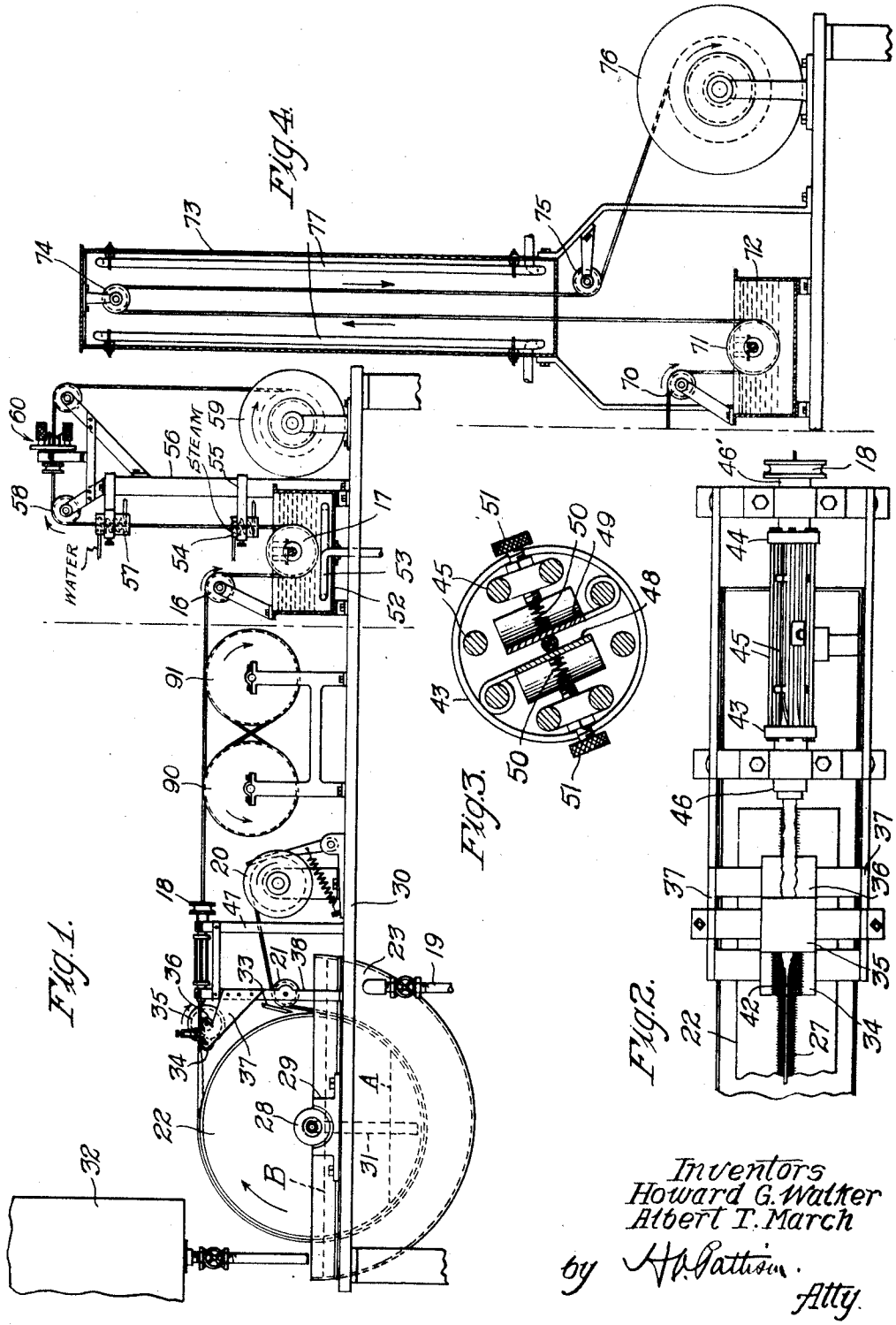
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H. G. WALKER ET AL.

METHOD AND APPARATUS FOR COATING CORES

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Inventors
Howard G. Walker
Albert T. March
by H. B. Pattison.
Atty.

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HOWARD GEORGE WALKER, OF BERWYN, AND ALBERT THOMAS MARCH, OF CHICAGO, ILLINOIS, ASSIGNORS TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

METHOD AND APPARATUS FOR COATING CORES.

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This invention relates to a coated core and a method of and apparatus for producing the same.

The object of the invention is to produce a core coated with a pulpous material attached to the core solely by an intermingling of the fibres thereof and so treated that the said coating is impervious to moisture, and provide a method for producing the said coating.

Briefly described, the method consists in bringing the core and pulp into intimate relation in such manner that pulp is applied to the core and retained thereon solely by an intermingling of the fibres thereof and then treating the said coating with a waterproofing material in such manner that the coating is rendered impervious to moisture.

The present method may be employed to advantage in the insulating of electrical conductors but it is to be understood that the invention is not limited to this purpose but only in so far as is 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 which contemplates in its broadest aspect the coating of any core with any pulp and then so treating the coating that it is impervious to moisture. The term "core in strand form" as used in the specification and appended claims, refers to a core having a configuration resembling a fibre, hair, filament, string, small cord, or the like, or it may be in the nature of a rope consisting of fibres, yarns, or wires twisted together.

The wood "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.

The drawings illustrate the method as employed for coating a core in strand form and impregnating the said coating with a material which will render it impervious to moisture, and disclose an apparatus for performing the method in which the pulpous material is applied to the strand by the method and apparatus disclosed in our copending applications Serial No. 547,923, filed March 29, 1922, and Serial No. 547,924, filed March 29, 1922 respectively, two different apparatus being utilized for impregnating the coating applied to the strand, depending upon the character of the impregnant. Where a molten waxy or pitch like impregnant is employed, an apparatus for applying it to the coating may comprise, a bath containing the impregnant through which the coated strand is passed, a suitable wiper for removing excess impregnant from the coating after it leaves the bath, and means for cooling the impregnant and causing it to set before the coated strand is stored on a take-up reel or other suitable storage mechanism. Where an impregnant is employed which comprises waterproofing material dissolved in a volatile solvent, an apparatus for applying the impregnant to the coating may comprise a bath containing the impregnant through which the coated strand is passed, and a heated oven through which the impregnated coating is drawn, the oven being maintained at a temperature to volatilize the solvent so that the waterproofing material alone is left on the coating.

Where the above method is employed for the insulating of electrical conductors, after the pulp coating has been treated so as to be impervious to moisture it may be served with a strand wrapping of cotton, linen, silk or other suitable material to form a protection for the coating, and to give the conductor a cleaner and more pleasing appearance.

In the accompanying drawings—

Fig. 1 is a side elevation partly in section showing an apparatus by which the method may be performed, where a molten waxy or pitch like impregnant is employed.

Fig. 2 is an enlarged fragmentary top plan view of a portion of the apparatus shown in Fig. 1.

Fig. 3 is a vertical sectional view taken on the line of 3—3 of Fig. 2.

Fig. 4 is a vertical sectional view showing an impregnating apparatus which may be employed when an impregnant is utilized which comprises waterproofing material dissolved in a volatile solvent.

The apparatus disclosed for performing the process is particularly adapted for coating cores in strand form but it is to be understood that other apparatus may be devised for coating cores in other forms and still be within the scope of the present invention.

Referring now to the drawings in which like reference numerals designate similar parts throughout the several views, the core to be coated is fed from a supply 20 over an idler roll 21 and thence around a drum 22 which is partially submerged in a liquid containing pulp within a semi-spherical trough 23. The drum 22 comprises a pair of sheet metal sides and a peripheral portion secured thereto which is provided with a plurality of relatively large perforations (not shown) which are covered with a narrow strip of fine wire mesh 27 (Fig. 2). The drum 22 has a centrally disposed tubular axle which is suitably mounted within bearings 29 carried by a framework 30 which supports all of the elements of the apparatus.

In order to apply pulp to the core as it passes over the drum 22, the liquid within the drum is maintained at a lower level than that of the pulp mixture in the tank 23, as indicated by dotted lines A and B respectively. This difference in levels is maintained by a siphon pipe 31 which has its inlet opening submerged in the liquid within the drum 22 and its discharge through the tubular axle 28. A continuous circulation of the pulp mixture is maintained in the tank 23 by feeding the pulp mixture from a supply tank 32 into the tank 23 and out of the said tank through a pipe 19 into a receiving tank (not shown) from which it is pumped back into the supply tank 32 in any suitable manner. As the drum 22 carries the core thereon through the tank 23, the liquid in the tank will pass through the wire mesh 27, straining the pulp onto the outer surface of the wire and applying pulp to the core supported thereon. In order to keep the wire mesh clean prior to its reception of the core and a new coating of pulp, it is washed by a jet of water under pressure which is supplied through a nozzle 33.

The drum 22 is rotated in the direction indicated by the arrow. The core and coating thereon leaves the drum at the top thereof, and the force of gravity, surface tension of the liquid in the pulp mixture, and the felting action of the pulp fibers cause it to surround the core and cling to it in substantially the form shown in Fig. 6.

From the drum 22 the core with pulp applied thereon is passed over an auxiliary roll 34 and then between a pair of squeezing rolls 35 and 36. These three rolls are best shown in Fig. 2, and are rotatably mounted between a pair of brackets 37 secured to an upright standard 38 supported by the framework 30. Suitable means (not shown) is provided for driving the roll 36, and this roll and the roll 35 preferably draw the core from the supply 20 over the drum 22, causing it to rotate, and then between them.

The auxiliary roll 34 (Fig. 2) is a hollow sheet metal drum having a peripheral slot covered with a strip of fine wire mesh 42. It has been found preferable to employ the auxiliary roll 34 and to make it foraminous where it engages the core and pulp coating thereon in order that the "free liquid," so to speak, may be strained off away from the core and coating without causing a back flow of the liquid, which would tend to wash off the pulp coating which at this stage of the process is very soft and moist and easily removed from the core. With the "free liquid" removed, the coating has greater strength, due to a closer felting of the fibers, so that when the cord and coating are passed through the squeezing rolls the coating will not be torn from the core.

The squeezing rolls may be formed of rubber and forced together by any suitable tension means which is adjustable to present the proper pressure on the core and pulp coating as they pass between the rolls. These rolls remove the greater portion of the liquid from the pulp mixture and form the pulp into a thin ribbon which extends laterally from each side of the core, as is shown in Fig. 2. This squeezing operation also tends to mat or felt the fibers into more intimate relation, increase the tensile strength of the covering and attach it to the core.

From the squeezing rolls the core with its ribbon pulp coating is drawn through a former which wraps the projecting edges of the ribbons around the core and around each other, the appearance of the coating after the forming action is completed being shown in Fig. 3. The former causes a thorough intermingling of the pulp fibers and shapes the coating so that it embraces the core and conforms to the shape thereof.

The former comprises two cup-shaped collars 43 and 44 held together and in spaced relation by means of rods 45. Integral with each of said collars 43 and 44 is a sleeve 46 and 46′ respectively which are rotatably mounted with suitable bearings in standards 38 and another pair of standards 47 which are supported by the framework 30. Two plates 48 and 49 (Fig. 3) have projecting tongues which are bent around the rods 45 to pivotally support the plates in opposed relation to each other. Compression springs 50 engage the lower faces of each of the plates 48 and 49 and tend to force them together. The springs 50 are put under the requisite tension by means of adjusting screws 51. The ends of the plates 48 and

49 adjacent the squeezing rolls 35 and 36 are flared outwardly so as to present a smooth surface to the core and pulp coating as they pass from said rolls through the sleeve 46 and between the forming plates 48 and 49. The core passes from the forming plates through the sleeve 46'.

The plates 48 and 49 are rapidly rotated around the core and the pulp coating thereon through the medium of a pulley 18 secured to the sleeve 46', the said pulley being driven by any suitable means (not shown).

The forming plates 48 and 49 wrap the projecting edges of the pulp ribbon about each other and around the core in much the same manner as though the core and pulp ribbon were rolled on a table top with the palm of the hand.

The core with its formed coating is drawn from the former and subjected to a mechanism for drying the coating. The means shown for performing this operation are a pair of wide hollow drums 90 and 91 heated internally and having a plurality of grooves (not shown) which receive the core, guides (not shown) being provided for directing the core over first one drum and then the other until it has traversed all of the grooves of both drums.

The core with its coating is drawn from the heating drums and subjected to apparatus for impregnating the coating to render it impervious to moisture. When a molten waxy or pitch like impregnant is utilized the apparatus shown in Fig. 1 may be employed. From the drying drums the coated core is passed over an idler roll 16 and then around a drum 17 which is partially submerged in a molten impregnant within a tank 52. The drum 17 is rotatably mounted within suitable bearings carried by the tank 52. The impregnating material may comprise a mixture of rosin, paraffin, bees-wax and rosin oil but it is to be understood that various other molten solutions may be substituted without departing from the spirit and scope of the present invention. The material is kept in a molten state by means of a steam coil 53 submerged in a tank or by any other suitable heating means. After the coated core leaves the drum 17 it is completely covered with the impregnant, surplus of said impregnant being wiped off of the coating by means of a die 54 or other suitable wiper. Where a die is used it may be supported on an arm 55 carried by a standard 56 supported by the framework 30. It is desirable that the die 54 be maintained at a temperature approximating the melting point of the impregnant and suitable means such as steam coils (not shown) may be employed to maintain the temperature of the die at the proper degree. After leaving the die 54 the core is passed through a second die 57 or other suitable wiper which is maintained at a temperature considerably below the melting point of the impregnant and as a consequence the die 57 serves to chill and cause the impregnant to set. A suitable means may be employed for cooling the die 57 such as air, or water. After leaving the die 57 the coated core is passed over an idler pulley 58 and is thence stored upon a take up reel 59 driven by any suitable means (not shown).

Where the above method is employed for insulating electrical conductors, after the pulp coating has been treated by the impregnating material to render it impervious to moisture, it may be served with a strand wrapping of cotton, linen, silk or other suitable material to form a protection for the coating and to give the conductor a cleaner and more pleasing appearance. The wrapping may be applied by a serving mechanism 60 which wraps a strand around the pulp coating in a manner well known to those skilled in the art.

Where the coated core is subjected to an impregnant which comprises waterproofing material dissolved in a volatile solvent the apparatus shown in Fig. 4 may be utilized. From the heating drums the coated strand is passed over an idler pulley 70 and around a drum 71 partially submerged in the impregnant within a tank 72. The impregnating material may comprise a waxy waterproofing material such as carnauba and paraffin wax dissolved in a volatile solvent such as turpentine, naphtha, gasolene, tetrachloride or benzene. Various other waterproofing materials and volatile solvents may be employed, however, without departing from the spirit and scope of the present invention. The drum 71 is rotatably mounted in suitable bearings supported by the tank 72. Upon leaving the said tank the core, with its said coating saturated with the impregnating material, is passed upwardly through an oven 73, over an idler pulley 74 supported therein then downwardly through the oven over an idler pulley 75 and is thence stored on a take up reel 76 driven by any suitable means (not shown). The core may be passed up and down through the oven any number of times desired a single pass being illustrated merely for the sake of simplicity. The oven 73 may be heated by steam coils 77 or any other suitable means. As the coated core passes through the oven the volatile solvent of the impregnant evaporates so that the waterproofing alone is left in the coating.

Where this method is employed for insulating electrical conductors after the pulp coating has been treated so as to be impervious to moisture it may be served with a wrapping of cotton, linen, or any other suitable material by a strand server similar to the server 60, the wrapping as previously stated

forming a protection for the coating and giving the conductor a cleaner and more pleasing appearance.

What is claimed is:

1. A method of coating a core in strand form with pulp, consisting in forming the pulp in liquid suspension around the core to cause it to be attached thereto by an intermingling of the fibers of the pulp and imparting thereto a curved outer surface, and treating the said coating in such manner as to render it impervious to moisture.

2. A method of coating a core in strand form, consisting in applying unfinished paper free of adhesive material to the core, subsequently completing the fabrication of the unfinished paper on the core to constitute a coating on the core in such a manner that it is retained thereon by the intermingling of the fibres and then treating said coating in such manner as to render it impervious to moisture.

3. A method of coating a core in stranded form, constituting in subjecting the core to a liquid containing pulp in such manner that pulp is applied thereto, and then treating the said coating in such manner as to render it impervious to moisture.

4. A method of coating a core in strand form, consisting in subjecting the core to a liquid containing pulp in such manner that pulp is applied thereto to produce a coating, removing excess moisture from the coating forming the said coating, and then treating the coating in such manner as to render it impervious to moisture.

5. A method of coating a core in strand form, consisting in applying a pulp ribbon to a core and wrapping the ribbon around the core to cause an intermingling of the fibers thereof to attach the pulp to the core, and then treating the said coating in such manner as to render it impervious to moisture.

6. A method of coating a core. consisting in subjecting the core to a liquid containing pulp in such manner that a ribbon of said pulp is applied to the core, wrapping the ribbon around the core to cause an intermingling of the fibers thereof to attach the pulp to the core, and then treating the said coating in such manner as to render it impervious to moisture.

7. A method of coating a core in strand form with pulp, consisting in subjecting the core to a liquid containing pulp in such manner as to apply said pulp in the form of a ribbon longitudinally of the core, wrapping said ribbon laterally around the core to cause an intermingling of the fibers thereof to attach the pulp to the core, and then treating the said coating in such manner as to render it impervious to moisture.

8. A method of coating a core in strand form, consisting in subjecting a continuously moving core to a liquid containing pulp in such manner as to cause the pulp fibres to be attached thereto, and treating the said coating in such manner as to render it impervious to moisture.

9. A method of coating a core in strand form with pulp, consisting in subjecting a continuously moving core to a liquid containing pulp in such manner that a pulp ribbon is attached to the core, wrapping said ribbon around the core to constitute a coating therefor, and treating the said coating in such manner as to render it impervious to moisture.

10. A method of coating a core in strand form, consisting in applying a wet pulpous mixture to a continuously moving core in such manner as to cause the pulp to be attached thereto solely by an intermingling of the pulp fibers, and treating the said coating in such manner as to render it impervious to moisture.

11. A method of coating a core in strand form, consisting in subjecting the core to a pulp in such manner that pulp is attached thereto solely by a felting of the pulp fibers, and impregnating the said coating with a material to render it impervious to moisture.

12. A method of coating a core in strand form, consisting in subjecting the core to a liquid containing pulp in such mannner that pulp is applied thereto to form a coating, so treating the pulp coating that it is attached to the core and has a substantially circular outer surface, and then impregnating the said coating with a material to render it impervious to moisture.

13. A method of coating a core in strand form, consisting in subjecting the core to a pulp in such manner that pulp is applied thereto and attached by a felting of the pulp fibers, and then impregnating the said coating with a molten organic water-proofing compound to render it impervious to moisture.

14. A method of coating a core in strand form, consisting in subjecting the core to a pulp in such manner that pulp is applied thereto by a felting of the pulp fibers, impregnating the coated core with a waterproofing material, and then wiping the excess material from the said coating.

15. A method of coating a core, consisting in subjecting the core to a liquid containing pulp in such manner that pulp is applied thereto, impregnating the coated core with a molten waterproofing compound, and then cooling the said coating to cause a solidification of said impregnating material.

16. A method of coating a core in strand form, consisting in subjecting the core to a pulp in such manner that pulp is applied thereto, passing the coated core through a bath of waterproofing material, removing

excess waterproofing material from the coated core in the presence of heat, and then cooling said coating to cause a solidification of said waterproofing material.

17. A method of coating a core, consisting in subjecting the core to a pulp in such manner that pulp is applied thereto, passing the said coated core through a bath of impregnating material, drawing the said coated core through a heated die to remove excess impregnating material, and then cooling said coating to cause a solidification of said impregnating material.

18. A method of coating a core, consisting in subjecting the core to a pulp in such manner that pulp is applied thereto, passing the said coated core through a bath of impregnating material, drawing the said coated core through a heated die to remove excess impregnating material, and then drawing said coating through a chilled die to cause a solidification of said impregnating material.

19. A method of coating a core in strand form, consisting in subjecting the core to a pulp in such manner that pulp is applied thereto, treating the coating in such manner as to render it impervious to moisture, and then serving a strand wrapping around said coating.

20. A method of coating a core in strand form, consisting in subjecting the core to a liquid containing pulp in such manner that pulp is applied thereto, treating the coating in such manner as to render it impervious to moisture, and then serving a strand wrapping around said coating.

21. A method of coating a core in strand form, consisting in subjecting the core to a pulp in such manner that pulp is applied to the core and attached thereto by a felting of the pulp fibers, treating the coating in such manner as to render it impervious to moisture, and then serving a strand wrapping around said coating.

22. A method of coating a core in strand form, consisting in subjecting the core to a pulp in such manner that pulp is applied thereto, and impregnating the said coating with a waterproofing material suspended in a volatile fluid.

23. A method of coating a core in strand form, consisting in subjecting the core to a pulp in such manner that pulp is applied thereto, impregnating the pulp with a waterproofing material suspended in a volatile fluid, and then subjecting the impregnated coating to heat of sufficient temperature to cause the volatilization of said fluid.

24. A method of coating a core, consisting in subjecting the core to a pulp in such manner that pulp is applied thereto to form a coating, so treating the said coating that it is attached to the core and conforms to the shape thereof, impregnating the said coating with a waterproofing material suspended in a volatile fluid, subjecting the said impregnated coating to heat of sufficient temperature to cause a volatilization of said fluid, and then serving a strand wrapping around the said coating.

25. In a machine for coating a core in strand form with pulp, a receptacle holding a supply of liquid containing pulp, means for causing relative movement between the core and the liquid whereby pulp is applied to the core, and means for applying waterproofing material to said coating.

26. In a machine for coating a core in strand form with pulp, a receptacle holding a supply of liquid containing pulp, means for causing relative movement between the core and liquid whereby pulp is applied to the core, means for forming the said pulp so that it conforms with the shape of the core, and means for applying waterproofing material to said coating.

27. In a machine for coating a core in strand form with pulp, a receptacle holding a supply of liquid containing pulp, means for causing relative movement between the core and liquid whereby pulp is applied to the core to form a coating, means for removing a portion of the liquid from the pulp on the core, means for forming said pulp so that it conforms with the shape of the core, means for removing the remaining moisture from the coating, and means for applying waterproofing material to said coating.

28. In a machine for coating a core with pulp, a foraminous carrier for the core, a receptacle holding a supply of liquid containing pulp, means for causing relative movement between the said carrier and the liquid whereby pulp is strained onto the said core, and means for applying waterproofing material to said coating.

29. In a machine for coating a core with pulp, means for subjecting the core to a wet pulp whereby pulp is applied thereto, means for applying pressure to the pulp, means for forming the pulp so that it conforms with the shape of the core, and means for applying waterproofing material to said coating.

30. In a machine for coating a core with pulp, a receptacle holding a supply of liquid containing pulp, means for bringing the core and said liquid into intimate contact and causing a relative movement between the core and pulp whereby pulp is applied to the core, a former for shaping the pulp so that it conforms with the contour of the core, said former comprising rotating members engaging the pulp coating, and means for applying waterproofing material to said coating.

31. In a machine for coating a core in strand form with pulp, means for attaching

a wet pulpous ribbon to the core, means for forming said ribbon on the core to constitute a coating conforming with the shape of the core, and means for applying waterproofing material to said coating.

32. In a machine for coating a core in strand form with pulp, means for attaching a wet pulpous ribbon to the core longitudinally thereof, means for wrapping said ribbon around the core to constitute a coating therefor, and means for applying waterproofing material to said coating.

33. In a machine for coating a core in strand form with pulp, a receptacle holding a supply of pulp, means for causing relative movement between the pulp and the core whereby pulp is applied to the core, means for fabricating the pulp into ribbon form, means for wrapping said pulp ribbon around the core, and means for applying waterproofing material to said coating.

34. In a machine for coating a core with pulp, a receptacle containing pulp, means for causing relative movement between the pulp and the core whereby pulp is applied to the core, means for fabricating the pulp into ribbon form, means disposed in engagement with said pulp ribbon, means for causing relative lateral movement between said means and the core to wrap the ribbon around the core, and means for applying waterproofing material to said coating.

35. In a machine for coating a core with pulp, a receptacle holding a supply of liquid containing pulp, a squeezing mechanism, a former, a waterproofing device and means for drawing the core into contact with the liquid and then through the squeezing mechanism and former, and waterproofing device.

36. In a machine for coating a core with pulp, a receptacle holding a supply of liquid containing pulp, a carrier having a foraminous portion and mounted in contact with said liquid, a squeezing device, a forming device, a drying mechanism, a waterproofing device and means for submitting said core to said carrier, squeezing device, forming device, drying mechanism, and said waterproofing device.

37. In a machine for coating a core with pulp, a receptacle holding a supply of liquid containing pulp, means for causing relative movement between the core and the liquid whereby a deposit of pulp is formed on the core, a strand serving mechanism, means for causing the core to pass through said serving mechanism, and means for applying waterproofing material to said coating.

38. In a mechanism for coating a core, in combination a tank containing a mixture of pulp, a drum rotatable therein and provided with a foraminous portion on its periphery adapted to support the core to be coated, means for maintaining a lower pressure within the drum than within the tank to cause a flow from the tank through the foraminous portion of the drum whereby the pulp will be strained onto the core, and means for applying waterproofing material to said coating.

In witness whereof, we hereunto subscribe our names this 13 day of June, A. D. 1922.

HOWARD GEORGE WALKER.
ALBERT THOMAS MARCH.