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MEANS FOR INSULATING ELECTRICAL CONDUCTORS.

APPLICATION FILED SEPT. 16, 1921.

1,432,933. **Patented Oct. 24, 1922.**

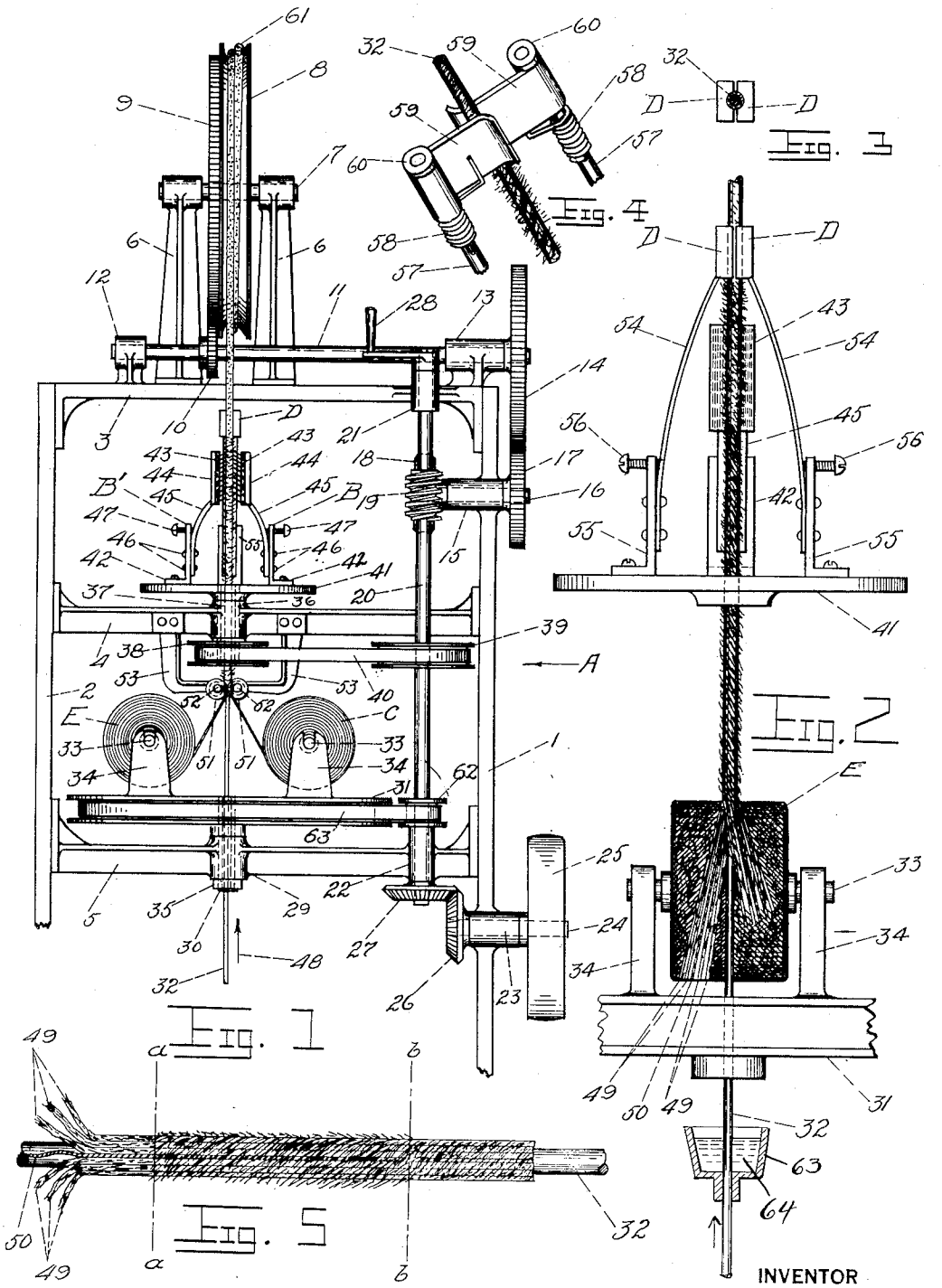


Fig. 1

Fig. 5

Fig. 2

Fig. 3

Fig. 4

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UNITED STATES PATENT OFFICE.

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Application filed September 16, 1921. Serial No. 501,065.

To all whom it may concern:

Be it known that I, CHARLES J. WENNERSTROM, a citizen of the United States, and a resident of York, county of York, State of Pennsylvania, have invented certain new and useful Improvements in Means for Insulating Electrical Conductors, of which the following is a specification.

This invention relates to a machine for insulating electrical conductors with fibrous asbestos and other fibrous materials.

The object of this invention is to apply the fibrous insulating material to the wire in the form of roving, having a uniform quantity of fibrous material per unit of length, and then to distribute or spread the same over the entire surface of the wire, and thereby produce a covering of uniform thickness.

Another object is to provide means for covering the electrical conductor without rotating the fibrous insulating material at high speed around the wire.

It is well known that when rotating fibrous material around the wire at high speed, a certain percentage of the fibres become disengaged and fly into the air, thereby reducing the quantity which is applied to the wire and greatly increasing the cost of the insulating material which covers the wire. The fibres which fly in the air is waste material, and has little value, especially when asbestos fibres are employed, for they are then only useful for making low grade asbestos products. It cannot be recarded and made into roving again, because excessive carding reduces the fibres to shorter lengths, in which condition they cannot be formed into the roving.

With the insulating means herein shown and described practically all of the fibres which are formed into the roving goes on the wire, and remains there, the same being distributed and spread over the surface of the wire with very little or no loss in fibres.

Asbestos roving has very little strength, it cannot be wound from a ball directly on the wire as is usually done when insulating wire with cotton threads, because there is not sufficient strength in the asbestos roving to rotate the ball to unwind the same, therefore a further object of this invention is to provide a new means for applying roving to the wire with assurance that at all times the ball will rotate and unwind the roving as it is laid upon the wire.

Other new and novel features will be apparent from the following description, taken in connection with the accompanying drawing forming a part hereof and in which similar numerals refer to similar parts throughout the several views.

Fig. 1, is a front elevation of an insulating machine embodying the principal features of this invention.

Fig. 2, is an enlarged side elevation of the flyers embodied in the construction shown in Fig. 1, looking in the direction indicated by the arrow A, and in which the spreading brush B and ball of asbestos C are not shown.

Fig. 3, is a plan view of the ironing device shown at D in Fig. 2.

Fig. 4, is a modified form of ironing device which may be used instead of the one shown at D, Fig. 2.

Fig. 5, is an enlarged view of the wire, in which the roving is laid parallel thereto, showing the condition of the insulating material in the various stages of its application.

Reference being had to the drawings, 1 and 2 are side frames which carry cross brackets 3, 4 and 5. The standards 6 are carried by the cross bracket 3. Into the standards 6 is journaled a shaft 7 which carries a pull-out wheel 8. The pull-out wheel 8 is provided with gear teeth as shown at 9 and into which meshes a pinion 10. The pinion 10 is carried by the shaft 11 which is journaled in the brackets 12 and 13; and also carries the gear 14.

Forming a part of the side frame 1 is a bearing 15 into which is journaled a shaft 16 which carried the gear 17, the same meshing with the gear 14, and the worm gear 18 which meshes with the worm 19. The worm 19 is carried by the vertical shaft 20 which is journaled in the bearings 21 and 22 as shown. The bearings 21 and 22 form part of the cross brackets 3 and 5 respectively.

Forming a part of the side frame 1 is a bearing 23 into which is journaled a shaft 24 which carries a pulley 25 and a bevel gear 26 as shown.

Carried by the vertical shaft 20 is a bevel gear 27, which meshes into bevel gear 26; and a crank 28. The crank 28 is for operating the machine by hand and the pulley 25 is for operating the machine by belt from a line shaft or the like.

Forming a part of the cross bracket 5 is a bearing 29 into which is journaled a hol-

low spindle 30. The hollow spindle 30 carries the flanged pulley 31 which in turn carries the balls of roving E and C around the wire 32; the same being rotated by the flanged pulley 62 through the belt 63. The balls of roving C and E are provided with spindles 33 which are journaled in the standards 34, forming part of the flanged pulley 31 as shown. A set collar 35 is fixed to the hollow spindle 30 by a set screw (not shown) to prevent the same from rising out of the bearing 29.

Forming a part of the cross bracket 4 is a bearing 36 into which is journaled a hollow spindle 37. The hollow spindle 37 carries the flanged pulley 38, the same being rotated by the flanged pulley 39 through the belt 40.

The hollow spindle 37 also carried the disk 41 to which is fixed as shown, angle pieces 42. Spreading brushes formed by the pieces of card clothing 43 and the brush backs 44 are carried by the angle pieces 42 through the flexible strips 45, the same being riveted as shown at 46. Adjusting screws 47 are provided so that the spreading brushes may be adjusted to have the proper space between the strips of card clothing 43 to accommodate various sizes and shapes of wire.

The operation of the machine is as follows:—

The vertical shaft 20 is caused to rotate, either by turning the crank 28 by hand or, by power through the pulley 25, shaft 24, and bevel gears 26 and 27. The spreading brushes B and B′ and the balls of asbestos roving C and E are caused to rotate by the vertical shaft 20 as herein before described.

The pull-out wheel 8 is caused to rotate and feed the wire 32 through the machine in the direction indicated by the arrow 48. The means for rotating the pull-out wheel 8, from the vertical shaft 20, is through the meshing of the gear teeth 9 into the pinion 10 which is caused to rotate through the shaft 11, gears 14 and 17, shaft 16, worm gear 18 and worm 19.

As the wire 32 is pulled through the machine in the direction indicated by the arrow 48, and the flanged pulley 31 is caused to rotate, the rovings from the balls C and E are wound spirally around the wire and substantially covers the same. As the wire passes between the spreading brushes B and B′ the roving is spread to a uniform thickness around the wire by the card clothing pieces 43.

After the roving has been spread to a uniform thickness around the wire, the same may be impregnated with a suitable water proofing material, or it may be covered with a braiding in the usual manner.

The roving for my method of insulating wire must be made very loose and with the fibers well separated so that an easy spreading condition is obtained. Roving of this character has very little strength; not sufficient to cause the balls C and E to rotate when tension is applied to unwind the same.

To add strength to the roving and thereby prevent the same from breaking I wind in the ball with the roving, a fine thread which has strength, such as a cotton thread twisted hard, or some other kind of fine filamentary body having sufficient strength and suitable insulating qualities. This thread is intermingled with the roving, is wound upon the wire with the roving, and adds strength to the roving to cause the balls C and E to rotate; thereby feeding the roving to the wire as it progresses forward in the direction indicated by arrow 48. This will be more fully understood by referring to Fig. 2 in which 49 indicates a series of rovings intermingled with a cotton thread 50.

Fig. 5, shows the series of rovings 49 and the thread 50 laid parallel to the wire 32. I prefer this method of laying the rovings and thread on the wire in preference to winding it spirally around the wire, but then the roving must be exactly of the proper weight to give the correct thickness to the insulation. There is an objection to this in the event that different thicknesses of insulation are to be furnished, for then different weights of roving must be kept in stock. When the rovings and thread are wound spirally upon the wire a variation in thickness of insulation may be obtained by increasing or decreasing the pitch of the spiral.

In the construction shown in Fig. 1 a variation in the pitch of the spiral may be accomplished by changing the rate of feed of the wire 32 relative to the speed of the flanged pulley 31; this can be done by changing the ratio of the gears 14 and 17.

If it is desired to lay the rovings and thread parallel to the wire as shown in Fig. 5, it may be done by removing the belt 34, when the flange pulley 31 will not rotate. In this event it will be necessary to employ pulleys as indicated at 51, which are free to rotate on the pins 52, carried by the brackets 53. The pulleys 51 are also of some value when the rovings and threads are wound spirally around the wire, in that they press the rovings close to the wire.

With this means for insulating electrical conductors I obtain the best results by first coating the bare wire with an adhesive, this may be accomplished by any of the well known methods employed for this purpose, one of which I have shown in Fig. 2, comprising a pot 63 filled with a liquid adhesive 64, through which the wire passes.

In many cases it is desirable to obtain a smooth finish to the surface of the roving after it is on the wire; to accomplish this I provide ironing dies D which are carried

by the disk 41 through the flexible ends 54, and angle pieces 55. The pressure exerted on the roving by the dies D is regulated by the adjusting screws 56.

A modified form of ironing device is shown in Fig. 4, which is adaptable for any size of wire within the limits for which it is made; it is intended that the rods 57 be mounted on the disk 41; the springs 58 cause the plates 59 to press against the roving. The set collars 60, prevents the plates 59 from stripping off the rods 57.

Referring to Fig. 5, the portion of the wire to the left of line *a*—*a* represents substantially the condition of the roving before it passes between the spreading brushes B and B′, the portion between the lines *a*—*a* and *b*—*b* represents substantially the condition of the roving after the action of the spreading brushes have taken effect, and the portion to the right of line *b*—*b* the condition after the ironing dies have done their work.

It is of course understood that the wire after leaving the pull-out wheel at the point 61 is finally wound upon a reel in the usual manner.

It is to be understood that it is possible to make modifications of the disclosures herein set forth without departing from the nature and scope of my invention as set forth in the claims.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is as follows:

1. In a wire covering machine the combination with means for moving the wire lengthwise, of means for covering the surface of the wire with an adhesive, means for mounting a ball of fibrous roving in a manner free to rotate and adapted whereby the roving is unwound from the ball through said lengthwise movement of the wire, means for pressing said roving on the surface of said wire, and brushes adapted to rotate around said wire and spread said fibrous roving over the surface thereof.

2. In a wire covering machine the combination with means for moving the wire lengthwise, of means for covering the surface of the wire with an adhesive, means for mounting a ball of fibrous roving in a manner free to rotate and adapted whereby the roving will lay upon the surface of said wire and cling thereto through said adhesive and also adapted whereby the roving is unwound from the ball through said lengthwise movement of the wire, and brushes adapted to rotate around said wire and spread said fibrous roving over the surface thereof.

3. In a wire covering machine the combination with means for moving the wire lengthwise, of means for covering the surface of said wire with an adhesive, and means for mounting a ball of fibrous roving in a manner free to rotate and adapted whereby the roving will lay upon the surface of said wire and cling thereto through said adhesive and also adapted whereby the roving is unwound from the ball through said lengthwise movement of the wire.

4. In a wire covering machine the combination with means for moving the wire lengthwise, of means for covering the surface of the wire with an adhesive, means for applying flocculent fibrous material to the surface of said wire which clings thereto through said adhesive, and brushes adapted to rotate around said wire the bristles of which being slightly inclined in the direction of said lengthwise movement of the wire and adapted to contact with said fibrous material for spreading the same over the surface of the wire.

5. In a wire covering machine the combination with means for moving the wire lengthwise, of means for applying flocculent fibrous material to the surface of said wire, and brushes adapted to rotate around said wire the bristles of which being slightly inclined in the direction of said lengthwise movement of the wire and adapted to contact with said fibrous material for spreading the same over the surface of the wire.

In testimony whereof I affix my signature.

CHARLES J. WENNERSTROM.