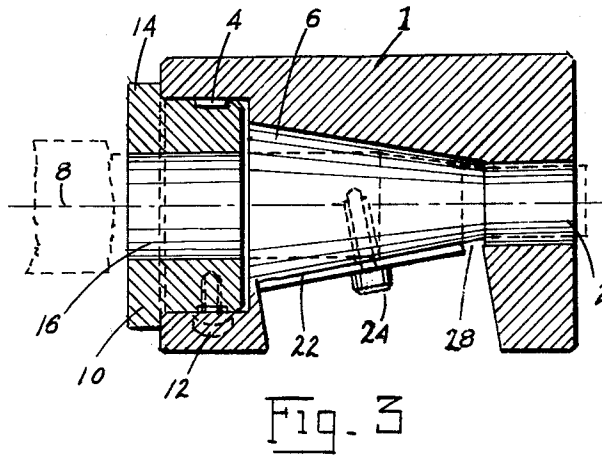
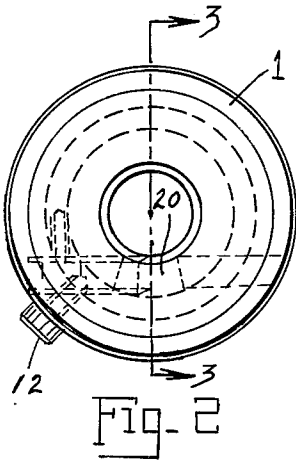
R. G. HORROCKS

3,225,629

DEVICE FOR REMOVING INSULATION FROM CABLES

Filed Feb. 27, 1964

2 Sheets-Sheet 1



INVENTOR
RAYMOND G. HORROCKS
WATTS & FISHER
BY *R. Durato*
ATTORNEYS

Dec. 28, 1965

R. G. HORROCKS

3,225,629

DEVICE FOR REMOVING INSULATION FROM CABLES

Filed Feb. 27, 1964

2 Sheets-Sheet 2

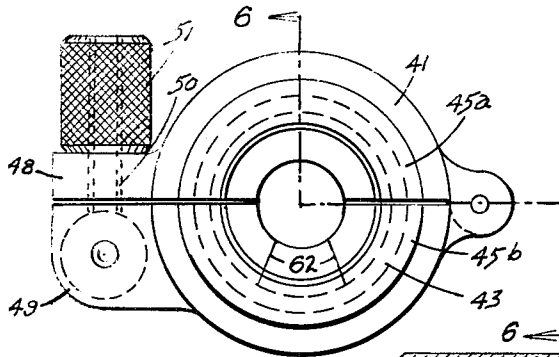


Fig. 5

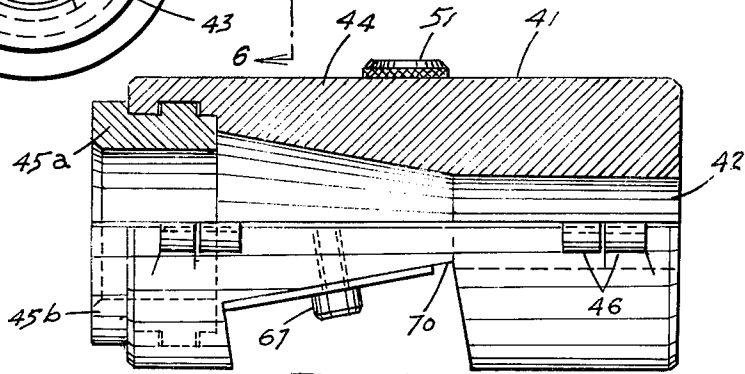


Fig. 6

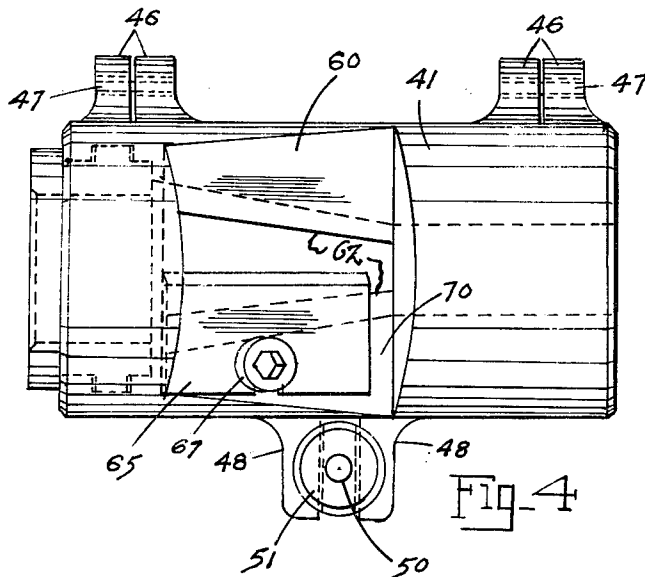


Fig. 4

INVENTOR.
RAYMOND G. HORROCKS
WATTS & FISHER
BY *R. L. Watts*

ATTORNEYS

1

3,225,629

DEVICE FOR REMOVING INSULATION FROM CABLES

Raymond G. Horrocks, Lakewood, Ohio, assignor to PLM Products, Inc.

Filed Feb. 27, 1964, Ser. No. 347,836

4 Claims. (Cl. 81-9.5)

This invention relates to the art of removing insulation from an electrical conductor preparatory to joining the bare conductor to another similar conductor or to a terminal and is particularly concerned with a new tool which can be used manually to remove the insulation and in doing so to form a substantially perfectly beveled surface and also to remove the semi-conductive material in contact with the bare conductor without damaging the latter.

It will be understood that electrical conductors which are to carry high voltage current are covered by shielding which is thin and in close engagement with the bare cable and that the shielding is surrounded by a thick layer of a plastic composition, for example, polyvinyl chloride, polyethylene, cross linked polyethylene, high density polyethylene and the like. Such insulation is hard and difficult to cut and the conductor may not be exactly coaxial with the insulation. When the cutting is accomplished by a knife in the hands of an operator, the resulting surface of the insulation is often not uniformly beveled. When the insulation is removed mechanically, there is danger of nicking the conductor if the semi-conductive material is removed by the blade action of the cutter or the semi-conductive material may clog the device.

Such non-uniformity of beveling often results in abnormal dielectric stresses in, and ultimate failure of, the connection between the conductor and another conductor or terminal. Nicking of the conductor creates stress points which may cause failure of the insulation.

Various devices have been proposed for removing the insulation and the semiconductive material from electric conductors but, so far as I am aware, none of these proposals has been entirely satisfactory.

The present invention aims to avoid all such prior difficulties and provides a tool which has been found to be highly satisfactory in commercial use not only in removing the insulation and forming a uniformly beveled surface thereon, but also in removing semiconductive material, particularly such material when extruded over the bare conductor, without causing any damage to the cable.

The illustrated structure embodying the present invention may be briefly described as comprising a body and a cutting blade removably connected to prevent relative movement. The body has an aperture extending there-through, the intermediate portion of which is frusto-conical and has a longitudinally extending slot. The cutting blade is positioned with its cutting edge disposed in a plane passing through the axis of said apertures and the slot and tangent to a circle having a radius slightly less than the radius of said intermediate portion of the aperture.

The present invention will be better understood by those skilled in the art from the following specification read in conjunction with the drawings which accompany it and in which:

FIGURE 1 is a top plan view of a tool embodying the present invention;

FIGURE 2 is an end elevational view of the tool of FIGURE 1;

FIGURE 3 is a cross sectional view taken on line 3-3 of FIG. 2; and

FIGURES 4, 5 and 6 are similar to FIGURES 1, 2 and 3 but show a modified form of the invention.

In the drawing, 1 designates a cylindrical body which has a small diameter end aperture 2 in one end, a large

2

diameter aperture 4 in the other end, and a frusto-conical aperture 6 connecting the two end apertures. All these apertures are coaxial, that is, their axes lie on a single axis 8 which is indicated in FIGS. 1 and 3.

The large end aperture 4 is provided with an adapter 10 which has a cylindrical portion fitting closely in aperture 4 and held in place therein by a cap screw 12, and a flange 14 which bears against the adjacent end surface of the body 1. This adapter 10 has an opening 16 which is coaxial with the axis of the large and small end apertures and the frusto-conical aperture. The diameter of the opening 16 varies in different adapters to accommodate conductors having insulation of different diameters, the intent being that the diameter of opening 16 shall be only slightly larger, for example, .06" greater, than the outside diameter of the insulation of a conductor from which the tool is to remove the insulation. The aperture 2 should have a diameter which is only slightly larger, for example not more than .045" greater, than the bare conductor.

The mid-portion of body 1 is provided with a recess by being cut away, as is indicated at 18, on a plane parallel to the side of the conical aperture and the cutting away extends inwardly far enough to remove part of that conical surface, for example, up to about .06", with the resultant formation of a slot 20 which extends longitudinally of body 1 from closely adjacent to the large aperture 4 to the opposed end of small aperture 2.

A blade 22 bears against the surface of body 1 adjacent to one side of slot 20 and is provided with a screw notch 23 through which a cap screw 24 may extend into body 1 for adjustably securing the blade in proper position with respect to the slot 20 and the insulation on the cable on the body. As is shown in FIGS. 1 and 2, the blade 22 has a cutting edge 26 which lies between the adjacent side of the slot 20 and a plane passing through the slot and the axis of the apertures and which lies tangent to a circle having a radius which is less than that of the frusto-conical aperture by an amount which is substantially equal to the desired thickness of the insulation to be removed in one cut. When the blade is so positioned and the tool and cable are relatively rotated, for example, the tool is rotated counterclockwise, the blade will remove insulation from the cable and form a substantially uniformly beveled surface on the insulation.

It will be noted in FIGS. 1 and 3 that the blade 22 and its edge 26 extend from adjacent to the large end aperture 4 toward but stop short of the small end aperture 2 thereby providing a space 28 between the end of the blade and the opposed body surface 30 which was formed when the body was cut away as above described. The space 28 serves as an escape hatch through which semiconductive material in contact with the metal conductor may be removed without passing into the small end aperture 2 and clogging the tool. Since the end 30 of the cutting edge 26 is disposed just out of contact with the bare conductor, and the latter has a fit in end aperture 2 which prevents any substantial lateral movement of the conductor relative to end 30 of edge 26, all danger of nicking or otherwise damaging the cable by reason of engagement of the cutting edge with it is avoided.

FIGURES 4, 5 and 6 show a modified form of the invention which resembles that shown in FIGS. 1 to 3. The body 41 is quite like body 1 of FIGURES 1 to 3 and has a small end aperture 42 in one end, a large diameter aperture 43 at the other end and a frusto-conical aperture 44 joining these two end apertures, all these apertures being coaxial. The end aperture 43 is provided with an adapter which consists of two semi-cylindrical parts 45a and 45b. The body 41 is made up of two semi-cylindrical parts each having a pair of ears 46, each pair being

3

pivotally connected by pivot pins 47. One of the body parts 41 has two lugs 48 projecting outwardly on the side opposite ears 46. The other part of body 41 has a similar pair of outwardly projecting lugs 49 between which is pivoted a threaded bolt 50 having a nut 51 threaded thereon.

The body parts 41 are cut away or milled as shown at 60 thereby forming a recess having an opening or slot into the frusto-conical aperture and defined by edges 62 on the body. A cutting tool 65 is secured against the milled surface with its cutting edge lying between the adjacent side of the slot formed by edges 62 and a plane which passes through the slot and the axis of the aperture 44, and lies tangent to a circle having a radius which is less than that of the frusto-conical aperture by an amount which is substantially equal to the radial thickness of the insulation to be removed from the cable in one cut. This cutting tool 65 is secured in place by a cap screw 67 which extends through a notch in one side of the tool.

It will be noted that the end of the cutting tool 65 is substantially in abutting contact with the transverse surface of the body adjacent to the larger end of the frusto-conical aperture and that the cutting tool stops short of the transverse surface adjacent to the small end of aperture 42, as is indicated by the space 70 on FIGURES 4 and 5.

It will be understood that the pivotally connected parts may be opened up sufficiently for an insulated cable to be placed between the body and adapter and then the latter may be brought together around the cable and secured in that position by nut 51 and bolt 50.

The device of FIGURES 4 to 6, after being clamped in place around an insulated cable, may be rotated around the cable in a direction which will cause the cutting tool 65 to remove insulation from the cable, for example, clockwise as seen in FIG. 5. However, the end of the cutting tool adjacent to the small end of aperture 42 does not extend radially toward the cable far enough to engage the metal thereof after removal of the insulation. Any shielding material which may surround the metal part of the cable within the insulation may not be severed by the cutting tool and, if not, it will be dislodged by the edge 62 of the slot and will escape through space 70.

Having thus described this invention in such full, clear, concise and exact terms as to enable any person skilled in the art to which it pertains to make and use the same, and having set forth the best mode contemplated of carrying out this invention, I state that the subject matter which I regard as being my invention is particularly pointed out and distinctly claimed in what is claimed, it being understood that equivalents or modifications of, or substitutions for, parts of the above specifically described embodiment of the invention may be made without departing from the scope of the invention as set forth in what is claimed.

What is claimed is:

1. A tool for removing insulating and semi-conductive material from an electric conductor, said tool comprising:

(a) a body comprising two hingedly connected semi-cylindrical parts provided with means to clamp them together, said body having an aperture extending therethrough and including coaxial, large and small diameter end portions and a frusto-conical intermediate portion, an adapter comprising two semi-cylindrical parts removably secured in said large end portion and having an aperture coaxial with said aperture in the body and only slightly greater in diameter than the diameter of the insulated conductor, the diameter of the small end portion of the aperture in the body being only slightly greater than that of the bare conductor,

(b) the body having a slot in said intermediate portion of the aperture extending longitudinally from

4

the small end portion to adjacent to the large end portion of the aperture,

(c) and a blade removably secured to the body against movement relative thereto, said blade being positioned along one side of said slot and having a cutting edge extending into the intermediate portion of the aperture between the adjacent side of the slot and a plane passing through the axis of said aperture and through the slot, said edge being tangent to a circle having a radius which is less than the radius of the intermediate portion of the aperture by the desired thickness of insulation to be removed in one cut, said edge extending from adjacent to the large end aperture to within a short distance of the small end aperture, the space between the end of the blade and the small end portion of the aperture serving as an escape hatch for semi-conductive material as it is removed from a conductor by said cutting edge.

2. A tool, for removing insulation and semi-conductive material from an electrical conductor, comprising:

(a) a cylindrical body having an aperture extending therethrough and including coaxial, large and small diameter cylindrical end portions only slightly larger in diameter than those of the insulated conductor and the bare conductor, respectively, and a frusto-conical intermediate portion, said body having a recess formed by being cut away on a plane substantially parallel to the adjacent side of said intermediate portion and intersecting the surfaces thereof to form a longitudinal slot,

(b) a blade in said recess having a side surface positioned on said plane and a substantially straight cutting edge disposed in a plane through said axis and slot, and tangent to a circle having a radius which is less than the radius of the intermediate portion by the desired thickness of insulation to be removed in one cut, said edge extending from adjacent to the large end of said frusto-conical aperture to within a short distance of the small end of said frusto-conical aperture, the space between the end of said cutting edge and the adjacent end of the small end aperture of the body serving as an escape hatch for semi-conductive material as it is removed from the conductor by said cutting edge,

(c) and means in the recess for removably securing the blade to the body against relative rotation of the blade and body.

3. The combination of elements set forth in claim 2 in which an adapter is removably secured in said body and carries the said large diameter end portion of the axial aperture.

4. The combination of elements set forth in claim 2 in which the recess is partly defined by substantially parallel surfaces extending transversely of the body adjacent to the ends of said intermediate portion and substantially normal to the adjacent side of the said intermediate portion.

References Cited by the Examiner

UNITED STATES PATENTS

585,670	7/1897	Graves	120—87
1,534,547	4/1925	Rupp	120—85
2,519,854	8/1950	Schar	120—85
3,057,232	10/1962	Cornell	81—9.5
3,125,835	3/1964	Crowl et al.	81—9.5

FOREIGN PATENTS

768,853	2/1957	Great Britain.
---------	--------	----------------

WILLIAM FELDMAN, *Primary Examiner*.

MILTON S. MEHR, *Examiner*.