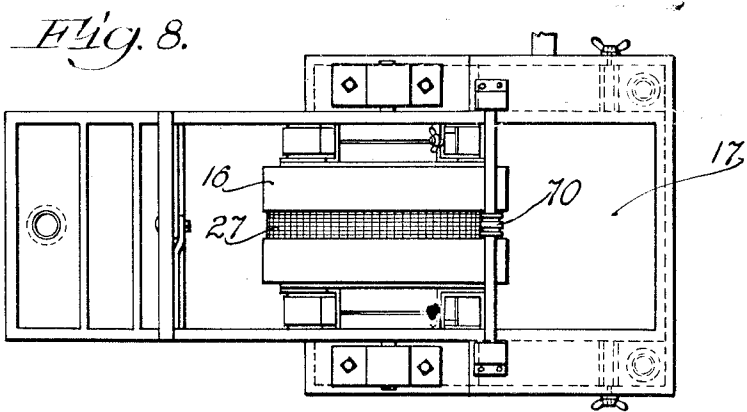
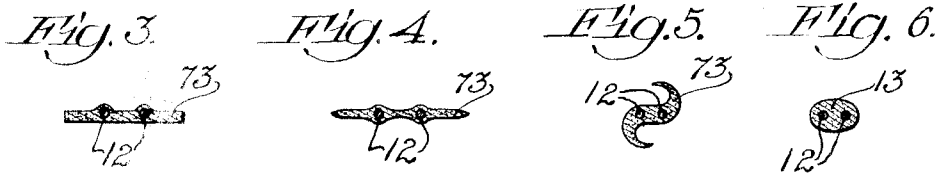
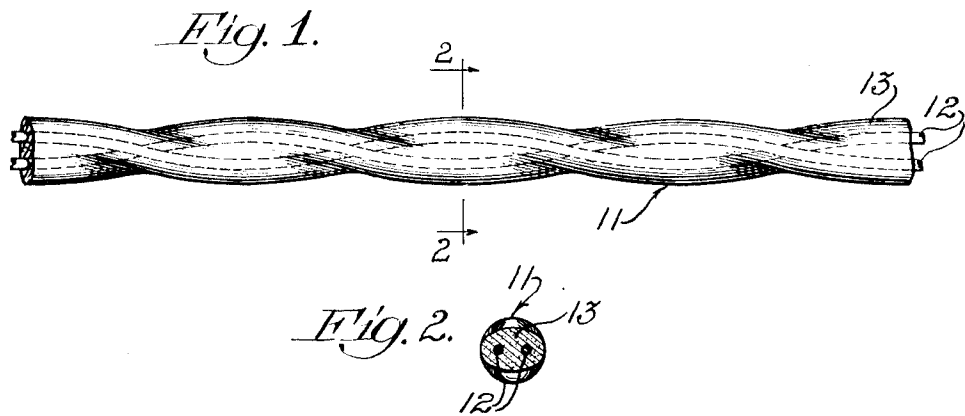


May 10, 1927.

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COATED STRANDS

1,627,740

Original Filed Oct. 11, 1924      2 Sheets-Sheet 1



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## UNITED STATES PATENT OFFICE.

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## COATED STRANDS.

Application filed October 11, 1924, Serial No. 743,160. Renewed February 25, 1927.

This invention relates to coated strands, and more particularly to an article comprising a plurality of intertwined strands having a common coating.

5 An object of the invention is to provide an improved article of the character described which may be produced economically in large quantities.

Two specific forms of the invention are embodied in articles each comprising a plurality of spaced electrical conductors in strand form having a common coating of pulpos material attached to the conductors by an intermingling of the fibers thereof, 10 the conductors being twisted around each other in accordance with the practice usually followed in the manufacture of telephone cables and the like. In one of the aforementioned forms of the invention each wire is twisted in the same direction from end to end, and in the other form each wire is twisted in a plurality of directions. Both forms are preferably produced by practicing the improved method described 20 in my copending application, Serial No. 743,159, filed October 11, 1924, which method comprises subjecting a plurality of cores in strand form to a liquid containing pulp in such manner that a ribbon of moist pulp is applied to the cores. The ribbon is wrapped around the cores to form a uniform coating common to the cores. In one of the aforementioned forms of the present invention, the coating is first substantially 35 dried and then the cores or conductors are twisted around each other. In the other form the cores are first twisted around each other and then the coating is thoroughly dried.

40 The word "pulp" as used in the specification and claims is to be understood as defining and including any cohering fibrous mass whether suspended in a liquid, moist, or substantially dry.

45 Other objects and features of the invention will become apparent as the detailed description progresses, reference being had to the accompanying drawings, wherein

Fig. 1 is a fragmentary view of an article embodying the invention; 50

Fig. 2 is a sectional view taken on line 2—2 of Fig. 1;

Figs. 3, 4, 5, and 6 are transverse sectional views which progressively illustrate various steps in the method by which the article 55 shown in Fig. 1 is preferably formed;

Fig. 7 is a side elevation of apparatus adapted to produce the article shown in Fig. 1, a modified form of the apparatus being indicated in dotted lines; 60

Fig. 8 is a sectional view taken on line 8—8 of Fig. 7;

Fig. 9 is a plan view of a portion of the modified apparatus shown in Fig. 7, and

Fig. 10 is a sectional view taken through 65 another portion of the modified apparatus shown in Fig. 7.

Referring to Fig. 1, 11 designates in general an article embodying the invention and comprising a plurality of electrical conductors 12 twisted around each other and covered with paper which forms a common coating 13 for the conductors. It is to be understood, however, that the invention is limited to the use of paper only in so far as 75 is indicated in the appended claims as any suitable pulpos material may be employed to produce the coating 13 without departing from the spirit of the invention.

The article 11 is preferably produced by 80 the method described in my copending application, Serial No. 743,159, filed October 11, 1924. This method is preferably practiced by apparatus of the type shown in Figs. 7 to 10, inclusive, which apparatus is 85 fully described in the aforementioned copending application.

The apparatus comprises a drum 16 partly submerged in a liquid which contains pulp and is held in a tank 17. The drum 16 90 has an annular foraminous portion 27 through which liquid may pass from the tank 17 so as to strain pulp onto the foraminous portion 27. The tank 17 is supplied with liquid containing pulp from a mixing 95 vat (not shown) by means (not shown)

which insures a forced circulation between the vat and the tank 17 through the foraminous portion 27.

To produce the article 11, a plurality of 5 electrical conductors 12 in strand form are withdrawn from supply reels 65 and are guided by rollers 70 to the foraminous portion 27. The drum 16 carries the conductors 12 through the liquid containing pulp and as 10 the conductors pass therethrough a ribbon of wet pulp is applied to them. Some pulp is first strained onto the foraminous portion 27 before the conductors 12 are brought into contact therewith. Then, when the conduc- 15 tors contact with the initial layer of pulp on the foraminous portion and the drum continues to revolve in the tank, an additional amount of pulp is deposited on the conductors. When the conductors pass from the 20 tank 16, the pulpos material deposited on the conductors and on the foraminous portion 27 adheres to the conductors in the form of a ribbon 73 which appears substantially as shown in Fig. 3. A woven belt 75 aids in 25 freeing the pulp ribbon from the drum 16, the belt 75 being held in contact with the drum by a felt covered roll 76 which coacts with the belt and the drum to squeeze excess moisture from the ribbon and to impart the form illustrated in Fig. 4 to the ribbon. The 30 ribbon 73 and the conductors 12 then travel with the belt 75 and between it and a similar belt 79 to a forming mechanism 90 adapted to wrap the ribbon around itself and around the conductors. The ribbon then 35 becomes a uniform coating 13 common to the conductors which coating is attached to the conductors solely by an intermingling of the fibers of the pulpos material from 40 which the coating is formed. The manner in which the ribbon 73 is wrapped around itself and the conductors is illustrated in Fig. 5, the fully formed coating being shown in Fig. 6.

In producing one embodiment of the invention, the coated conductors pass directly 45 from the forming mechanism 90 to a housing 100 wherein means indicated at 106 is adapted to dry the coating by subjecting it to air of predetermined temperature and 50 predetermined relative humidity, the conductors being guided into the housing 100 by a sheave 101. When the coating 13 is substantially dry, the coated conductors are 55 guided by a sheave 115 to a take-up spool 109.

The take-up reel 109 is removably 60 mounted upon a shaft 117 which is rotatably journaled intermediate its ends in a bracket 118 (Figs. 7 and 9). The reel 109 is splined to the shaft 117 and is held in place upon the shaft by a washer 119 and a nut 120. A bevel gear 122 splined to the 65 shaft 117 meshes with a bevel gear 123 secured to a shaft 124 rotatably journaled in

the bracket 118. A pinion 125 secured to the shaft 124 meshes with a gear 126 which is rigidly secured to a bracket 127 mounted on a frame 128. The bracket 118 is rigidly 76 secured to one end of a shaft 130 journaled in the bracket 127, a pulley 131 being secured to the other end of the shaft. The pulley 131 may be rotated by a belt 132 which connects the pulley with any suitable driving means (not shown). 75

A friction disc 134 secured to the bevel gear 122 engages a friction disc 135 secured to a collar 136 splined upon the shaft 117. Disposed around the shaft 117 is a compression spring 138 which has one of its ends 80 resting against the collar 136 and the other of its ends resting against a washer 140 secured to the shaft 117 by a nut 141. The spring 138 yieldingly urges the friction disc 135 into engagement with the friction disc 85 134.

It is obvious that when the pulley 131 is driven by the belt 132, the reel 109 will rotate around the axis of the shaft 117 and will also rotate around the axis of the shaft 90 130. The coated conductors passing from the housing 100 will be wound upon the reel and will then be twisted around each other in the manner illustrated in Fig. 1.

In producing another embodiment of the 95 invention the coated cores are twisted around each other directly after they pass from the forming mechanism 90 by a twisting mechanism 150 interposed between the forming mechanism 90 and the sheave 101, (Fig. 10). 100 A sheave 151 guides the coated cores to the twisting mechanism 150 which comprises a plurality of gripping members 153, each of which is pivotally mounted intermediate its ends upon one end of a tube 154 adapted to 105 accommodate the coated conductors. One end of each gripping member 153 is adapted to engage the coating 13 on the conductors 12 and the other end thereof is provided with an anti-friction roller 155. Springs 156 110 yieldingly urge the gripping members 153 into positions wherein the rollers 155 rest upon a grooved collar 158 slidably journaled upon the tube 154. Longitudinal displacement of the grooved collar 158 relative to 115 the tube 154 is limited by an annular flange 160 formed integral with the tube 154 and a set collar 161 mounted on the tube. A slide 163 rotatably journals the tube 154 and is mounted upon rods 165 which are in turn 120 mounted in brackets 166. The tube 154 is held against longitudinal displacement relative to the slide 163 by a gear 168 keyed to the tube and a set collar 169 mounted upon the tube. The gear 168 meshes with a gear 125 170 splined upon a shaft 171 which is rotatably journaled in brackets 172. The gear 170 is secured to the slide 163 by a split collar 173 which permits the gear to be rotated by the shaft 171, but constrains the 130

gear to travel with the slide 163 when the slide moves in either direction along the rods 165. Secured to the shaft 171 is a pulley 175 which is operatively connected to any suitable driving means (not shown) by a belt 176.

Slidably mounted on the rods 165 is a yoke 180 carrying anti-friction rollers 181 which ride in the groove of the collar 158. Pivotally secured to the yoke 180 by a pin 183 is a rack 184 slidably journaled in a bracket 185. A segment 186 which meshes with the rack 184 is pivotally mounted upon a pin 187 and is formed integral with a segment 188 which meshes with a rack 190 slidably journaled in a bracket 191. Secured to one end of the rack 190 is an anti-friction roller 192 riding in a cam slot 193 of a cam 194. The cam 194 is adapted to reciprocate the rack 190 so that it will oscillate the segments 188 and 186 to reciprocate the rack 184. The rack 184, when reciprocated, will reciprocate the collar 158 along the longitudinal axis of the tube 154. The collar 158 will in turn reciprocate the tube 154, but through a lesser distance because of the lost motion connection between the collar and the tube. The cam 194 is driven by any suitable means (not shown) in such manner that when the tube 154 is advanced in the direction in which the coated conductors are being advanced, the tube and conductors will travel at substantially the same rate of speed. It is obvious that when the tube 154 is being advanced in this direction, the collar 158 will bear upon the anti-friction rollers 155 and cause the gripping members 153 to seize the coated conductors. The shaft 171 which is driven by means of the pulley 175 and the belt 176 causes the gear 170 to drive the gear 168 which in turn rotates the tube 154. Therefore when the gripping members 153 seize the coating 13 and travel with the coated conductors and the coating, the gripping members 153 will be rotated around the cores and will twist certain portions of the conductors 12 around each other, the portions which are so twisted being the portions disposed intermediate the sheaves 101 and 151. Of course, the conductors 12 will be twisted in opposite directions from the gripping members 153 so that each conductor will comprise a plurality of sections twisted in one direction and a plurality of portions twisted in the other direction.

In producing the latter embodiment of the invention, the coating 13 is relatively moist during the twisting operation, the coating being subsequently dried in the housing 100. When the coated conductors pass from the housing 100 the sheaves 108 and 115 are adapted to guide them to a take-up reel (not shown) which is driven by any suitable means (not shown).

What is claimed is:

1. A new article of manufacture comprising a plurality of intertwined strands separated from each other and covered by an integral, continuous and substantially homogeneous body.
2. A new article of manufacture comprising a plurality of intertwined strands separated from each other and covered by a common coating of pulp attached to the strands solely by an intermingling of the fibers thereof.
3. A new article of manufacture, comprising a plurality of strands held in spaced relation by a common coating of pulpous material applied thereto and retained thereon by an intermingling of the fibers of the pulpous material, one of the strands being twisted around another.
4. A new article of manufacture, comprising a plurality of strands, a common coating therefor, one of the strands being twisted around another subsequently to the application of the coating thereto.
5. A new article of manufacture, comprising a plurality of spaced strands having a common coating of a wrapped matted pulp fiber applied to the strands in a wet state, the cores being twisted around each other subsequently to the application of the coating thereto.
6. A new article of manufacture, comprising a plurality of strands held in spaced relation by a coating applied to the strands in the form of a ribbon of unfinished paper which is subsequently wrapped around the strands, one of the strands being twisted around another.
7. A new article of manufacture, comprising a plurality of strands held in spaced relation by pulp applied to the strands in a moist state and formed into a uniform and substantially homogeneous coating therefor, one of the strands being twisted around another.
8. A new article of manufacture, comprising a plurality of strands held in spaced relation by pulp applied to the strands in the form of a moist ribbon, the moist ribbon being applied longitudinally of the strands and being subsequently wrapped laterally around the strands to form a homogeneous coating common to the strands, one of the strands being twisted around another.
9. A new article of manufacture, comprising a plurality of strands held in spaced relation by paper applied to the strands in an unfinished state and subsequently fabricated to form a common coating for the strands, one of the strands being twisted around another.
10. A new article of manufacture, comprising a plurality of strands held in spaced relation by paper applied to the strands in an unfinished state and subsequently fabri-

cated to form a common coating for the strands, one of the strands being twisted around another subsequently to the application of the unfinished paper to the strands.

- 5 11. A new article of manufacture, comprising a plurality of spaced strands having a common coating of paper, the fabrication

of which is completed upon the strands, one of the strands being twisted around another subsequently to said fabrication. 10

In witness whereof, I hereunto subscribe my name this 29th day of September A. D., 1924.

WILLIAM FULLER HOSFORD.