Dec. 8, 1931. W. M. HILL ET AL 1,835,597

APPARATUS FOR WORKING STRAND COVERINGS

Filed Jan. 1, 1930 2 Sheets-Sheet 1

Fig. 1.

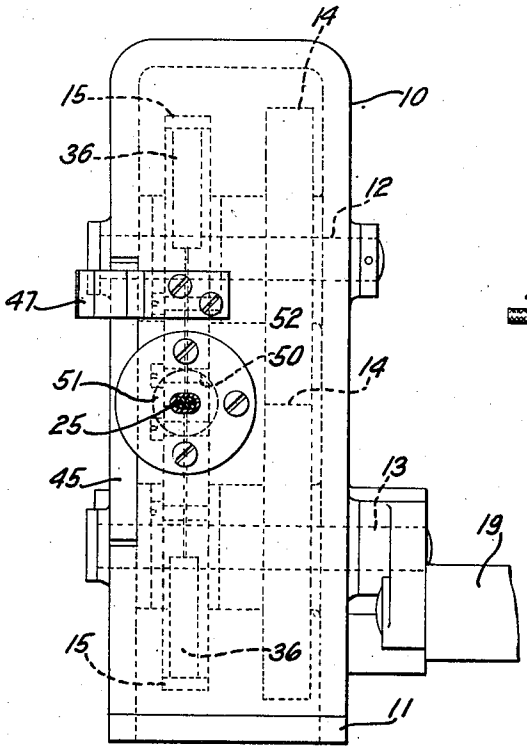


Fig. 5.

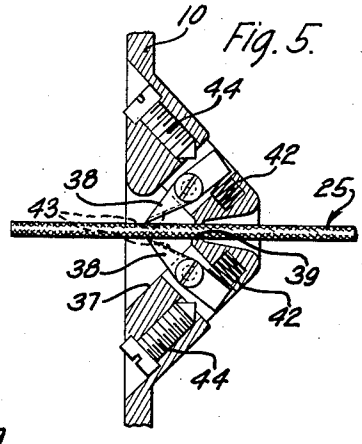


Fig. 6.

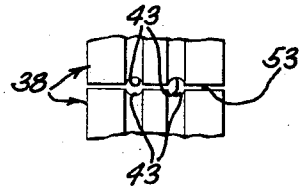


Fig. 7.

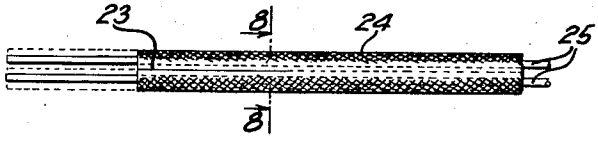
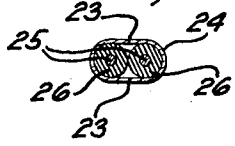


Fig. 8.



Inventors
Walter M. Hill
Robert E. McFarland
By H. B. Whitfield Att'y.

Dec. 8, 1931. W. M. HILL ET AL 1,835,597

APPARATUS FOR WORKING STRAND COVERINGS

Filed Jan. 1, 1930 2 Sheets-Sheet 2

Fig. 3.

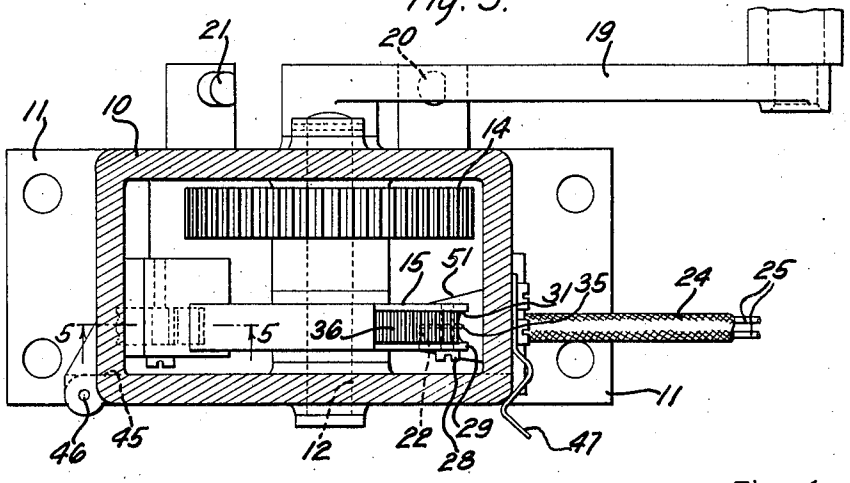


Fig. 2.

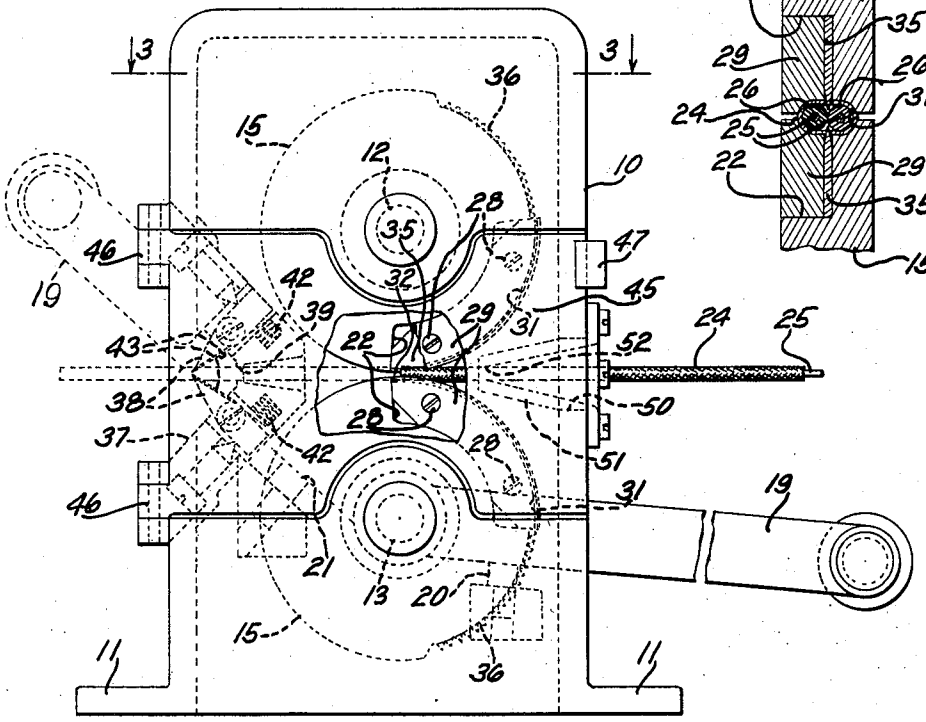


Fig. 4.

Inventors
Walter M. Hill
Robert E. McFarland
By H. B. Whitfield Att'y.

Patented Dec. 8, 1931 1,835,597

UNITED STATES PATENT OFFICE

WALTER M. HILL, OF CHICAGO, AND ROBERT E. McFARLAND, OF LA GRANGE, ILLINOIS, ASSIGNORS TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

APPARATUS FOR WORKING STRAND COVERINGS

Application filed January 1, 1930. Serial No. 417,838.

This invention relates to apparatus for working strand coverings, and more particularly to apparatus for slitting a common covering of and removing the individual insulation from the ends of parallelly arranged electrical conductors.

This invention has been found particularly useful in preparing the ends of individually insulated, parallelly arranged electrical conductors sheathed in a common braided covering so that they may be connected to associated electrical apparatus or circuits. Heretofore in some instances this has been accomplished by manually slitting in a longitudinal direction the braided covering intermediate the two insulated conductors for a suitable distance from their ends with a hand knife and thereafter laterally severing the braided covering and insulation by the same means at an intermediate point, and then stripping the covering and the individual insulations from the conductors by means of pliers.

The primary object of this invention is to provide an apparatus for accurately slitting a common covering of and removing individual insulation from the ends of parallelly arranged electrical conductors in a facile manner.

In accordance with one embodiment of this invention there is provided a pair of opposed manually driven rolls provided with cooperating peripheral grooves of a predetermined length for receiving therebetween a sheathed pair of individually insulated parallelly arranged electrical conductors, the grooves being substantially spanned throughout their length by opposed knives carried by the rolls for slitting the sheath at diametrically opposite sides for a predetermined length as the pair of conductors are advanced therebetween. Following the slitting operation opposed serrated peripheral portions of the rolls advance the conductors between and beyond two opposed, spring pressed pivoted knives to a predetermined point. The conductors are then retracted by a reverse movement of the rolls by the opposed serrated peripheral portions thereof, whereupon the knives become effective for cutting laterally through the sheath and the insulation of the individual conductors at a predetermined point intermediate the length of the slitted portion of the sheath, the continued retraction of the conductors stripping the laterally severed portion of the sheath and insulation from the conductors.

Other objects and advantages of this invention will more clearly appear from the following detailed description, taken in connection with the accompanying drawings, wherein

Fig. 1 is a fragmentary elevation of an apparatus embodying the features of this invention;

Fig. 2 is a fragmentary side view thereof with a portion of a housing for the apparatus removed to show the initial position of the conductors before the operation of the apparatus;

Fig. 3 is a transverse section taken on the line 3—3 of Fig. 2;

Fig. 4 is an enlarged fragmentary vertical detail section through the rolls, showing the relative positions of the knives carried by the rolls and the conductors during the sheath slitting operation;

Fig. 5 is a vertical detail section taken on the line 5—5 of Fig. 3, showing the conductors in their completely advanced position between the rolls and before the retraction thereof to laterally sever the covering and insulation and the subsequent stripping thereof from the conductors;

Fig. 6 is an enlarged fragmentary detail view of the opposed spring pressed pivotal cutting and stripping knives, looking in the direction in which the conductors are advanced;

Fig. 7 is an enlarged fragmentary plan view of a pair of sheathed and insulated conductors after their ends have been operated upon by the apparatus of this invention, and

Fig. 8 is an enlarged vertical sectional view taken on the line 8—8 of Fig. 7.

Referring now to the drawings in detail wherein like reference numerals designate similar parts throughout the several views, and particularly to Fig. 2, there is provided a housing 10 having base lugs 11 for securing

the housing to a bench surface or other support. Within the housing is journaled a pair of shafts 12 and 13, each having keyed thereto a gear 14 and a roll 15 (Fig. 1), the gears being similar and intermeshing and the rolls being arranged in opposed cooperating relationship, with their adjacent peripheral surfaces slightly spaced apart, as clearly shown in Fig. 2. The lower shaft 13 extends for a distance outside the wall of the housing 10 and has fixed thereto a hand crank 19, which in the normal position of the apparatus lies substantially in a horizontal position, as clearly shown in Fig. 2, and rests against a stop pin 20 mounted in a lug integral with the housing 10. It will be apparent that by moving the crank 19 counterclockwise to the dotted outline position the rolls 15 will be rotated at the same speed in opposite directions and for identical distances by means of the similar intermeshing gears 14. The movement of the crank counterclockwise is limited by a stop pin 21 mounted in a manner similar to that of the stop pin 20.

The rolls 15 are arranged in the same vertical plane and are similar in construction, except one is left hand and the other right hand, so that a description of one of the rolls will apply to both. A curved pocket 22 is formed in the forward side face of the roll 15 extending inwardly from the periphery thereof and therearound for a distance substantially equal to the length of a slit 23 to be formed in a common braided sheath 24 covering a pair of parallelly disposed electrical conductors 25, each having an individual rubber sheath 26, as clearly shown in Figs. 7 and 8. Although the conductors 25 are described and illustrated as being individually insulated, it will be obvious that the slitting, severing and stripping operations to be presently described may be performed equally well with the apparatus of this invention upon conductors insulated with a common insulating sheath. Secured by screws 28 to the roll 15 within the pocket 22 is a plate 29 which substantially fills the pocket and is flush at its outer edge with the periphery of the roll along the length of the pocket (Figs. 2, 3 and 4). The inner peripheral edge and surface of the plate 29 and the corresponding edge and surface of the roll 15 along the length of the pocket and for a predetermined distance from one end thereof are provided with complementary grooves 31 which with the corresponding grooves in the opposed roll 15 cooperate to grip and advance the covered conductors 25 during the operation of the apparatus (Fig. 4). As indicated at 32 in Fig. 2, when the apparatus is in its normal position, one end of the grooves 31 terminate on a line substantially joining the axes of the rolls 15.

Clamped between the opposed surfaces of the pocket 22 and the plate 29 is a knife blade 35 (Figs. 3 and 4), the outer cutting edge of the blade lying slightly within the periphery of the roll 15 and the plate 29, as clearly shown in Fig. 4. During the operation of the apparatus the opposed knife blades 35 carried by the rolls 15 span the distance between the opposed grooves 31 of the rolls sufficiently to cut through the braided sheath 24 upon opposite sides thereof, but do not cut into the insulation 26 of the conductors 25. The peripheral surface of the rolls 15 for a predetermined distance beginning at one end of the knife blade 35 is serrated or toothed as indicated at 36, the diameter of the roll along this portion being slightly less in diameter than the rest of the roll, but slightly greater than the depth of the grooves 31, as clearly shown in Fig. 2, the purpose of which will appear hereinafter.

The left vertical wall of the housing 10 has a depressed apertured portion 37 coaxial with the conductors 25 as they are advanced by the rolls 15 and pivoted upon the portion 37 in opposed relation in a vertical plane are a pair of knife blades 38 (Figs. 2, 5 and 6), the opposed cutting ends of which normally are in the path of the conductors 25 as they are advanced through an aperture 39 (Fig. 5) substantially the size and shape of the covered conductors, by the cooperating rolls 15. Suitably mounted compression springs 42 pressing against the inner ends of the knife blades 38 hold them in their normal position with their cutting ends, which are grooved as indicated at 43 (Fig. 6), sufficiently spaced from each other to prevent cutting into the metal conductors 25 during the operation of the apparatus. The movement of the knife blades 38 inwardly by the springs 42 is limited by adjustable stop screws 44 engaging the knife blades in opposed relation to the springs.

The forward wall of the housing 10 intermediate the axes of the shafts 12 and 13 is provided with a hinged cover 45 for the purpose of facilitating the replacement of the knife blades 35 when they become dull, the cover being hinged at one end as indicated at 46, while at the opposite end a spring clip 47 normally holds the cover in a closed position. In an aperture 50 formed in the front wall of the housing 10, as viewed in Fig. 1, is mounted a nozzle 51, whose dimensions at its inner end 52 are substantially the size and shape of the covered conductors 25, the greatest dimension thereof extending horizontally and coaxially aligned with the opposed grooves 31 in the rolls 15.

In the operation of the apparatus the hand crank 19 should be in its lowered normal position as shown in Fig. 2 and against the stop pin 20, thus positioning the ends 32 of the opposed grooves 31 of the rolls 15 substantially in a plane coinciding with the axes of the rolls as hereinbefore described. The

operator then inserts the end of the covered parallel conductors 25 which are to be slit and stripped into the nozzle 51 with the greatest width of the conductors positioned in a horizontal plane and threads the end through the inner end 52 thereof, which it closely fills and into engagement with the opposed knife blades 35 which substantially span the opposed grooves 31 of the rolls 15 with sufficient pressure to wedge the ends fairly tight therebetween, as clearly illustrated in Fig. 2.

The hand crank 19 is then rocked counterclockwise until it comes to a stop against the stop pin 21, as shown fragmentarily in dotted outline (Fig. 2). During this movement of the hand crank 19 it will be apparent from the description hereinbefore given that the rolls 15 will rotate in opposite directions with their adjacent peripheral surfaces, which are slightly spaced apart, moving towards the left (Fig. 2). Due to the cooperating pressure of the opposite side surfaces of the opposed grooves 31 of the rolls 15 upon the covered conductors 25 (Fig. 4), the conductors will be advanced a predetermined distance towards the left through the aperture 39 in the depressed portion 37 of the left hand wall of the housing 10 into engagement with the opposed cutting edges of the pivotal spring pressed knife blades 38 which swing outwardly, as clearly shown in Fig. 5. At the end of the movement of the conductors 25 the ends thereof are spaced from the cutting edges of the knife blades 38 a predetermined distance, as shown in Fig. 5. This is the length of the covering 24 and the insulation 26 which is to be stripped from the conductors 25 when the conductors are retracted, which operation will be presently described.

Simultaneously with the advance of the conductors 25, as just described, the knife blades 35 carried by the opposed rolls 15 which are engaged with the braided covering 24 at diametrically opposite points thereof and slit it longitudinally for a predetermined length beginning at the end of the conductors. Near the end of the advance of the conductors 25 by the cooperating grooves 31 of the rolls 15 the opposed serrated peripheral surfaces 36 of the rolls engage the braided covering 24 and continue the advance of the conductors to the position shown in Fig. 5 to the left of the cutting ends of the knife blades 38.

The hand crank 19 is then moved clockwise back to its normal position in one continuous operation, which immediately sets the rolls 15 in reverse motion to retract the conductors 25 from between the pivotal spring pressed knife blades 38, the opposed serrated surfaces 36 serving firmly to grip the conductors so that they will positively be drawn back. This movement of the conductors 25, it will be obvious, causes the cutting edges of the opposed knife blades 38 to catch in the braided sheath 24, facilitated by the pressure of the springs 42, and as the conductors continue to move back the blades will rock about their pivots until their cutting edges reach their normal position, as shown in dotted outline in Fig. 2, the movement of the blades being stopped by the stop screws 44.

In this latter position of the knife blades 38 the common braided covering 24 and the individual insulation 26 have been severed completely around the conductors 25, except possibly for a very minute thickness, due to a horizontal clearance indicated at 53 (Fig. 6) provided between the cutting edges of the blades to prevent the blades from cutting or marring the metal conductors. The continued movement of the covered parallel conductors 25 still gripped between the serrated surfaces 36 of the moving rolls 15 breaks any unsevered portion of the covering 24 and the insulation 26 and strips the severed strip of covering and insulation as a whole from the conductors and the severed strip of covering and insulation falls from the ends of the conductors and may be caught in a receptacle (not shown). The conductors 25 are then removed manually from between the rolls 15 through the nozzle 51, the stripped ends of the conductors appearing as shown in Fig. 7 with a suitable length thereof beginning at the ends bared of all braided covering and insulation and the covering slit upon opposite sides between the insulated conductors for a suitable length from the inner end of the bared portion of the conductors for facilitating the connecting thereof to electrical apparatus or circuits.

It will be understood that by substituting other sets of rolls 15 having differently formed peripheral grooves 31 and correspondingly different associated severing blades 38 and carrying slitting blades 35 and serrated peripheral surfaces 36 of varying lengths a wide range of conductors of different diameters with different lengths of covering and insulation to be slitted, severed and stripped therefrom may be produced.

Although the invention as herein illustrated and described is particularly well adapted for use in connection with the slitting, severing and stripping of coverings and insulation of electrical conductors, it should be understood that the novel features thereof are capable of other applications and should be limited only by the scope of the appended claims.

What is claimed is:

1. In apparatus for working strand coverings, means for advancing and retracting a plurality of strands having a common covering, means effective during the advancement of the strands for longitudinally slitting the

covering for a predetermined length, and severing means engaged by the covered strands during their advancement effective upon a retraction of the strands for laterally severing the slitted portion of the covering advanced past the severing means and stripping it from the strands.

2. In apparatus for working strand coverings, means for longitudinally advancing and retracting a plurality of strands having a common covering, means effective during the advancement of the strands for longitudinally slitting the covering for a predetermined length, and severing means engaged by the covered strands during their advancement effective upon a retraction of the strands for laterally severing the covering at a predetermined point along the length of the slitted portion thereof and stripping the severed portion of the covering from the strands.

3. In apparatus for working electrical conductor coverings, opposed movable members for longitudinally advancing and retracting for predetermined distances a plurality of individually insulated parallelly arranged conductors having a common covering, means controlled by the conductor advancing means during the advancement of the conductors for longitudinally slitting the covering for a predetermined length, opposed movable knife blades disposed in the path of the conductors and movable thereby to positions upon opposite points of the covered conductors as the conductors advance thereby and effective upon a retraction of the conductors for laterally severing the slitted portion of the covering advanced past the knife blades together with a corresponding length of the individual insulation upon the conductors and stripping the whole therefrom, and means for operating the movable members.

4. In apparatus for working electrical conductor coverings, opposed rolls provided with aligned peripheral grooves and serrated portions for longitudinally advancing and retracting a plurality of individually insulated parallelly arranged conductors having a common covering, aligned knife blades carried by the rolls substantially spanning the grooves thereof and extending for a predetermined distance therealong for longitudinally slitting the covering upon opposite sides for a predetermined length during the advancement of the conductors by the grooves, the cooperating serrated portions then being effective to continue the advance, opposed pivotal spring pressed aligned knife blades disposed in the path of the conductors and movable thereby to positions upon opposite points of the covered conductors as the conductors advance thereby and effective upon a retraction of the conductors for laterally severing the slitted portion of the covering advanced past the knife blades together with a corresponding length of the individual insulation upon the conductors and stripping the whole therefrom, and means for simultaneously rotating the rolls at the same speed in opposite directions and for identical predetermined distances during the advancement and retraction, respectively, of the conductors.

5. In an apparatus for removing strand coverings, opposed driven rolls for advancing a covered strand therebetween, and an arcuate knife blade carried on the periphery of one roll and extended partially around and of a length less than the circumference thereof to slit the covering of the advancing strand for a predetermined length corresponding with the length of the knife but less than the circumference of the roll.

In witness whereof, we hereunto subscribe our names this 20th day of December A. D., 1929.

WALTER M. HILL.
ROBERT E. McFARLAND