Aug. 31, 1943. F. R. REEVELY 2,328,096

METHOD OF TREATING STRANDS

Original Filed May 21, 1938

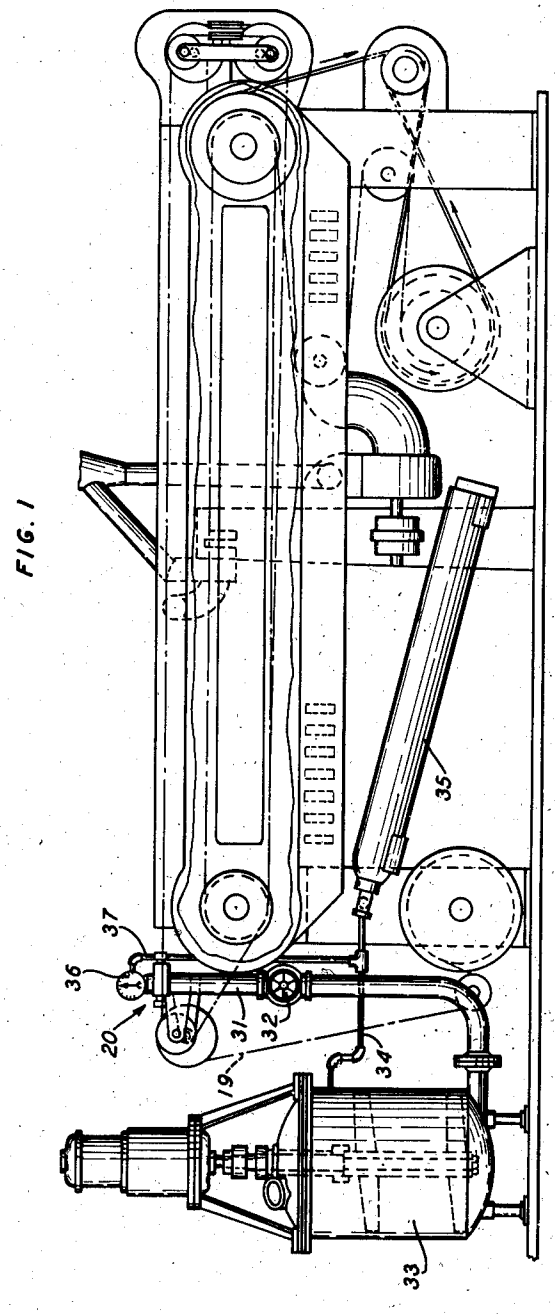


FIG. 1

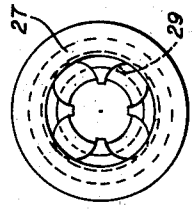


FIG. 4

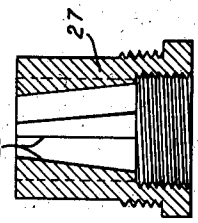


FIG. 3

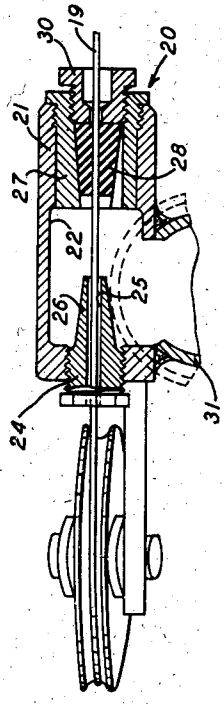


FIG. 2

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METHOD OF TREATING STRANDS

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Original application May 21, 1938, Serial No. 209,395. Divided and this application November 18, 1939, Serial No. 305,079

8 Claims. (Cl. 117—102)

This invention relates to a method of treating strands, and more particularly to a method of coating strands, especially electrical conductors, with viscous liquid or plastically pasty materials.

Insulating sheathings on electrical conductors are made, at the present time, in a multitude of ways, some of which include the application to a bare or previously variously sheathed strand of hardenable materials applied in liquid, semi-liquid, or pasty form and subsequently hardened. Thus materials in the nature of paint, enamel, varnish, or waxes, asphalts, paraffins and the like dissolved in volatile vehicles, artificial resins hardenable by polymerization induced by heat, and other analogous materials are used for one or another specific purpose. In many such instances a solvent or vehicle is used which is volatilized to be subsequently recovered, and a considerable part of the cost of the coating operation may arise out of the volume of material to be recovered for subsequent re-use. Hence it is desirable and may be vitally important to apply the raw sheathing or sheath treating material in a condition approaching dryness as nearly as may be practicable, i. e. as a liquid of high viscosity or even a smoothly plastic paste, in order that the volume of vehicle or solvent circulated in the process, or perhaps wasted, may be kept low.

An object of the present invention is to provide an improved method for forming a coating of material, such as described above, upon a strand, in which the material may be of a viscous or stiffly liquid nature or even a plastic paste, and in which the material may be applied thickly and yet uniformly.

With the above and other objects in view, the invention in one form may be embodied in a method of applying on a strand a coating of predetermined thickness of a coating material in a highly viscous plastic form, which process comprises steps of passing a strand to be coated through a body of the coating material which is under pressure to thereby form an excessive coating of the material on the strand, and wiping the excessively coated strand with a wiping pressure proportionate to the pressure on the body of coating material.

Other objects and features of the invention will appear from the following detailed description of one embodiment thereof in an apparatus for practicing the method of the invention to apply a viscous mixture of cellulose acetate in an acetone vehicle to a textile covered electrical conductor strand, taken in connection with the accompanying drawings in which the same reference numerals are applied to identical parts in the several figures, and in which

Fig. 1 is a view in side elevation of the apparatus with a portion of one wall broken away;

Fig. 2 is a broken enlarged view in horizontal section of one of the twin applicator heads of the apparatus;

Fig. 3 is a detached, further enlarged view in longitudinal central section of the die supporting plug shown in Fig. 2; and

Fig. 4 is a corresponding view thereof in end elevation.

The apparatus herein disclosed comprises, roughly, means to apply a viscous or pasty material to a strand combined with means to harden the applied material on the strand, the two being so constructed and arranged that the process of hardening begins immediately the coating is applied with a step of preliminarily hardening at room temperature and subsequent further treatment at an elevated temperature. This apparatus and the process to be carried out by it generally form no part of the present invention, being fully disclosed and claimed in copending application Serial No. 209,396, filed May 21, 1938, by the present inventor and two others. The apparatus generally is disclosed herein only in so far as is necessary for a clear understanding of the present invention and reference may be had to the copending application mentioned if necessary for the construction and functioning of the apparatus generally. The specific structure of the die and its mounting, however, is the subject of copending application, Serial No. 209,395, filed May 21, 1938, by the present inventor, and upon which application U. S. Patent 2,218,482 was issued on October 15, 1940; and of which application the present one is a division.

The heart of the paste applying means is a twin applicator device best shown in Fig. 2, and generally indicated by the numeral **20**. Since this is a twin, a description of one side only will suffice for both. An individual applicator comprises a cylindrical body member **21** having a chamber **22** therein, through which passes a strand **19** to be coated. The strand enters the chamber through an axially bored plug **24** mounted in the rear wall of the chamber, the bore **25** of the plug being sufficiently large to pass the strand without harmful friction. The forward end of the plug extends taperingly into the chamber as at **26**. Another plug **27** is mounted in the front wall of the chamber and has housed completely therein a wiper die member **28**. This member or die **28**

is a body of soft vulcanized rubber or similar material and is given any convenient shape. The particular member or die 28 illustrated is an ordinary soft rubber bottle stopper of suitable size. The plug 27 is recessed to fit the member 28 which is held in place in the plug by any suitable means such as the removable retainer 30. The plug 27 and retainer 30 are axially bored to pass the strand 19 with liberal clearance for both the strand and its raw coating. The die member 28 is formed with an axial bore of such size as to pass the strand 19 bearing a raw coating of predetermined desired thickness, and the member 28 acts to wipe off any superfluous thickness of coating.

The twin applicators 20 may conveniently be supported, as shown, upon the upper end of a vertical feed pipe 31 which serves to bring coating material under pressure to the chambers 22 as well as to support the twin applicators. A valve 32 mounted in the feed pipe serves to control the flow of coating material from a supply tank 33 through the pipe to the applicators. A supply of air or of some inert gas, nitrogen, carbon dioxide or other similar gas according the nature of the coating material under pressure is fed into the upper part of the tank 33, preferably above the level of the coating material therein, through a pipe 34 from a suitable supply 35 of the compressed gas. If desired an indicating pressure gage 36 may be mounted at any convenient place and connected by a pipe 37 to the pipe 34.

A characteristic feature of the invention is that the die supporting plug 27 has the walls of its die receiving recess formed with longitudinal flutings or grooves 29, so that the member 27 touches the lateral outer wall of the die member 28 only along the narrow edges of the ribs between the grooves 29. Thus these grooves 29, when the assembly is complete as in Fig. 2, provide chambers or recesses covering most of the outer lateral surface of the die 28, open at their rear ends to the coating material chamber 22, and closed at their front ends by the member 30.

In this manner, the pasty material under pressure in the chamber 22 flows into these grooves 29 and thus surrounds and is in contact with substantially the entire outer lateral surface of the compressible die 28. As a result, if for any reason the pressure in the chamber 22 becomes excessive and tends to form too thick a coating on the strand by forcing too much material to accompany the strand through the die, the die will be compressed correspondingly, and so correspondingly increase the severity of the wiping effect of the die by decreasing the diameter of its bore.

The strand 19 thus provided with raw coating material then passes from the applicator through the adjacent hardening and curing devices and may then be considered to be finished, or may be returned through the other side of the twin applicator to receive a second raw coating and thence through the hardening and curing again.

As noted before, the present invention relates only to the method of application. As herein disclosed the invention is illustrated by means of apparatus for applying pasty coating material to a strand. It might obviously, however, be also used for liquid materials if desired, so only that the material in question be supplied under pressure to the chamber 22 or an equivalent thereof. The particular embodiment disclosed is illustrative and may be modified and departed from without departing from the spirit and scope of the invention as pointed out in and limited solely by the appended claims.

What is claimed is:

1. A process of applying on an electrical conductor strand a coating of predetermined thickness of a coating material in a highly viscous plastic form, which process comprises steps of passing a strand to be coated through a body of the coating material, exerting pressure upon the body of coating material to thereby form an excessive coating of the material on the strand, and wiping the excessively coated strand with a wiping pressure varying in accordance with variations of the pressure on the body of coating material.

2. A process of applying on an electrical conductor strand a coating of predetermined thickness of a coating material in a highly viscous plastic form, which process comprises steps of passing a strand to be coated through a body of the coating material, exerting pressure upon the body of coating material to thereby form an excessive coating of the material on the strand, and wiping the excessively coated strand with a wiping pressure generated by the pressure on the body of coating material to be variable with variations of the pressure on the material.

3. A process of applying on a strand a coating of predetermined thickness of a coating material in a highly viscous plastic form, which process comprises steps of passing a strand to be coated through a body of the coating material, exerting pressure upon the body of coating material to thereby form an excessive coating of the material on the strand, and wiping the excessively coated strand with a wiping pressure varying in accordance with variations of the pressure on the body of coating material.

4. A process of applying on a strand a coating of predetermined thickness of a coating material in a highly viscous plastic form, which process comprises steps of passing a strand to be coated through a body of the coating material, exerting pressure upon the body of coating material to thereby form an excessive coating of the material on the strand, and wiping the excessively coated strand with a wiping pressure generated by the pressure on the body of coating material to be variable with variations of the pressure on the material.

5. A process of applying on a strand a coating of predetermined thickness of a coating material in a highly viscous plastic form, which process comprises steps of passing a strand to be coated through a body of the coating material, exerting pressure upon the body of coating material to thereby form an excessive coating of the material on the strand, and wiping the excessively coated strand with a wiping pressure circumferentially uniform and varying in accordance with variations of the pressure on the body of coating material.

6. A process of applying on a strand a coating of predetermined thickness of a coating material in a highly viscous plastic form, which process comprises steps of passing a strand to be coated through a body of the coating material, exerting pressure upon the body of coating material to thereby form an excessive coating of the material on the strand, and wiping the excessively coated strand with a wiping pressure circumferentially uniform and generated by the pressure on the body of coating material to be variable with variations of the pressure on the material.

7. A process of applying on a strand a coating

of predetermined thickness of a coating material in a highly viscous plastic form, which process comprises steps of passing a strand to be coated through a body of the coating material, exerting pressure upon the body of coating material to thereby form an excessive coating of the material on the strand, wiping the excessively coated strand with a compressible member surrounding the strand, and simultaneously subjecting the member to compression varying in intensity in accordance with variations in the pressure on the coating material to thereby maintain a wiping pressure on the coated strand varying in accordance with variations in the pressure on the coating material.

8. A process of applying on a strand a coating of predetermined thickness of a coating material in a highly viscous plastic form, which process comprises steps of passing a strand to be coated through a body of the coating material, exerting pressure upon the body of coating material to thereby form an excessive coating of the material on the strand, wiping the excessively coated strand with a compressible member surrounding the strand, and simultaneously subjecting the member to compression generated by the pressure on the coating material and so varying in intensity in accordance with variations in the pressure on the coating material to thereby maintain a wiping pressure on the coated strand varying in accordance with variations in the pressure on the coating material.

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