April 13, 1943. I. C. EATON 2,316,572

PROCESS OF FINISHING ELECTRIC CONDUCTORS

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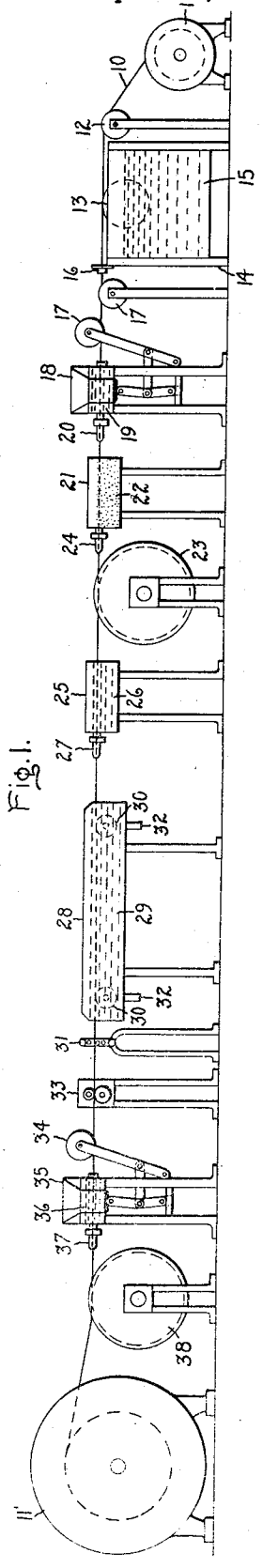

Fig. 1.

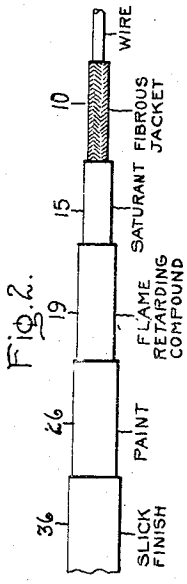

Fig. 2.

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PROCESS OF FINISHING ELECTRIC CONDUCTORS

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5 Claims. (Cl. 117—92)

My invention relates to a process for applying a finishing coating to insulated conductors, and more particularly to a process for continuously applying a moisture-resisting, flame-retarding and colored finish to insulated conductors, for example, building wire.

According to former processes such finishes were applied in individual steps, and it was necessary to allow a setting period for each of the coatings before the application of the succeeding one in order to prevent mixing and consequent loss of desirable properties such as flame resistance. This meant a considerable loss in time in finishing the conductor and an increase in cost due to the numerous handling operations incident to carrying out the individual steps in applying the finishing coats.

The object of my invention is the provision of a new and improved process whereby the moisture-resisting, flame-retarding and colored finishes may be applied continuously one after the other without any interruption in the treatment of the insulated conductor.

In the accompanying drawing, Fig. 1 shows an assembly of apparatus which permits carrying out my continuous process; and Fig. 2 is a view of an insulated conductor finished in accordance with my process.

In accordance with my invention, an insulated conductor 10 is subjected to a continuous finishing process and is unwound continuously from a take-off capstan 11 and after being subjected to the various finishing processes is wound up on a take-up capstan 11'. The conductor 10 is provided with any convenient jacket of insulating material, for example, a fibrous insulating material such as cotton braid.

The insulated conductor passes over a guide pulley 12 and is then wound several times around a saturating reel or drum 13 mounted in a saturating tank 14. The tank 14 contains a moisture-resisting compound 15, for example, a bituminous compound containing asphalt. By being passed several times around the drum 13, the jacketed wire is immersed in the saturant for a time interval sufficient to thoroughly impregnate the fibrous covering with the bituminous compound. The moisture-resisting compound should be applied at a temperature of approximately 350° F.

After passing the wire through the moisture-resisting compound the excess material is removed by means of a wiper 16 and the wire is then guided by means of the rollers 17 to a tank 18 containing a flame-retarding compound 19, for example, stearine pitch. It should be noted that the wire is run continuously without any interruption from the saturating tank to the tank containing the flame-retarding compound and that the stearine pitch is applied directly over the asphalt saturant. The stearine pitch is maintained at temperatures ranging from approximately 300° F. to 325° F.

Upon passage of the jacketed conductor from the tank of flame-retarding compound, the excess material is removed by a wiper 20 and the coated jacket is then passed through a tank 21 of powdered material 22, for example, talc and is then wound around a driving capstan 23. A wiper 24 removes excess talc. The powdered talc forms a fine protective surface and prevents the coated jacket from sticking to the driving capstan. If desired, the talc coating may be omitted without in the least affecting the quality of the finished product, for example, if the driving capstan is omitted.

The coated conductor passes from the driving capstan to a tank 25 containing a quantity of paint 26 which is applied directly over the coatings of flame-retarding and moisture-resisting compounds. I employ a quick drying paint using synthetic resins having solvents miscible with water, for example, a chlorinated rubber paint. Excess quantities of the paint are removed by a wiper 27 and the painted conductor is then fed directly into a tank 28 filled with water 29.

The conductor is passed around rollers 30 placed at opposite ends of the tank so that it travels back and forth through the water bath several times and then passes out of the tank through an air blast 31 which removes the excess water from the conductor and dries it. Fresh water is circulated through the tank 28 continuously by means of the inlet and outlet pipes 32 and is at the temperature from which it comes from the water supply.

One purpose of the water bath is to dry the paint. This is accomplished due to the fact that the paint contains a water soluble solvent, and this solvent is removed from the paint as the conductor passes back and forth through the water bath permitting the pigment to dry on the wire. In addition to drying the paint, the water bath cools the wire which has been heated by the hot applications of the flame-retarding and moisture-resisting compounds, so that further blending of these compounds is prevented. The water bath cools the coated wire sufficiently so that it may be easily wound upon the take-up capstan 11' without causing deformation of the insulation on the

wire or adhesion between the adjacent coatings of the wires.

In some instances it may be desired to print or mark the building wire for the purpose of identifying the size of the wire or the source of manufacture. In such cases the wire is passed directly from the water bath through a printing machine 33 where any suitable identification means may be applied to the painted wire. The printing is done with a colored ink contrasting with the color of the paint coating.

After being printed the wire is passed over a guide pulley 34 to a tank 35 containing wax or paraffin 36 which provides a slick finished coating on the painted wire. The wax provides a smooth satin finish for the wire and gives the wire a "fishable" outer coating making it particularly adapted for drawing within a metallic conduit. A wiper 37 removes any excess wax or paraffin as the wire is wound around a driven capstan 38 before being coiled on the take-up capstan 11'. The wax or paraffin is applied at a temperature of approximately 160° F. In those cases where the wire is not printed the outer slick finish of wax or paraffin is applied directly over the paint.

According to my invention, the wire is run continuously through the moisture-resisting and flame-retarding compounds without the necessity of interrupting the process to permit the setting of each of these layers of compounds prior to application of the other, such as was the case according to former practices. This is due to the fact that the wire is impregnated at a speed such that the water bath 29 cools the wire before the flame-retarding and moisture-resisting compounds have had an opportunity to intermix such as might destroy the effectiveness of the flame-retarding compound. Unless intermixing of these compounds is prevented, the coatings will become sticky and the conductor will not pass the flame test for flame-retarding finishes. By applying a paint having a water soluble solvent immediately over the flame-retarding compound and then removing the solvent by means of a water bath, it is possible to paint directly over the flame-retarding compound without the necessity of setting this compound prior to application of the pant because the water bath not only dries the paint but cools the wire preventing intermixing of the paint and flame-retarding compound. Moreover, the use of a paint of the type mentioned in combination with the water bath makes it unnecessary to interrupt the process to permit drying of the paint prior to application of the finishing wax, such as was the case according to former practices, when it was necessary to pass the painted wire through a drying chamber before application of the finishing wax. In painting over the impregnating compounds, any suitable colored paint may be employed including the light colored paints which, it has been found, are very effective in covering the black colored impregnating compounds.

The conductor is run continuously through the various finish coatings without the need of intermediate setting steps such as would necessitate special handling. For a No. 14 wire, the conductor may be subjected to the finishing process at speeds of approximately 175 to 275 feet per minute. The process results in a conductor having an excellent moisture-resisting and flame-retarding finish and one on which the paint will not peel or flake off upon twisting or bending of the conductor.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. The process of treating the insulating jacket of an electric conductor which comprises applying a hot layer of moisture-resisting compound including bituminous material to said jacket, applying a hot layer of flame-retardng compound immediately over said moisture-resisting compound, applying a coating of paint having a water soluble solvent over said flame-retarding compound and then immersing said jacket in a water bath to dry said paint and to cool said layers to prevent blending of said compounds.

2. The process of treating the insulating jacket of an electric conductor which comprises applying a hot layer of bituminous saturant to said jacket, applying a hot layer of stearine pitch, applying a coating of paint having a water soluble solvent, and then immersing said jacket and layers in a water bath to dry said paint and simultaneously cool and prevent blending of said layers of bituminous saturant and stearine pitch.

3. The process of treating the insulating jacket of an electrical conductor which comprises applying a hot layer of moisture-resisting compound to said jacket, applying a hot layer of flame-retarding compound including stearine pitch immediately over said moisture-resisting compound, applying a coating of paint having a water soluble solvent over said flame-retarding compound and then immersing said jacket in a water bath to dry said paint and to cool said layers to prevent blending of said layers.

4. The process of treating the insulating jacket of an electrical conductor which comprises applying a hot layer of moisture-resisting material to said jacket, applying a hot layer of flame-retarding compound immediately over said moisture-resisting compound, applying a coating of paint having a water soluble solvent over said flame-retarding compound, and then immersing said jacket in a water bath to remove said solvent to dry said paint and to cool said layers to prevent blending of said material and compound.

5. The process of treating the insulating jacket of an electrical conductor which comprises applying a hot layer of bituminous saturant to said jacket, applying a hot layer of stearine pitch immediately over said asphalt saturant, applying a coating of paint having a water soluble solvent immediately over said stearine pitch, immersing said jacket and layers in a water bath to remove said solvent and dry said paint and simultaneously cooled to prevent blending of said layers of bituminous saturant and stearine pitch and then applying a coating of waxlike material over said paint to provide a slick finish to said conductor.

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