

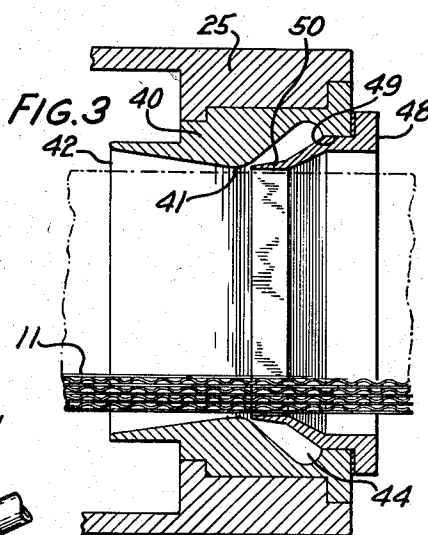
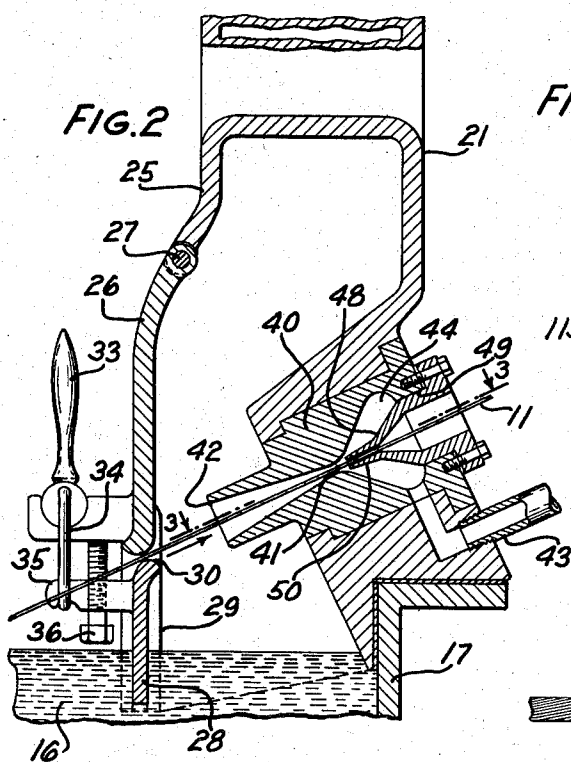
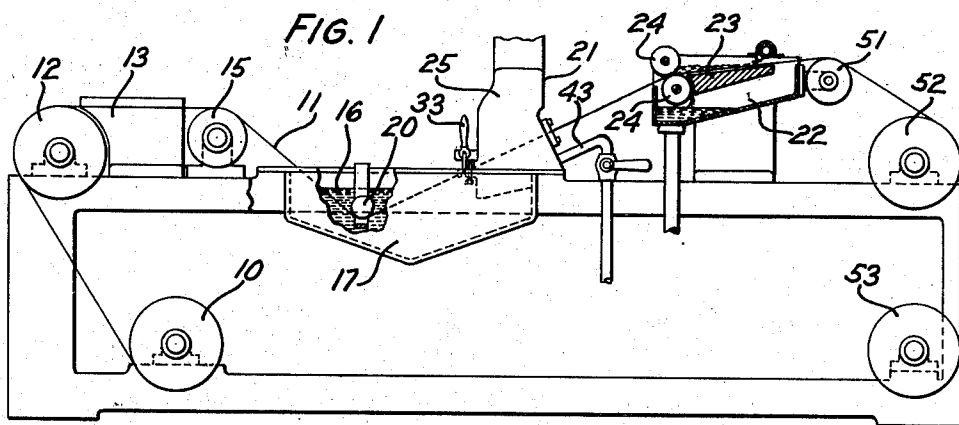
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C. M. UNDERWOOD

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COATING MATERIAL

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INVENTOR
C. M. UNDERWOOD
BY H. A. Whitehorn
ATTORNEY

UNITED STATES PATENT OFFICE

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COATING MATERIAL

Carl M. Underwood, Newton Center, Mass., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York

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This invention relates to coating material and more particularly to an improved method of and apparatus for applying a coating of tin or other metal to a multisided article or uniting a plurality of strands by tinning to form a bundle or tape and to the product produced thereby.

Objects of the invention are to provide an improved method of and apparatus for applying a thin coating to strand material or the like and to provide an improved composite stranded article.

In one embodiment of the present invention, a plurality of strands are advanced in a side by side arrangement through a bath of coating solution, then through a wiping die, after which they are advanced through a nozzle where they receive the final wiping by a gas, such as superheated steam.

The invention will be more fully understood from the following description taken in connection with the accompanying drawing, in which

Fig. 1 is a diagrammatic elevational view of a strand coating apparatus embodying the invention and which may be used in practicing the invention;

Fig. 2 is a sectional view of the wiping mechanism embodying the invention;

Fig. 3 is a sectional view taken along the line 3—3 of Fig. 2; and

Fig. 4 is a fragmentary view of a cable formed of a plurality of strands to illustrate another embodiment of the invention.

In Figs. 1 to 3, inclusive, which illustrate one form of the invention, reference numeral 10 designates a supply reel upon which is wound a plurality of strands 11 in parallel formation. To illustrate one embodiment of the invention, the strands of material may be alternately straight and corrugated. These strands may be wound upon the supply reel so that each convolution will constitute a layer of material upon the supply reel, or if desired, separate reels may be employed for each strand.

From the reel 10 the strands of material are advanced over a roller 12 through a fluxing bath 13, the purpose of which is to remove impurities from the surface of the strands and prepare them to receive the coating material. From the bath 13 the strands pass over a roller 15 to a coating bath 16 consisting of a liquid coating material, such as molten tin or other metal, to be applied to the strands. The coating material is contained in a tank 17 which may be heated by any suitable means (not shown) and is provided with a lateral member 20 under which the strands pass during their immersion in the bath. From the

coating bath the strands, carrying an excess of coating material, next pass to the wiping mechanism 21 where the excess coating material is removed, after which they may pass through a suitable cooling device as illustrated at 22. The cooling device comprises a slanting trough 23 through which the coating strands pass in one direction as a cooling liquid such as water passes in the opposite direction for the purpose of freezing the coating material. Prior to the freezing of the coating material on the strands it is desired to insure proper positioning of the strands relative to each other. This is brought about by passing the coated strands between rolls 24, one of which or both may be mounted for adjustment (Fig. 1). Furthermore, one or both of the rolls 24 may be cooled by the cooling liquid.

The wiping mechanism 21 shown in detail in Fig. 2 is mounted at the edge of the tank 17 and comprises a casing 25 having a door 26 hinged at 27, the lower portion 28 of which extends beneath the upper surface of the bath 16. The portion 28 is separate from the door 26 and has its ends slidably mounted in downwardly projecting guides 29, only one of which is shown in the drawing, the guides being integral with or rigidly supported on the door 26. The lower edge of the door 26 and the upper edge of the portion 28 have elongated recesses to form a wiping die 30, the surfaces of which are formed of hard material to withstand wear during the advancement of the coated strands therethrough. At each side of the die opening are positioned fastening latches 33 carried by the door 26 and having links 34 arranged to engage lugs 35 carried by the portion 28. The opening of the die may be varied, for example, to take up for wear upon the hardened surfaces by rotating adjusting screws 36, one of which is placed upon each side of the die opening and carried by the lugs 35.

The wall of the casing 25 opposite the die 30 is apertured to receive a nozzle 40 which is flanged at its outer end. The flange of the nozzle 40 is provided with slots or apertures at opposite ends thereof for receiving screws or the like, the purpose of which is to secure the nozzle in the aperture of the casing 25. Within the nozzle 40 a passageway is formed which tapers outwardly from the throat 41 of the nozzle to the inner edge 42 thereof. The throat 41 of the nozzle is slightly larger than the coated strands passing therethrough so as to bring about a satisfactory wiping of the coating material by the force of gas from the conduit 43 through a gas chamber 44 and thence through the passageway

of the nozzle 40. Reference is made to application Serial No. 608,041, filed April 28, 1932, for a more complete discussion of the operation of this type of apparatus for wiping coated strands and to application Serial No. 673,857, filed June 1, 1933, for modifications which may be desirable when using zinc or other high melting point metal for the coating material.

The chamber 44 is positioned as shown in Fig. 2 adjacent the throat 41 of the nozzle surrounding an elongated funnel-shaped adjustable member 48 which is movably disposed in an aperture 49 of the nozzle and has its inner portion 50 tapering inwardly toward the path of the coated strands to a point closely adjacent the throat 41 of the nozzle. The adjustable member 48 is hollow, the hollow portion of which, from the end adjacent the throat 41 of the nozzle for a short distance therefrom, being slightly larger than the coated strands so that the coating material on the strands will not contact with the walls thereof, and the remaining hollow portion being greater in contour as illustrated in Fig. 2.

The adjustable member 48 is held in place by screws or the like and the position of its inner end may be varied with respect to the throat 41 of the nozzle by placing spacing washers between the adjacent outer surfaces of the nozzle 40 and the flange of the adjustable member 48. A purpose of this adjustment is to obtain a condition in which no cold air is drawn through the member 48 and in which no substantial amount of the gaseous wiping medium is lost by outward flow therethrough.

The coated strands, after passing through the nozzle 40 and through the cooling unit 22, pass over rollers 51 and 52 and are wound upon the takeup reel 53 as shown in Fig. 1. During the advancement of the strands from the supply reel 10 to the takeup reel 53, the impurities are removed therefrom as the strands pass through the fluxing bath 13, after which the strands are submerged in the bath of a coating solution. After the strands pass from the bath 16, they are drawn through the die 30, where a large quantity of the coating solution remaining upon the strands is removed therefrom, together with any foreign particles which might happen to be in the bath 16. There still remains, however, a greater quantity of coating material upon the strands than is desired in the finished product and the surplus material is removed to provide an even coating upon the individual strands by subjecting them to the action of a suitable gas as they pass through the nozzle 40.

One form of gas which may be utilized in the nozzle 40 for the final wiping operation may be superheated steam which is passed through the nozzle at a pressure greater than atmospheric pressure. The steam in entering the chamber 44 from the conduit 43 completely surrounds the coated material as it passes through the nozzle, and as the direction of flow of the steam is opposite that of the coated material, the excess coating material is forced therefrom.

From the throat 41 of the nozzle to the inner end 42 thereof, the velocity of the steam increases due to its expansion so that the coated strands are subjected to a wiping action by the movement of the steam at a high velocity longitudinally thereof for a substantial distance. The excess coating material remaining on the surfaces of the strands after they pass through the die 30 is thereby removed and broken up into particles which are separated from the steam by

gravity in the casing 25 and returned to the bath 16. The thickness of the coating material remaining on the strands may be controlled by varying either the speed of the wire or the pressure of the steam or both, the higher speed tending to produce a heavier coating, while a higher steam pressure or temperature tends to produce a lighter coating. By viewing Fig. 3, it will be observed that the passageway in the nozzle 40 from the throat 41 to the inner end 42 tapers outwardly at each side of the coated strands, as they pass through the nozzle, as well as above and below the coated strands. The die 30 may also serve to center the strands as they pass through the nozzle to prevent the strands or the coating material thereupon from contacting with the inner surfaces of the nozzle 40 for the adjustable member 48.

The simultaneous coating of a plurality of strands not only eliminates the coating of each strand singly but secures the strands together in a desired unit form so that they may be cut into any desired lengths without separating from each other.

In Fig. 4 a cable 60 is shown which is formed of a plurality of strands to illustrate another embodiment of the present invention. It is not believed necessary to show additional figures in the drawing to illustrate the formation of the nozzle and die for receiving a plurality of strands in cable form as illustrated in Fig. 4 for the reason that the construction will be the same as shown in Fig. 2, with the exception that the passageways through the die and the nozzle will be circular in cross-section instead of elongated as illustrated in Fig. 3. The coating operation will be the same as described in the foregoing for the strands 11. After the cable 60 has been coated and the coating material cooled, the cable may be cut into desired lengths and the strands forming the cable will be firmly held against separation from each other by the coating material.

While the invention has been described with particular reference to the coating of a plurality of strands with tin, using superheated steam as a pressure gas, it will be understood that the form of the invention illustrated may be capable of coating a wide variety of materials having various cross-sectional contours, that coating materials other than tin may be employed, and that other gases may be used in place of superheated steam.

What is claimed is:

1. In an apparatus for coating moving articles, means for applying an excess of liquid coating to a longitudinally moving article, a liquid and gas separating chamber through which the article passes, a door swingably mounted upon said chamber and constituting a part thereof, a scraping die mounted in said door, and surrounding the article while advancing for removing a portion of the excess liquid coating therefrom, an expansion nozzle mounted in said chamber and surrounding the article, said door being movable away from said nozzle to afford communication with said nozzle during the preliminary threading of the article therethrough, and means to supply gas under high pressure to the nozzle for removing the remainder of the excess liquid coating from the article.

2. In an apparatus for coating a plurality of strands simultaneously, means for applying an excess of liquid coating to a plurality of contacting longitudinally moving strands, means for removing the excess liquid coating from the

strands, means for subsequently cooling the coating material to solidify it upon the strands, and means positioned to engage the coated strands prior to their passage through said cooling means for insuring proper relative positioning of the strands.

3. A method of forming a composite strand which comprises passing a plurality of strands through molten coating material, removing excess coating material, and cooling the coated strands to harden the coating material with spaced portions of adjacent strands in contact to unite the strands.

4. A method of forming a composite coated strand which comprises assembling a plurality of strands side by side with contacting points at spaced intervals, passing the assembly through a molten bath of coating metal, removing excess coating metal, and cooling the coated strands to unite the strands and form a composite strand.

5. A method of forming a composite strand which comprises assembling alternate straight and undulating strands side by side to contact at spaced intervals, passing the assembled strands through a bath of coating material, removing excess coating material, and hardening the remaining coating material to form a composite strand.

6. A method of forming a composite strand which comprises passing a plurality of strands side by side and contacting at spaced intervals through a bath of coating material, removing a portion of the excess coating material mechanically, and subsequently removing the remainder of the excess coating material by passing a gas

longitudinally of the strands at a high velocity for a substantial distance.

7. A method of forming a composite strand which comprises assembling a plurality of strands into a composite strand, applying to the composite strand an amount of coating material in excess of that desired in the finished product, removing a portion of the excess coating material mechanically, and subsequently removing the remainder of the excess coating material by passing a gas longitudinally of the articles at a high velocity for a substantial distance.

8. A method of forming a composite strand which comprises assembling a plurality of strands to form a composite strand, applying thereto an amount of coating material in excess of that desired in the finished product, removing a portion of the excess coating material mechanically, and subsequently subjecting the coated composite strand to a heated gaseous medium to render the coating uniform.

9. A method of forming a composite strand which comprises assembling a plurality of strands to form a composite strand, applying thereto an amount of coating material in excess of that desired in the finished product, removing a portion of the excess coating material mechanically, subsequently subjecting the coated composite strand to a heated gaseous medium to render the coating uniform, and cooling the coated strand to unite the individual strands into a unitary composite strand.

CARL M. UNDERWOOD.