Feb. 28, 1939. S. E. BRILLHART 2,148,526

METHOD OF TREATING INSULATED ELECTRICAL CONDUCTORS

Filed Dec. 31, 1935

FIG. 1

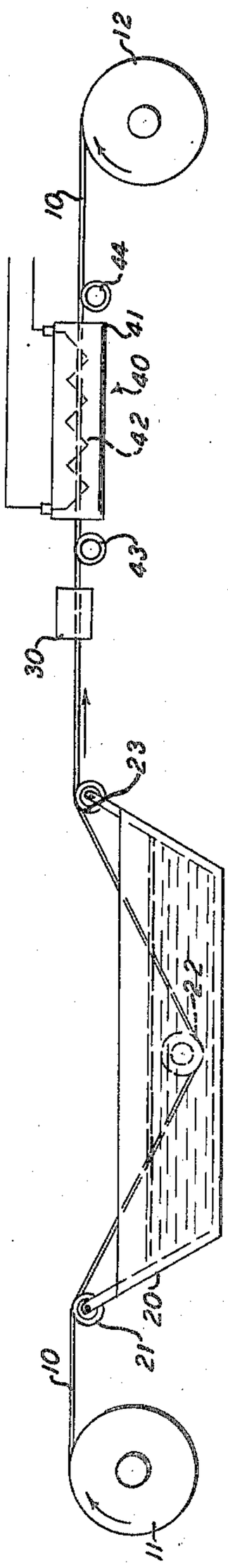
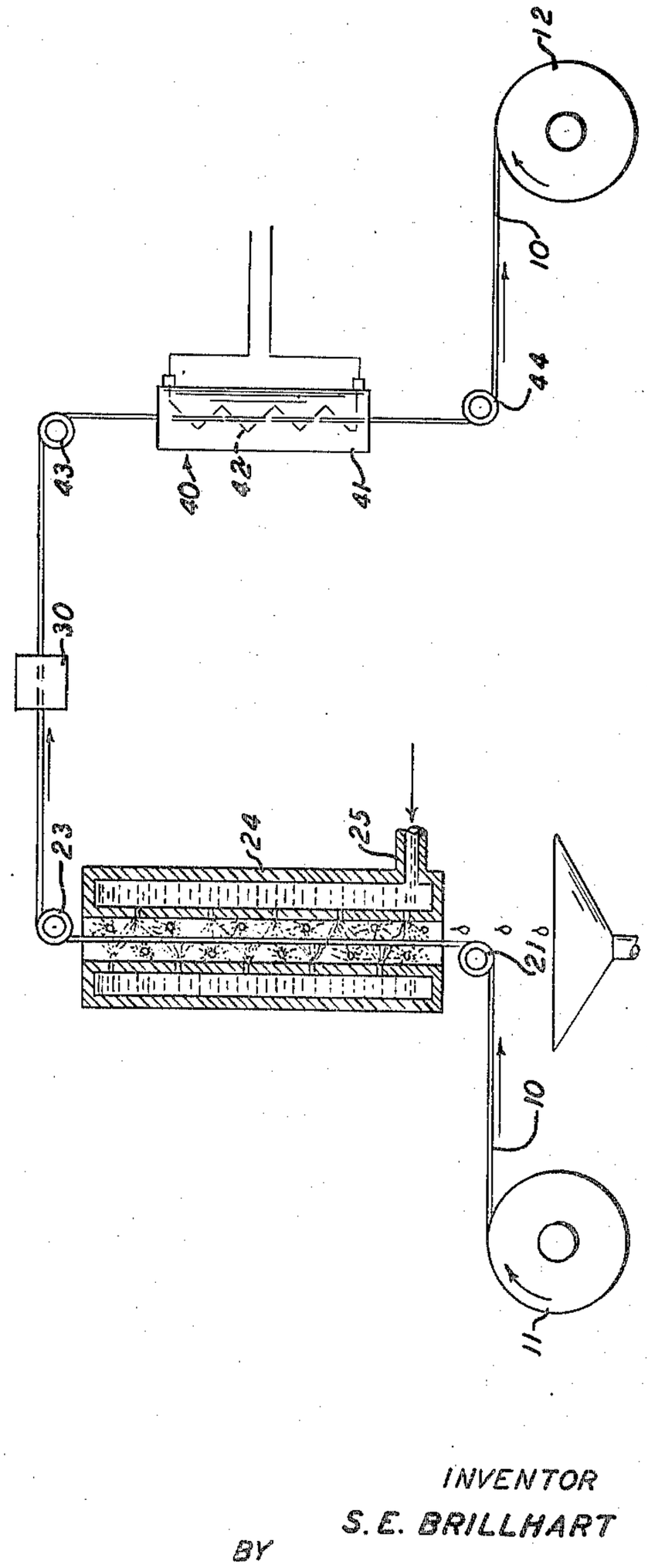


FIG. 2



INVENTOR
S. E. BRILLHART

BY E. R. Nowlan
ATTORNEY

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METHOD OF TREATING INSULATED ELECTRICAL CONDUCTORS

Samuel E. Brillhart, Baltimore, Md., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York

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2 Claims. (Cl. 91—68)

This invention relates to a method of treating insulated electrical conductors and more particularly to a method of applying a coating of waxy substance such as mixtures comprising paraffin, carnauba wax, beeswax, and the like to the sheaths of insulated electrical conductors.

There are situations of various kinds in which it may be advantageous to have the outer surfaces of insulated electrical conductors of a smooth and substantially frictionless nature. Thus if a plurality of strands having metallic conductive cores and insulating sheaths of rubber compounds or the like to be combined in a cable, and such a cable be wound or bent in arcs of small radius relatively to the overall diameter of the cable, it is well that a certain amount of sliding of the strands over each other be permitted, as such action will increase the flexibility of the cable as a whole and will decrease the liability to breakage of strands on the outer side of the arc of bending. However, if the rubber sheaths are in their natural state, the extremely high frictional resistance to the sliding of one sheath over another will hinder if not prohibit such sliding. Another example is illustrated by the case of an insulated conductor or cable having an outer cover of served or braided textile threads, where it is desired to draw a length of such cable into a preformed rigid conduit which may or may not contain other conductors or cables already in situ therein, and in which the frictional resistance of the conductor or cable cover, especially when braided, may rise to practically prohibitive values. In either such instance, the application of a thin film of waxy material such as paraffin, carnauba wax, beeswax, and the like, will obviate the difficulty. In some cases such films have been applied by passing the insulated conductor or cable through a bath of hot molten wax. However, in some instances the subjection of insulated conductors or cables, especially such as include a sheath of rubber material, to a hot liquid may have objectionable effects on the insulation.

An object of the present invention is to provide a method of applying a coating of waxy material to insulated electrical conductors without necessitating the use of hot materials.

One embodiment of the invention contemplates the use of waxy material, such as paraffin, carnauba wax, beeswax and the like emulsified in a watery medium; this to be applied to the surface of an insulated conductor or cable by dipping, spraying or in any other suitable manner, after which the coated conductor or cable is to be dried in any suitable manner.

Other features and objects of the invention will appear from the following detailed description of one embodiment thereof taken in connection with the accompanying drawing in which the same reference numerals are applied to identical parts in the several figures and in which

Fig. 1 is a schematic diagram of an apparatus for carrying out the method of the invention, and

Fig. 2 is a similar representation of a modified apparatus.

In the embodiment of the invention represented in Fig. 1, an insulated conductor or cable 10 to be provided with a thin film of waxy substance on its outer surface, is drawn from a supply reel 11, passed through the apparatus and wound on a take-up reel 12.

A tank or vat 20 holds a bath of an emulsion, in water, of paraffin, carnauba wax, beeswax, or the like. The conductor 10 passes over a guide sheave 21 above the tank, under a guide sheave or roller 22 submerged in the bath in the tank, and up over a guide sheave 23 to a wiper die 30. The die 30 serves merely to remove any excess of emulsion adherent to the conductor. After leaving the die, the conductor may be passed through a drier generally indicated at 40. This drier may be of any suitable construction, and is here shown as a tubular housing 41 of iron, ceramic material or other appropriate substance, housing a helical heating coil 42 supplied with electric current from a source not shown, and through which the conductor passes axially. From the drier 40, the treated conductor passes to the take-up reel 12. The drier may have guide sheaves 43 and 44.

Each of the units comprising the apparatus is of familiar construction and operation, well known to those skilled in the art, and so is not here described in detail.

In the embodiment disclosed in Fig. 2, the emulsion applying tank 20 and sheave 22 of Fig. 1 are replaced by a device to spray the emulsion on the conductor 10. This may be a vertical double walled cylinder 24, shown in section, having a plurality of perforations in the inner wall. The conductor 10 passes axially through the cylinder. The annular chamber between the walls of the cylinder may then be supplied with emulsion under pressure from a source not shown through an inlet pipe 25, and thus the emulsion is sprayed through the perforations upon the conductor.

It is found that the use of the emulsion permits the application of a thinner and more uniform coating than do the customary methods of application using hot baths of molten wax material. The emulsion in water and its vapors are totally

noninflammable as contrasted with solutions of waxes in various organic solvents heretofore used for such purposes; and there is no costly, difficult and possibly dangerous solvent recovery problem, or health protection problem as water is not worth recovering and it and its vapors are not injurious to health. Also by applying the emulsion cold there is less danger of injuriously affecting the insulating material to which it is applied.

Also it is found that where colored coatings are desired it is possible to add either or both pigments and dyes to the emulsion before it is applied and so to obtain satisfactory colored films on the conductors.

Suitable emulsions of paraffin wax in water, as also of other waxes in a watery carrier, are available commercially on the open market under a variety of trade names. It is therefore not thought necessary to describe the manufacture of such emulsions here, as this is no part of the present invention. Suffice it to say that commercial emulsions carrying up to 20% of paraffin dispersed in water have been found satisfactory in practicing the method of the present invention.

The method of the invention is not limited to the apparatus or devices herein disclosed for carrying out the method, the principal characterizing feature of the invention being the use of an emulsion of waxy material in a watery carrier to apply a thin film of wax to the insulating sheath of an electrical conductor or cable. Thus in some instances it my be sufficient merely to dip the coiled conductor or cable in a vat of the emulsion, drain the conductor and let it dry at room temperature. The wiper die **30** may in some cases be dispensed with, or in other cases may be replaced by a wad of cotton, felt pads, compressed rubber wipers, air jets, or the like. The drier **40** may in some instances be omitted, or may be externally heated as by gas flames (there being no fire hazard), or otherwise.

In the case of a multiconductor cable having a plurality of individual conductors each having an individual insulating sheath of material such as a rubber compound characterized by a high frictional property, each such rubber insulated strand may profitably be coated with a thin film of waxy lubricant before the strands are assembled together in the core of the cable. A cable thus manufactured will have greater flexibility than otherwise and will be less subject to rupture of individual conductor strands when coiled or bent, since the lubricated strands will slide easily over each other.

Where conductors or multiconductor cables are to be installed in conduits or the like by being pulled into them, and the conductors or cables have textile covers, especially such as are braided, the method of the present invention may also be profitably applied to provide the textile sheath with a thin, non-sticky film of waxy lubricant, rendering it easier to pull the cable into a conduit and serving to protect the textile sheath against frictional abrasion.

The embodiment of the invention herein disclosed is illustrative only and may be departed from and modified in many ways without departing from the scope and spirit of the invention as pointed out in and limited only by the appended claims.

What is claimed is:

1. A method of treating a rubber sheathed electrical conductor which comprises the steps of applying to the surface of the sheath a quantity of an emulsion of paraffin in water, removing the excess of emulsion from the surface, and drying out the moisture from the emulsion remaining on the surface to leave a thin film of paraffin on the surface of the rubber sheath, the application of the emulsion and the removal of excess being carried out cold so that there is minimum absorption of paraffin by the rubber.

2. A method of treating a rubber sheathed electrical conductor which comprises the steps of spraying on the surface of the sheath a quantity of an emulsion of paraffin in water, removing the excess of emulsion from the surface, and drying out the moisture from the emulsion remaining on the surface to leave a thin film of paraffin on the surface of the rubber sheath, the spraying on of the emulsion and the removal of excess being carried out cold so that there is minimum absorption of paraffin by the rubber.

SAMUEL E. BRILLHART.