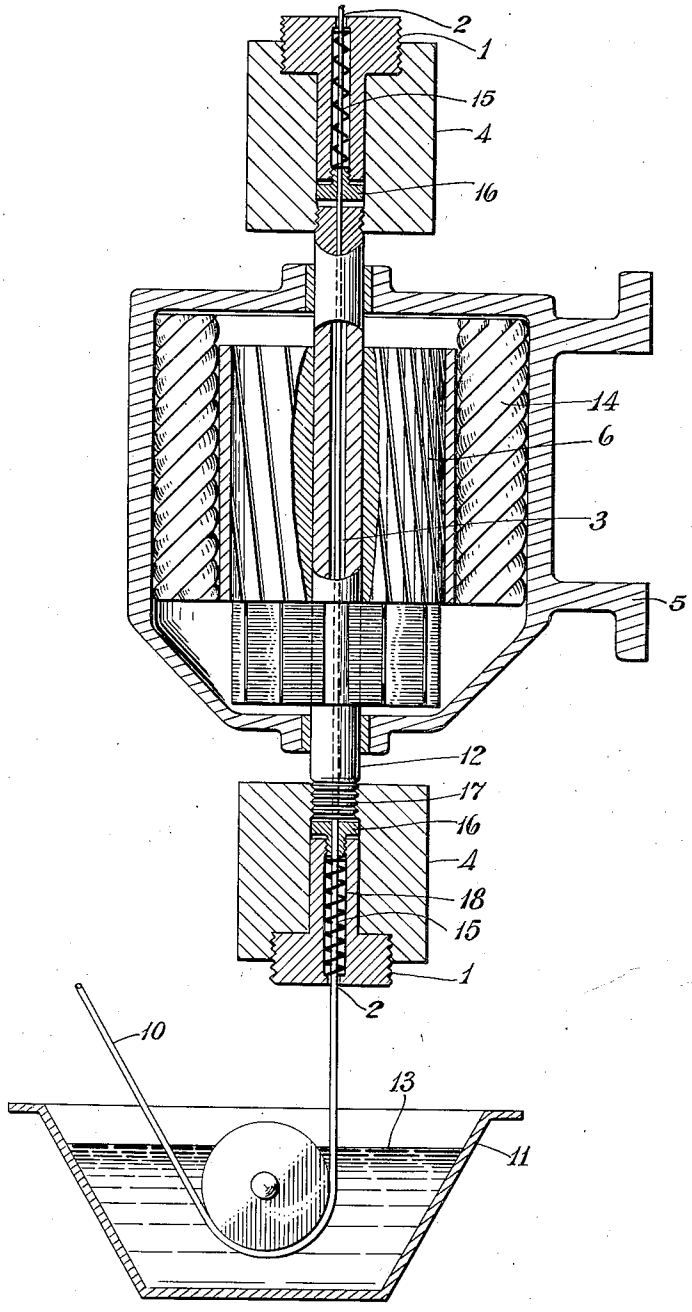
Jan. 14, 1941. H. G. DONOVAN 2,228,756

CABLE COATING MECHANISM

Filed Sept. 20, 1939



Howard G. Donovan INVENTOR

BY

Frank C. Hilberg ATTORNEY

Patented Jan. 14, 1941

2,228,756

UNITED STATES PATENT OFFICE

2,228,756

CABLE COATING MECHANISM

Howard G. Donovan, Evanston, Ill., assignor to E. I. du Pont de Nemours & Company, Wilmington, Del., a corporation of Delaware

Application September 20, 1939, Serial No. 295,719

3 Claims. (Cl. 91—32)

This invention relates to coating insulated electric cables, and more particularly to an improved device for securing uniform coatings on insulated electric cables and the like.

Heretofore, it has been customary in applying coating compositions to insulated electric cables and other strand-like base members to pass the cable through a vessel containing a coating material which adheres to the surface of the cable, and then through a stationary die, rubber or felt wipers, wiping rolls or the like to remove the surplus. In this process the coating is often unevenly applied to the base member. In many instances the cable or other base member is practically bare at intervals, because of the difficulty in centering the coated cable as it passes through the stationary die or because of non-uniformly worn rubber or felt wipers. Another difficulty encountered has been that the coating material works up through the die, and is thrown out at the surface. The older devices are also particularly incapable of proper application of aqueous emulsion type coatings.

The improved device, as described hereinafter, avoids the defects of previously available apparatus and affords a coated product of decidedly better quality.

This invention has as an object the provision of a device for obtaining coatings on insulated electric cables and the like which is characterized by improved mechanical operation. Another object is the provision of a device for use in connection with coating cables and the like, whereby a more continuous and uniform coating is secured. A further object is the provision of a device which may conveniently be employed in connection with applying lacquers and enamels or aqueous emulsions of such compositions to electric cables and other strand-like base members. Other objects will become apparent as the description of the invention proceeds.

These objects are accomplished by means of a device comprising a rotary unit including at least one die member, which may be caused to rotate at high speeds, through which the coated insulated electric cable or similar base is passed during rotation of the unit.

In the drawing the single figure represents a sectional view of the apparatus of the invention. In the figure, 10 represents the wire or cable to be coated; 11 is a vessel which contains the coating varnish 13. These elements may be of any conventional type, and form no part of the present invention. 1 represents a die which is provided with a hole 2 which admits the wire to be coated. This die is also provided with threads which screw into a housing 4 and is also recessed at a larger diameter than the hole meeting the wire. The recess is shown as 18 and is also provided with a spring 15 which acts as a wiper and tends to force the insulating varnish downwardly as the wire progresses upwardly. The die 1 also screws onto the end of the hollow shaft 12 which in turn has a thread and collar 16. This shaft is the drive shaft of the motor 5 in which 14 represents field windings and 6 is the rotor. The shaft 12 is also drilled throughout its entire length with a hole which tapers toward the top, that is, the bottom end is slightly larger than the top end. At the other end of the shaft a similar housing 4 is provided with a die 1 and a spring 15 substantially the same as that at the lower part of the motor shaft.

In the operation of the machine the wire 10 passes downwardly around a pulley through a bath of the insulating enamel 13 and then passes upwardly through the hole 2 and the spring 15 which tends to wipe off the surplus of the coating. The shaft of the motor 12 together with the housing 4 revolves at the usual speed of the motor, that is, about 2000 R. P. M. The wire passes upwardly through the tapered hole 3 which tends to place the composition under some pressure against the wire, thereby filling any uneven spots or imperfections in the wire. The surplus composition is again removed by the upper die 16 and spring 15. It emerges from a device through the hole shown as 2.

A modification of the apparatus may be made in which the shaft 12 rotates in bearings and which is provided with a pulley driven by outside means, all of which is not shown in the drawing since this will be apparent to those skilled in the art. The structure illustrated has the advantage that it is compact and may be fastened to a wall and take up a relatively small space.

In any such modification of the invention, however, the shaft between the dies is preferably slightly larger than the dies, on the order of about $\frac{1}{32}$'' greater in diameter and is preferably tapered slightly toward the top to facilitate movement of the surplus coating downward for return to the coating bath.

Although the preferred embodiment of the invention as illustrated provides for the operation of the rotary unit or die member in the vertical plane, satisfactory results can likewise

be achieved when the device is constructed off the vertical, including a horizontal plane.

As indicated, the device is constructed so as to permit its use with different dies which may be readily changed to accommodate cables of different diameters or to meet any particular coating thickness requirement.

The preferred embodiment of the invention comprises two dies joined at each end of the tubular shaft but the use of a single rotating die properly mounted on a rigid structure or affixed at the base of a conventional or modified drying tower and rotated by any convenient means is also considered within the purview of the present invention.

The use of the coil spring in the die member while preferred for best results is optional and in some instances satisfactory coatings are obtained without this modification.

The new device is unique and further distinguished from previously available cable coating apparatus in that it may be successfully employed in coating such bases with aqueous emulsion compositions. The following example illustrates one composition of this type which was successfully used. However, the utility of the device is not in any way limited to this composition or type of composition since it may be employed with diverse coating compositions including the conventional solvent type cable coating compositions or with solventless enamels.

The following example illustrates an emulsion which operates satisfactorily without modification.

Example 1

	Per cent
Cellulose nitrate (visc. 10–20'' Hercules)	22.0
Water	9.3
Tricresyl phosphate	23.0
Butyl alcohol	7.5
Butyl acetate	18.5
Xylene	5.0
Sodium lorol sulfate	0.2
Animal glue	0.5
Water	2.0
Water	12.0
	100.0

This composition was prepared by kneading the ingredients of the first portion in a kneading machine such as a Werner and Pfleiderer mixer until the cellulose nitrate was colloided and a smooth paste was obtained. The water dispersion or solution of the polar and water colloidable viscous type of emulsifying agents, sodium lorol sulfate and glue, respectively, was prepared separately in a rapid agitator mixer and then added slowly to the first portion. After further mixing the water of the third portion was added and mixing continued until a final homogeneous emulsion composition was obtained.

This emulsion was applied to an insulated electric cable designated 10 in the drawing by passing it through the emulsion composition 13 in the vessel 11 and then through the rotary unit including die 1 and the bored motor shaft 3, the unit, meanwhile, being rotated at about 2000 R. P. M. The coated cable was then passed into a conventional drying tower heated to a temperature of about 85° C. where the coating was dried. The resulting finish was unusually uniform with no "skips" or bare areas and was quite acceptable in all respects. If desired, a plurality of coats may be applied in the same manner. However, with successive coats it is necessary to substitute slightly larger die members to make allowance for the increased size of the cable as caused by the thickness of coating.

The improved device, such as illustrated in Figure 1, is preferably rotated at a speed of approximately 2000 R. P. M. Depending on the thickness of coating desired and the consistency of the coating material, a speed of about 1000 to 4000 R. P. M. may be employed. The size of the cable to be coated determines the diameter of the bore of the die. An allowance of about .002'' to .003'' is permissible between the surface of the cable and the wall of the bored shaft.

The coating mechanism described herein may be utilized for coating high and low tension cables, other insulated electric conductors such as radio wire, fish lines, tennis racket strings, fibre cord and the like.

The new apparatus affords several operating economies in coating electric cables and similar bases. The time and expense involved in replacing worn wiping equipment are eliminated. The operation of the device provides for the return of the surplus coating material to the coating vessel. The final product is characterized by an extraordinarily smooth, uniform coating with no "skips" or thinly coated areas. The new device also permits the use of coatings in aqueous emulsion form, a type of coating which is not operative with most previously available equipment.

It is apparent that many widely different embodiments of this invention may be made without departing from the spirit and scope thereof; and, therefore, it is not intended to be limited except as indicated in the appended claims.

I claim:

1. Apparatus for coating electric cables and the like which comprises an electric motor having a hollow shaft, means for applying a liquid coating composition to the cable to be coated, and two dies attached to the opposite ends of the said motor shaft, and means for passing the coated wire through the said dies and hollow shaft.

2. The apparatus of claim 1 in which the die encases a helical spring wiper.

3. Apparatus of claim 1 in which the axis of the rotary unit is vertical.

HOWARD G. DONOVAN.