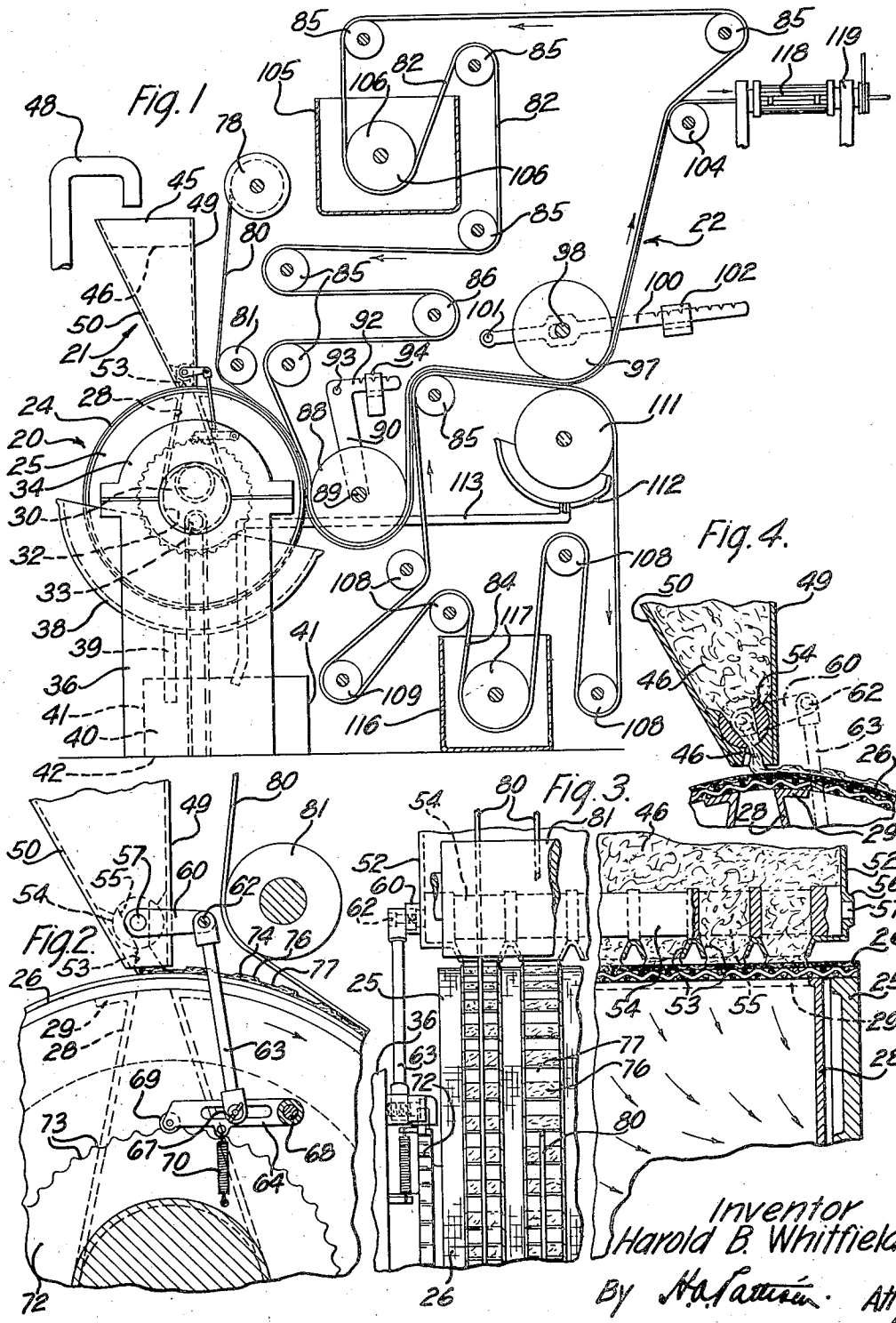
June 24, 1930. H. B. WHITFIELD 1,765,515

COATED CORE AND METHOD OF AND APPARATUS FOR APPLYING THE COATING THERETO

Filed March 19, 1929 2 Sheets-Sheet 1



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Filed March 19, 1929 2 Sheets-Sheet 2

Fig. 5.

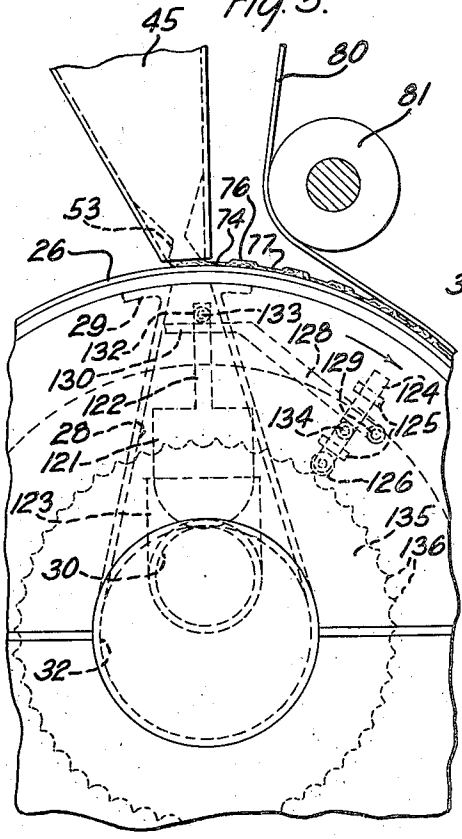


Fig. 6.

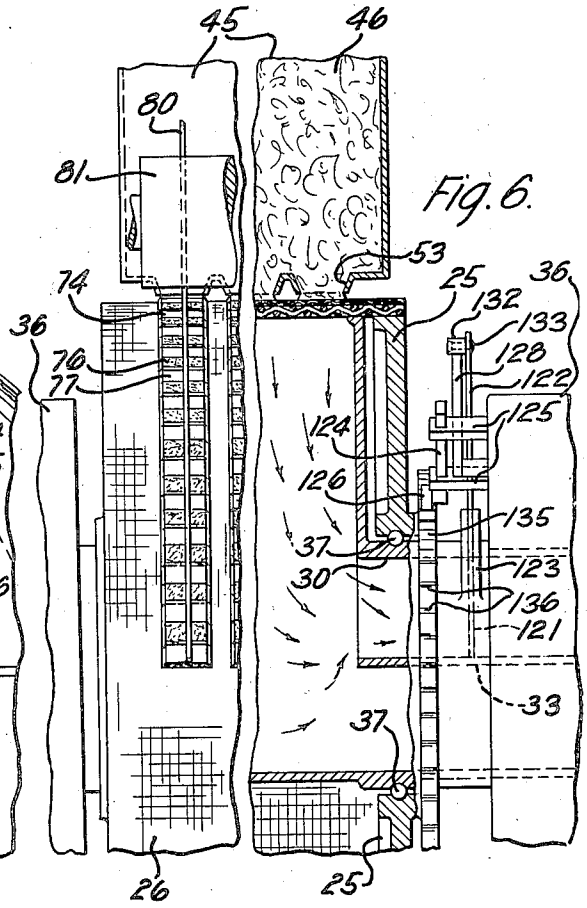


Fig. 7.

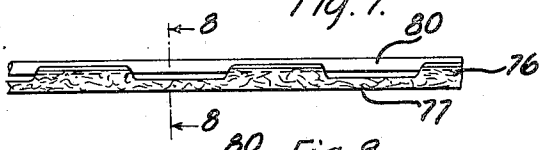


Fig. 8.

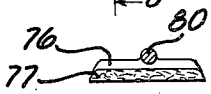


Fig. 9

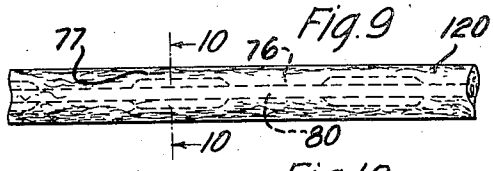
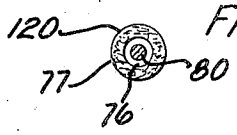


Fig. 10



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Patented June 24, 1930 1,765,515

UNITED STATES PATENT OFFICE

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COATED CORE AND METHOD OF AND APPARATUS FOR APPLYING THE COATING THERETO

Application filed March 19, 1929. Serial No. 348,151.

This invention relates to coated cores and a method of and apparatus for applying the coating thereto, and more particularly to pulp coated cores in strand form and a method of and apparatus for applying the pulpous coating thereto.

Objects of the present invention are to provide cores in strand form with a pulpous coating which will minimize the capacitance between adjacent strands, and a method of and an apparatus for producing such coated cores which will be economical and efficient.

In accordance with the general features of the invention, the method consists in reducing a stream of pulpous mixture to a ribbon of pulp by removing the water therefrom, and periodically varying the rate of flow of the stream to produce spaced corrugations on the surface of the ribbon. The ribbon is then wrapped around a core to be coated, and dried to form a cylindrical coating having isolated air spaces therein, corresponding to the corrugations in the ribbon. In a modified form of the invention, the corrugations are produced by subjecting the pulp stream to an alternately increasing and decreasing air pressure.

The present invention may be employed to advantage for insulating electrical conductors, but it is to be understood that it is not limited to this purpose but is limited only in so far as defined by the appended claims. Where the method is used for insulating electrical conductors, manila, wood, rag, cotton, esparto, jute, hemp and asbestos pulps may be employed as the coating material, but other materials than those specified may be used without departing from the spirit and scope of the present invention.

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.

In the accompanying drawings,

Fig. 1 is a diagrammatic side elevation, partly in section, of an apparatus embodying the features of the invention;

Fig. 2 is an enlarged fragmentary view of the distributing mechanism shown in Fig. 1;

Fig. 3 is a fragmentary front view of the apparatus shown in Fig. 2, partly in elevation and partly in section;

Fig. 4 is an enlarged detailed sectional view showing a portion of the distributing mechanism, in another position;

Fig. 5 is an enlarged framentary diagrammatic side elevation of a modification of the apparatus shown in Fig. 2;

Fig. 6 is a fragmentary front view of the apparatus shown in Fig. 5, partly in elevation and partly in section;

Fig. 7 is an enlarged fragmentary side elevation of the core with the associated ribbon of pulp;

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

Fig. 9 is an enlarged view of a section of the coated core, and

Fig. 10 is a sectional view taken on the line 10—10 of Fig. 9.

It is believed that the steps of the method may be readily understood from a detailed description of apparatus by which the invention may be practiced.

Referring to the drawings, in which corresponding parts in the several views are indicated by identical reference numerals, the apparatus comprises three cooperating units, a molding portion denoted generally by the numeral 20, a distributing portion denoted generally by the numeral 21, and a coating portion denoted generally by the numeral 22. The molding portion 20, (Fig. 1), includes a rotatable drum 24, comprising a pair of metal end walls 25 and a peripheral foraminous screen 26 secured thereto. The drum 24 is positively rotated by any suitable means (not shown). A stationary suction box 28 is mounted within the drum 24, and provided at one extremity with bearing lips 29 which slidingly contact with the under surface of the screen 26 and at the other extremity with an air pipe 30 leading to an air pump or other suitable exhausting means (not shown). The lower portion of the suction box comprises a water chamber 32 which terminates in a conduit 33. A housing 34, having side supporting members 36,

supports all the elements of the molding portion 20. The suction box is provided at its lower portion with projecting elements which engage the side supporting members 36 and suitable bearings 37, mounted on the projecting portions, for permitting smooth and free rotation of the drum 24 thereabout. A catch basin 38 is rigidly mounted in the side supporting members 36 beneath the drum and suction box, and has a downspout 39 which drains into a well 40 sunk beneath the apparatus. The well 40 comprises walls 41—41, and a bottom 42, and is provided with any suitable overflow means (not shown) to return water accumulated therein to a conventional pulp treating apparatus (not shown).

The distributing portion 21 of the apparatus consists of a stationary head box 45 which is furnished a continuous supply of pulp 46 by means of a supply pipe 48 leading from a reservoir or "stuff chest" (not shown). The head box comprises a front wall 49, an inclined rear wall 50, and perpendicular side walls 52—52 secured thereto. Extending across the bottom of the head box 45 are a plurality of restricted orifices 53, which are so spaced from each other as to predetermine the number and relative position of the ribbons of pulp which are to be produced. In the form illustrated, six orifices are used.

A horizontal bar 54 (Figs. 2 and 3), having a plurality of spaced perforations 55 is mounted in the lower portion of the head box 45, and is partially rotatable in journals 56, secured in the side walls 52—52 thereof, by means of integral shaft portions 57—57 which project at either side of the box. The perforations are spaced to coincide with the orifices 53 to permit, when the bar 54 is in a predetermined normal position, unrestricted flow of the pulp 46 through the orifices (Fig. 2), and when the bar is in another position to materially lessen the flow therethrough (Fig. 4). The shaft portions project through the walls 52—52 of the head box, the portion at the left being fitted with an arm 60, which is securely keyed to the shaft 57. Pivotally secured to the arm 60 by pin 62 is a link 63, an opposite end of which is pivotally attached to a slotted lever 64, by means of an adjustable thumb screw 67. The lever 64 is rotatably mounted on a fixed pivot 68, and is provided on the opposite end with a roller 69. A spring 70, secured to the lower edge of the lever 64, acts to maintain the roller 69 in engagement with a cam 72 which is rigidly mounted on the end walls 25 of the drum and rotatable therewith. The cam 72 is provided with regular peripheral leads 73.

From the foregoing it will be observed that an exhausted condition is maintained in the suction box which creates an inrush of air between the bearing lips 29—29. This current of air serves the two-fold purpose of assisting in the separation of free water from the pulpous solution to produce a solid deposition of pulp on the screen-covered periphery of the drum 24, and also acts positively to accelerate the flow of pulp from the head box above the normal capacity of the orifices 53. By periodically controlling the flow of pulp from the head box in rotating the horizontal bar as a valve to partially close the orifices, a ribbon of pulp 74, consisting of thick portions 76 and alternating thin portions 77, is produced on the drum. When the roller 69 is in the depth of one of the cam leads 73, the pulp is permitted to flow at its maximum rate, determinable by the normal capacity of the orifices plus the accelerating force produced by the difference in atmospheric pressures within and without the suction box. When in the course of the cam's rotation the roller engages the crest of a lead, the horizontal valve bar is partially rotated, in accordance with the cooperation of the lever 64, connecting link 63, and arm 60, to reduce the flow of pulp by partially closing the orifices. The link 63 is adjustable in the slotted portion of the lever 64 to increase or decrease the rotation of the valve bar in closing the orifices. Its effect may be increased by moving the link to the left end of the slot, and decreased by moving it to the right. In the apparatus illustrated, satisfactory results may be obtained by positioning the link medially of the slot, as shown. By thus altering the rate of flow of pulp from the head box a regularly corrugated ribbon of pulp is produced.

The coating portion 22 (Fig. 1) includes a plurality of supply reels 78 from each of which is fed a core 80 which is to be coated. Since in the apparatus shown each core requires an individual ribbon of pulp, the number of reels used is six. By means of guide rolls 81 the cores are brought to bear upon the corrugated upper surface of the pulpous ribbons 74. A continuously traveling belt or web system, consisting of a primary web 82 and a secondary web 84 which are associated during certain portions of their travel, is provided to impress between them the cores 80 and their associated ribbons of pulp 74, and to constitute the means for actuating the various portions of the core coating apparatus.

The primary web 82 is routed over idler rollers 85 to a stretcher roller 86, which is adjustable to permit regulation of the tension existing in the web. Leaving the stretcher roller, the web passes over another idler roller 85 to a couch roll 88. The couch roll is rotatable with an axis 89, which is suitably journaled in supports 90 which comprise integral depending portions of horizontal arms 92. This couch roll supporting

structure is rotatable about a fixed pivot 93 in such manner that the couch roll 88 presses upon the periphery of the drum 24 in accordance with the distance from the axis 93 of a weight 94, which is slidably mounted on the arm 92. The web 82 is thus borne against the drum 24 with a variable pressure sufficient to cause the pulp ribbon to adhere thereto and be carried away from the molding portion 20 and subjected to the action of the coating portion. From the couch roll 88 the web is routed over another idler roller 85 to a press roll 97. An axis 98 suitably journaled in arms 100 rotatably supports the press roll 97, the arms 100 being rotatable about a fixed pivot 101 in accordance with the distance from the pivot 101 of a weight 102, slidably mounted on the arms 100. From the press roll 97 the web is routed over roller 104 and idler rollers 85—85 to a cleaning box 105, a characteristic element of which is a rotatable drum 106, where the felt is thoroughly cleaned and substantially dried.

The secondary web 84 is routed over an idler roller 108 to a stretcher roller 109 which is adjustable to maintain a desired tension in the web. The web then passes around another idler roller 108, from which it travels to idler roller 85 in conjunction with the primary web 82. The primary and secondary webs are then pressed between a press roll 111 and the press roll 97, the core 80 and its associated ribbon of pulp 74 being carried between them. The press rolls cooperate to squeeze from the ribbon 74 substantially all of its moisture content. The press roll 111 is positively driven by any suitable source of power (not shown), and exerts the necessary tractive force on the companion press roll 97, to operate the associated webs in accordance with the speed of rotation of the drum 24. Located beneath the press rolls is a basin 112, having an outlet pipe 113 leading to the well 40, in order that the water pressed from the pulpous ribbon may be conserved and returned to the system. From the press rolls the secondary web passes over idler rollers 108 into a cleaning box 116, wherein it is subjected to the action of a rotatable drum 117 and other suitable apparatus (not shown) which cleans the web and drys it. The webs are drawn tightly around all of the rotating bearing surfaces by the respective stretcher rolls 86 and 109, and an equal tension is thereby impressed upon all portions of the webs. This tension may be varied by adjustment of the stretcher rolls to compensate for changes which may occur in the elasticity of the webs due to wear and tear.

The drum 24 is rotated in the direction indicated by the arrow, and carries the corrugated ribbons 74 beneath the guide rolls 81 which lay the cores 80 on the upper surface of the ribbons 74, as best shown in Fig. 7. Between the idler roller 85 and the couch roll 88, the primary web is brought to bear upon the cores and their associated ribbons of pulp with sufficient pressure as to cause them to adhere thereto and be carried around the couch roll to the next idler roller 85. It will be noted that both the primary and secondary webs pass over the latter, the cores and ribbons being impressed between them due to the tension existing in the web systems. Upon reaching the press rolls, the pressure exerted upon the stationary press roll 111 by the combined weight of the press roll 97 and weight 102 squeezes a large percentage of the remaining water content from the ribbons, and when afterwards they and the cores are carried on the lower surface of the primary web to the roller 104, the ribbons are in a comparatively dry state. Since the ribbon is moist when it reaches the press rolls, care should be taken that the pressure between the rollers is kept sufficiently low to avoid effacing the corrugations or rendering their alternate thick and thin portions less distinct. A plurality of polishers 118, rotatably mounted in supports 119, are provided, one for each core, and act to press the ribbon associated with the individual core firmly therearound. By engaging the under surface of the ribbons and applying a frictional pressure thereto, the polishers fold the ribbons laterally around the cores, and felt the overlapping edges of the ribbons to form a complete cylindrical insulating coating for the cores (Figs. 9 and 10). In so doing, the thick portions 76 form spaced supporting walls along the centered cores, and the thin portions 77 establish air spaces around the cores which are separated from each other and maintained by the supporting walls. The coated cores 120 are then forwarded for final drying and reeling, which may be accomplished by any suitable means (not shown). It should be understood, however, that the invention is not to be limited to the particular arrangement described above, since it is quite practicable and frequently desirable, by, for example, positioning the guide roller 81 to the left of the head box 45, and routing the cores 80 thereabout, to cause the cores to engage the screen covered periphery of the drum 24 prior to the deposition of pulp thereon. In such case, the cores engage the smooth surface of the ribbons which are formed around the cores by polishers 118 to provide a coating for the cores, the thick and thin portions of the ribbons forming transverse corrugations on the outside of the coating.

By using the apparatus described, the air spaces formed are equally as wide as the supporting walls, and the mechanical characteristics of the insulation constructed in

such manner are satisfactory for usual service conditions. Since the relative widths of the walls and air spaces may be readily varied without departing from the spirit of the invention, as for instance by changing the ratio of the cam leads, the invention should not be limited other than by the scope of the appended claims.

A modified form of apparatus, whereby a corrugated ribbon of pulp is produced through varying indirectly the rate of flow of pulp from the head box, is shown in Figs. 5 and 6. The apparatus consists of a plunger valve 121 having a projecting shaft 122, the valve being slidable in a grooved rack 123 which is interposed in the air line 30 exteriorly of the end walls 25 of the drum.

A valve operating mechanism is mounted on the side supporting members 36 and includes a rod 124, slidable in spaced guide brackets 125, and a roller 126 mounted in the lower end of the rod 124. A lever 128, rotatable at one end around a fixed pivot 129, is provided at the other end with a flange portion 130. The flange portion 130 supports a roller 132 which is pivotally secured by means of a pin 133 to the top of the projecting valve shaft 122. The lever 128 is supported adjacent the fixed pivot 129 by a roller 134 which is mounted on the rod 124 intermediately of the ends thereof. A cam 135 rigidly attached to an end wall 25 of the drum 24 and rotatable therewith, is provided peripherally with spaced leads 136. By means of any suitable spring means (not shown) the roller 126 is maintained constantly in close engagement with the cam leads 136. As the cam rotates the rod 124 slides upwardly and downwardly in accordance with the cam leads 136, causing the lever 128 to alternately raise and lower the plunger valve 121. This results in an intermittent action of opening and partially closing the air line 30. The closing of the air line sharply reduces the air pressure exerted on the pulp stream descending from the orifices 53 to the screen-covered periphery of the drum 24, and causes a corresponding diminution in the amount of pulp deposited on the drum. Since this action is periodical, the resulting ribbon 74 is found to have thick portions 76 and alternating therewith, thin portions 77, forming the desired corrugated surface. The corrugated ribbon is then subjected to the remaining steps of the method and apparatus described above, and formed into a cylindrical coating for a core, having the desired air spaces along the core, as described above.

It will be understood that the embodiments of the invention herein described and illustrated are merely convenient and useful forms of the invention which are capable of other modifications without departing from the spirit and scope of the invention as defined in the claims.

What is claimed is:

1. The method of coating a core in strand form which consists in producing a corrugated coating of pulp on the core, the corrugations extending transversely of the core.

2. The method of coating a core in strand form which consists in producing transverse corrugations in pulpous matter and forming the pulpous matter around the core to form a coating therefor.

3. The method of coating a core in strand form which consist in producing transverse corrugations in pulpous matter and forming the pulpous matter longitudinally around the core to form a continuous coating therefor.

4. The method of coating a core in strand form which consists in producing a corrugated deposition of pulp, associating the deposition with a core to be coated, and forming the deposition around the core to form a coating therefor.

5. The method of coating a core in strand form which consists in producing spaced transverse corrugations in a deposition of pulp, associating the pulpous deposition longitudinally with a core to be coated, and forming thereof a continuous coating for the core.

6. The method of coating a core in strand form which consists in projecting a liquid containing pulp in a stream, producing therefrom a corrugated deposition of pulp, and forming the corrugated deposition laterally around a core to form an insulating coating therefor having air spaces adjacent the core.

7. The method of coating a core in strand form which consists in projecting a liquid containing pulp in a stream having a predetermined rate of flow, reducing the stream to a deposition of pulp by removing the free liquid therefrom, producing spaced corrugations in the deposition by periodically varying the rate of flow, and forming the deposition laterally around a core to form a coating therefor, having air spaces of a predetermined length and spaced a predetermined distance apart.

8. The method of coating a core in strand form which consists in producing a corrugated ribbon of pulp, associating the ribbon with the core to be coated, and forming the ribbon around the core to form a coating therefor.

9. The method of coating a core in strand form which consists in producing a ribbon of pulp, simultaneously producing spaced transverse corrugations therein, associating the ribbon longitudinally with a core to be coated, and forming the ribbon into a cylindrical coating for the core.

10. The method of coating a core in strand form which consists in producing surges in a stream of liquid containing pulp, reducing the stream to a deposition of pulp having corrugations in the surface thereof corresponding to the surges in the pulp stream, and forming the corrugated deposition around a core to form an insulating coating therefor having air spaces adjacent the core.

11. In an apparatus for coating cores in strand form, means for distributing a coating material in a fluid state at a predetermined rate, means for reducing the material to a solid state, and means for intermittently varying the rate of distribution to produce corrugations in the material when in the solid state.

12. In an apparatus for coating cores in strand form, a receptacle having a restricted orifice for distributing a coating fluid at a predetermined rate, a valve for regulating the amount of coating fluid reaching the orifice, means for reducing the fluid to a solid state, and cam means for oscillating the valve to produce corrugation in the solid coating material.

13. In an apparatus for coating cores in strand form, a receptacle having a restricted orifice for distributing the coating fluid at a predetermined rate, a rotatable foraminous member for reducing the fluid to a solid state, and cam actuated means associated with the receptacle for intermittently varying the rate of distribution.

14. An article of manufacture comprising a core, and a coating of pulpous material around the core, the coating having spaced corrugations which engage the core.

15. An article of manufacture comprising a core, and a coating of pulpous material on the core, the coating having spaced transverse corrugations.

16. An article of manufacture comprising a core, and a coating of pulpous material around the core, the coating having spaced corrugations extending transversely of the core.

17. An article of manufacture comprising an electrical conductor, and a pulpous insulating coating thereon, the coating having spaced corrugations which peripherally engage the core.

18. An article of manufacture comprising an electrical conductor, and a pulpous insulating coating thereon, the pulpous coating having spaced corrugations for providing air spaces at intervals along the core.

19. An article of manufacture comprising a core, and a continuous coating of felted and matted fibres engaging the core at spaced points.

20. An article of manufacture comprising a core, and a continuous coating of felted and matted fibres around the core, the coating having spaced corrugations, the ridges thereof engaging the core.

In witness whereof, I hereunto subscribe my name this 8th day of March, A. D., 1929.

HAROLD BARNARD WHITFIELD.