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H. G. WALKER ET AL

METHOD OF AND APPARATUS FOR COATING CORES

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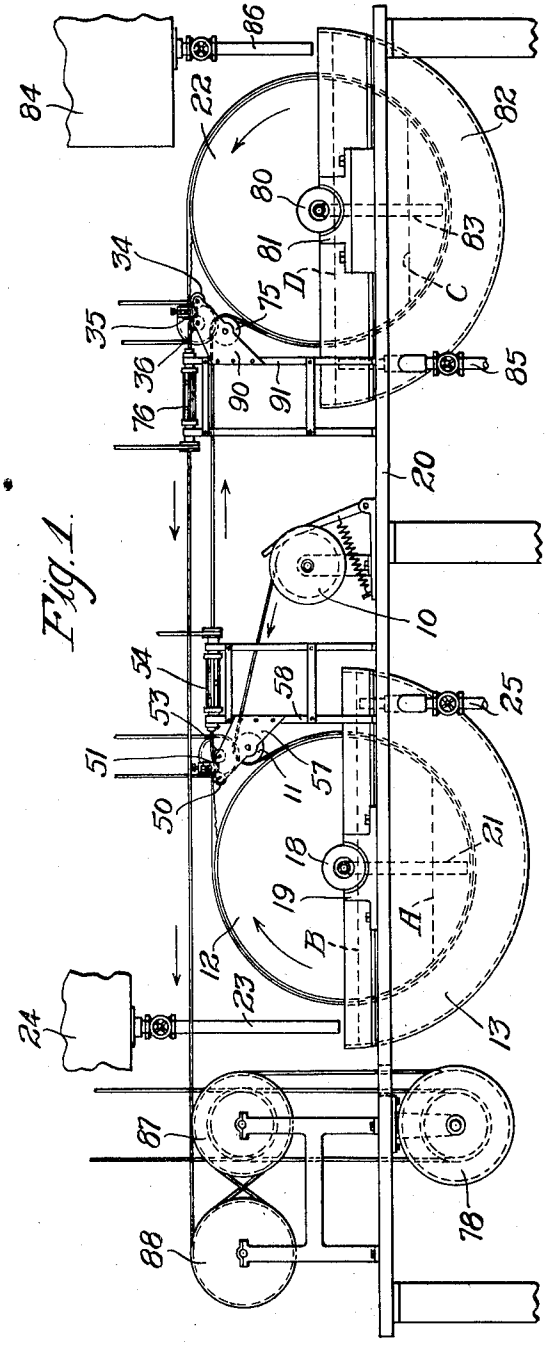


Fig. 1.

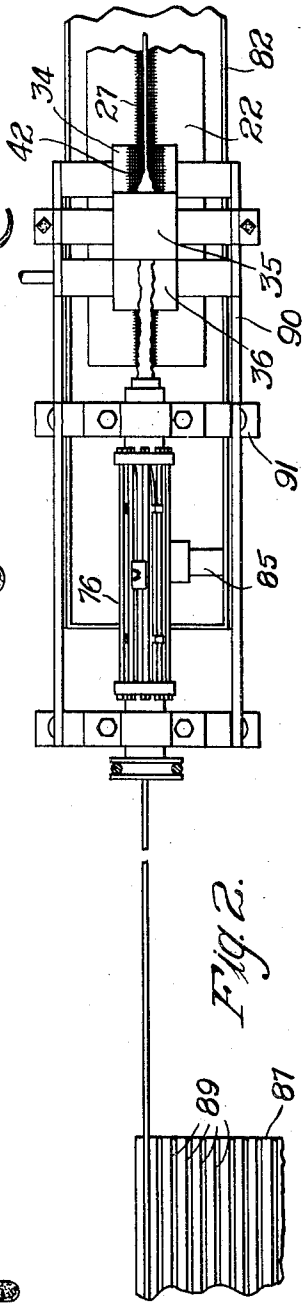


Fig. 2.

Fig. 3. Fig. 4. Fig. 5. Fig. 6. Fig. 7 Fig. 8. Fig. 9. Fig. 10.

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

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UNITED STATES PATENT OFFICE.

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 OF AND APPARATUS FOR COATING CORES.

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This invention relates to a method of and apparatus for coating cores.

The object of the invention is to produce a core having a plurality of coatings of pulp thereon which are attached to the core and to each other solely by an intermingling of the fibers thereof and without the use of any adhesive substance.

Briefly, the method consists in bringing the core and pulp into intimate relation in such manner that pulpous material is applied directly to the core, then forming said material on the core so that it constitutes a homogeneous coating therefor, then bringing the coated core into intimate relation with pulpous material in such manner that pulp is applied to said coating and then forming said last applied pulpous material on the core so that it constitutes a coating homogeneous with the coating first applied.

The present method may be employed to advantage for insulating electrical conductors, but it is to be understood that it 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.

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.

The drawings illustrate a preferred form of apparatus by which the method may be practiced, in which—

Fig. 1 is a side elevation of the apparatus;

Fig. 2 is an enlarged top plan view of the apparatus shown in Fig. 1, parts being omitted for the sake of clearness;

Figs. 3 and 4 are enlarged sectional views showing the form of the pulp coating on the core as it is delivered from the liquid containing pulp and the squeezing rolls respectively;

Figs. 5 and 6 are enlarged sectional views showing the form of the coating during the forming operation and after the completion of the forming operation respectively;

Figs. 7 and 8 are enlarged sectional views showing the form of the coating on the coated core as it is delivered from the liquid containing pulp and the squeezing rolls respectively; and

Figs. 9 and 10 are enlarged sectional views showing the form of the additional coating on the previously coated core during the forming operation and after the completion of the forming operation respectively.

The apparatus disclosed for performing the process is particularly adapted for coating a core 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 process.

Referring to the drawing in detail in which like reference numerals are used to designate similar parts throughout the several views, the core to be coated is fed from a supply spool 10 over an idler roll 11 and then around a drum 12 which is partially submerged in a fluid containing pulp within a semi-circular trough 13. After passing almost around the periphery of the drum 12 and thereby acquiring a deposit of pulpous material the core leaves the drum and passes over a roll 50 having a foraminous portion and between squeeze rolls 51 and 53 which may be surfaced with rubber or other similar material. After leaving the roll 53 the conductor passes through a forming device 54 and thence over an idler roll 75, similar in character to the roll 11, and thereafter around the periphery of a drum 22, similar in character to the drum 12, thus obtaining more pulp deposit. After leaving the drum 22 the coated core with the additional pulp deposit thereon passes over a roll 34 having a foraminous portion 42, between the squeeze rolls 35 and 36, and then through a former 76 whereupon it passes over heated drums 87 and 88 and thence to a receiving spool 78.

The drums 12 and 22 may be of any suitable type, comprising a pair of sheet metal sides, a peripheral portion which is provided with a plurality of relatively large perforations (not shown) which are covered with a narrow strip of fine wire mesh such as strip 27 of drum 22 (Fig. 2). The drums have

central tubular axles 18 and 80 respectively, mounted in suitable bearings 19 and 81 respectively, carried by the framework 20 which supports all of the elements of the apparatus. In each case the level of the pulp mixture within the drums 12 and 22 is maintained at a lower level than that of the pulp in the troughs 13 and 82 respectively as indicated by the dotted lines A, B, and C, D respectively. This difference in levels is maintained by syphon pipes 21 and 83 respectively which have their inlets submerged in the associated drums and which discharge through the tubular axles. The continuous circulation of the pulp mixture is maintained by feeeding the pulp mixture from the supply pipes 23 and 86 respectively, which may be connected to supply tanks 24 and 84 respectively, into the troughs 13 and 82 respectively, and out of the latter troughs by pipes 25 and 85 respectively, into receiving tanks (not shown) from which it is pumped back into the supply tanks in any suitable manner.

As the drums 12 and 22 revolve in their respective troughs due to the difference in levels of the fluids in the associated drum and trough the fluid will pass through the fine wire mesh, straining pulpous material onto the surface of the wire mesh such as 27. As the core passes around the drum 12 it is brought into engagement with the pulp and the fluid containing the pulp is strained through the perforations of the drums so as to deposit pulpous material upon the foraminous member and the core in contact therewith. The drum 12 is rotated in the direction indicated by the arrow and as the core with the deposited pulp leaves the drum at the top thereof, the force of gravity, the surface tension of the liquid in the pulp mixture, and the felting action of the pulp fibers causes the pulp to surround the core and cling to it substantially in the form shown in Fig. 3.

From the drum 12 the core with the pulp applied thereon is passed over the auxiliary roll 50 and then between squeezing rolls 51 and 53. These rolls are rotatably mounted upon a pair of brackets 57, secured to upright standards 58, supported by the framework 20. The shaft carrying the roll 53 is driven through a pulley attached thereto which is actuated from any suitable source of power by means of a suitable belt. The rolls 51 and 53 preferably draw the core from the supply reel 10 around the drum 12, causing it to rotate, and then between them.

The auxiliary roll 50 is a hollow sheet metal drum having a peripheral slot therein covered with a strip of fine wire mesh. It has been found preferable to employ the auxiliary roll and make it foraminous where it engages the core with the pulp coating thereon in order that the "free liquid" so to speak may be strained off and away from the core and coating without causing a back flow of the fluid which will 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. When the "free liquid" is removed the coating has greater strength due to a closer felting of the fibers so that when the core and coating are passed through the squeezing rolls, the coating will not be torn from the core.

The squeezing rolls may be forced together by any suitable tensioning means which is adjustable to present the proper pressures on the core and the pulp coating as they pass between the rolls. These rolls remove a greater portion of the liquid from the pulp mixture and form the pulp into a thin ribbon which extends laterally on each side of the core as is shown in Fig. 4. This squeezing action also tends to mat or felt the fibers into a more intimate relation; increase the tensile strength of the covering and secure it on the core.

From the squeezing rolls 51 and 53 the core with this ribbon of pulp is drawn through a former which wraps projecting edges of the ribbon around the core and around each other, the appearance of the coating after it is first acted upon by the former and after the forming action is completed, being shown clearly in Figs. 5 and 6 respectively. The former causes a thorough intermingling of the pulp fibers and shapes the coating so that is embraces the core and conforms to the shape thereof. This step of the process forms the coating into a mass so homogeneous that upon cutting the core and the coating, the latter will not fray or ravel and will not become easily detached from the core. The former, indicated generally by the reference character 54 is illustrated as being of the same type as that fully shown and described in a co-pending application of H. G. Walker and A. T. March, Serial No. 547,923, filed March 29, 1922. Reference is made to such application for a full disclosure thereof. The former comprises essentially two plates which wrap the projecting edges of the pulp ribbon around each other and around the core in much the same manner as though the core and pulp ribbon were rolled on the table top with the palm of the hand.

The core with its formed coating is then passed over the idler roll 75, mounted upon a pair of brackets 90 supported by uprights 91 upon the framework 20. After leaving the idler roll 75 the coated core engages the periphery of the drum 22 which is similar in character to that of drum 12, and passes around the periphery thereof so that when the drum 22 rotates in the direction indicated by the arrow, which is opposite to that of drum 12, the coated core is carried

through the pulp containing fluid in the trough 82 and is subjected to the same action as the core in passing around the drum 12 in the trough 13. Thus as the coated core with the additional pulp deposit thereon is carried away from the top of the drum 22, it presents a cross section similar to that shown in Fig. 7, although there may not be as distinct a line of demarcation between the originally coated core and the pulp deposit as indicated in Fig. 7, since there has occurred even at this time a more or less thorough intermingling of the fibers of the additional pulp and of the coating. Squeeze rolls 35 and 36 which are similar in character to rolls 51 and 53 draw the coated core with its additional deposit of pulp over a foraminous portion 42 of an auxiliary roll 34. The roll 36 is driven from a suitable source of power in the same manner as the roll 51. As the coated core with its deposit passes over the auxiliary roll 34, a portion of the moisture is squeezed therethrough by the action of the roll 35 and the co-operation of the rolls 35 and 36 transform it into the general shape shown in Fig. 8. Upon leaving the squeezing rolls 35 and 36 the coated core with its additional deposit in ribbon form passes through the former 76 of the same general type as the former 54. In passing through this former the plates 48 and 49 so co-operate as to thoroughly intermingle the pulp fibers of the additional coating with the fibers of the original coating and shapes the coatings so that they embrace the core and conform to the shape thereof. As in the case of the original coating, this step of the process forms the complete coating into a mass so homogeneous that upon cutting the core and coating the latter will not fray or ravel and will not become easily detached from the core or from the original coating. The action of the former 76 is very similar to that of the former 54 and the form of the core as it has been partially acted upon by the former 76 presents a cross section similar to that shown in Fig. 9. When the action of such former has been completed the cross section of the core is as shown in Fig. 10. It will be noted that the coating of the core as shown in Fig. 10 is entirely homogeneous and that no line of demarcation appears between the separate deposits which have been applied thereto.

The core with its formed coating which has been applied in a plurality of steps, is drawn from the former 76 and subjected to a mechanism for thoroughly drying out the coating. The means shown for performing this step of the process constitute a pair of wide hollow drums 87 and 88, heated internally and having a plurality of grooves 89 formed thereon, Fig. 2, which grooves receive the core, guides (not shown) being provided for guiding the coated core over first one of these drums and then over the other drum until it has traversed all of the grooves on both drums, after which it is stored on a receiving spool 78. The drums 87 and 88 are revolvably mounted in suitable bearings carried by vertical standards, supported by the framework 20. The receiving spool 78 is also revolvably mounted in bearings carried by brackets suitably supported by the framework 20, the drum 87 and the spool 78 being driven from a source of power through any suitable belting system.

Although it has been stated the principal object of the invention is to apply a coating or a plurality of coatings of pulp to a core without the use of any adhesive substance, the process herein disclosed may be used in a pulp mixture containing a sizing substance, or the pulp may be deposited on a core which has been previously treated with an adhesive agent without departing from the spirit and scope of the invention.

Although the invention has been described as being one in which the core passes through two coating and forming operations, it is evident that it may be passed through any number of similar operations in order to increase the thickness of the resultant coating on the core.

What is claimed is:

1. The method of coating a core in strand form with pulp which consists in subjecting the core to a pulp in such manner that pulp is applied directly thereto to constitute a coating, subjecting the core to a pulp in such manner that pulp is applied to said coating and so treating all of the pulpous material on the core that it constitutes a homogeneous coating therefor conforming with the shape of the core.

2. The method of coating a core in strand form with pulp which consists in attaching wet pulpous material directly to the core to constitute a coating, attaching additional wet pulpous material to said coating and so treating all of said pulpous material on the core that it constitutes a homogeneous coating therefor conforming with the shape of the core.

3. The method of coating a core in strand form with pulp which consists in attaching wet pulpous material directly to the core to constitute a coating, attaching additional wet pulpous material to said coating, so treating all of said pulpous material on the core that it constitutes a homogeneous coating therefor conforming with the shape of the core, and then removing substantially all of the moisture from said coating.

4. The method of coating a core in strand form with pulp which consists in attaching wet pulpous material directly to the core, forming said material on the core to constitute a coating therefor, attaching addi-

tional wet pulpous material to the core, and forming all of said pulpous material on the core so that it constitutes a homogeneous coating therefor conforming with the shape of the core.

5. The method of coating a core in strand form with pulp which consists in attaching wet pulpous material directly to the core to constitute a coating, removing some of the moisture from said coating, attaching additional wet pulpous material to the said coating, forming all of the pulpous material on the core to constitute a homogeneous coating therefor conforming with the shape of the core, and then removing substantially all of the moisture from said coating.

6. The method of coating a core in strand form with pulp which consists in attaching wet pulpous material directly to the core, removing some of the mosture from said material, forming said material on the core to constitute a coating therefor, attaching additional wet pulpous material to the coating, forming all of said pulpous material on the core to constitute a homogeneous coating therefor conforming with the shape of the core, and then removing substantially all of the moisture from said coating.

7. The method of coating a core in strand form which consists in subjecting the core to pulp in such manner that pulp is applied directly thereto, so treating the pulp that it is attached to the core, then subjecting the coated core to a pulp in such manner that pulp is applied to said coating, and then so treating the last applied pulp that said pulp and the first applied coating constitute a homogeneous coating for the core conforming with the shape of the core.

8. The method of coating a core in strand form which consists in subjecting the core to a liquid containing pulp in such manner that pulp is applied directly thereto, so treating the pulp that it is attached to the core, then subjecting the coated core to a liquid containing pulp in such manner that pulp is applied to said coating and then so treating the last applied pulp that said pulp and the first applied coating constitute a homogeneous coating for the core conforming with the shape of the core.

9. The method of coating a core in strand form which consists in subjecting the core to a liquid containing pulp in such manner that pulp is applied directly thereto, so treating the pulp that it is firmly attached to the core and conforms with the shape thereof, then subjecting the coated core to a liquid containing pulp in such manner that pulp is applied to said coating and then so treating the last applied pulp that said pulp and the first applied coating constitute a homogeneous coating for the core having a curved outer surface.

10. The method of coating a core in strand form consisting in attaching a ribbon of wet pulpous material directly to the core, forming said material on the core to constitute a coating therefor, attaching a second ribbon of pulpous material to said coating and then so forming said second ribbon and said first coating that they constitute a homogenous coating for the core conforming with the shape of the core.

11. The method of coating a core consisting in attaching a ribbon of wet pulpous material directly to the core longitudinally thereof, wrapping said ribbon laterally around the core to constitute a coating therefor, attaching a second ribbon of wet pulpous material to said coating and longitudinally of the core, and then wrapping said ribbon around the core so that said second ribbon and said first coating constitute a homogeneous coating for the core.

12. The method of coating a core consisting in attaching a ribbon of wet pulpous material directly to the core longitudinally thereof, wrapping said ribbon laterally around the core to constitute a coating therefor, attaching a second ribbon of wet pulpous material to said coating and longitudinally of the core, then wrapping said ribbon around the core so that said second ribbon and said first coating constitute a homogeneous coating for the core, and then removing substantially all of the moisture from said coating.

13. In a machine for coating a core in strand form with pulp, means for attaching wet pulpous material to the core, means engaging the pulpous material for forming it on the core to constitute a coating therefor, means for attaching wet pulpous material to said coating and means for forming said pulpous material and said first coating to constitute a homogeneous coating for the core conforming with the shape of the core.

14. In a machine for coating a core in strand form with pulp, means for applying pulpous material directly on the core to constitute a coating therefor, means for applying additional pulpous material on the core, and means for forming all of said pulpous material on the core to constitute a homogeneous coating therefor.

15. In a machine for coating a core in strand form with pulp, a plurality of foraminous members, means for depositing pulpous material on said members, a plurality of wrapping devices and means for drawing said core into contact with said foraminous members and wrapping devices.

16. In a machine for coating a core in strand form with pulp, a plurality of foraminous members, means for depositing pulpous material on said members, a plurality of forming devices for giving pulpous material a cylindrical form, and means for drawing the core into contact with said

foraminous members and said forming devices.

17. In a machine for coating a core in strand form with pulp, a plurality of foraminous members, means for depositing wet pulpous material on said members, a plurality of forming devices for giving pulpous material a cylindrical form, means for drawing the core into contact with said foraminous members and said forming devices, whereby a homogeneous coating of pulp is applied to the core, and means for removing substantially all of the moisture from said coating.

18. In a machine for coating a core in strand form with pulp, a plurality of foraminous members, means for depositing pulpous material on said members, a plurality of forming devices, means for drawing the core into contact with said foraminous members and said forming devices whereby a homogeneous pulp coating is applied to the core, said forming devices comprising rotating members engaging the pulp coating.

19. In a machine for coating a core in strand form with pulp, a plurality of foraminous members, means for depositing pulpous material on said members, a plurality of forming devices, means for drawing the core into contact with said foraminous members and said forming devices, whereby a homogeneous pulp coating is applied to the core, said forming devices comprising members engaging the pulp coating at diametrically opposite points of the core, and means for rotating said members.

20. In a machine for coating a core with pulp, means for applying wet pulpous material to the core, means for squeezing the pulp on the core into ribbon form, means for wrapping said ribbon around the core to constitute a coating therefor, means for applying additional wet pulpous material on said coating, means for squeezing said pulpous material into a ribbon, and means for wrapping said ribbon around the core.

21. In a machine for coating a core with pulp, means for applying wet pulpous material to the core, means for squeezing the pulp on the core into ribbon form, means for wrapping said ribbon around the core to constitute a coating therefor, means for applying additional wet pulpous material on said coating, means for squeezing said pulpous material into a ribbon, and means for wrapping said ribbon around the core and making it homogeneous with said first coating.

22. In a machine for coating a core with pulp, means for applying wet pulpous material to the core, means for squeezing the pulp on the core into ribbon form, means for wrapping said ribbon around the core to constitute a coating therefor, means for applying additional wet pulpous material on said coating, means for squeezing said pulpous material into a ribbon, means for wrapping said ribbon around the core, making it homogeneous with said first coating, and means for removing substantially all of the moisture from said coating.

23. The method of coating a core in strand form, which consists in applying unfinished paper directly to the core, attaching additional unfinished paper to the unfinished paper first applied, and then completing the fabrication of the paper on the core so that it constitutes a homogeneous coating thereon conforming with the shape of the core.

24. The method of coating a core in strand form, which consists in applying unfinished paper in a wet state directly to the core, attaching additional unfinished paper in a wet state to the first applied unfinished paper, and then completing the fabrication of the paper on the core so that it constitutes a homogeneous coating therefor conforming with the shape of the core.

25. The method of coating a core in strand form with pulp, which consists in subjecting the core to a pulp in such a manner that the pulp is applied directly thereto to constitute a coating, subjecting the core to a pulp in such a manner that pulp is applied to said coating, and treating all of the pulpous material on the core so that it constitutes a homogeneous coating having a curved outer surface.

26. A method of coating a core in strand form, which consists in applying unfinished paper directly to the core, attaching additional unfinished paper to the unfinished paper first applied, and then completing the fabrication of the paper on the core so that it constitutes a homogeneous coating thereon having a substantially circular outer surface.

In witness whereof, we hereunto subscribe our names this 16 day of Feb. A. D. 1923.

HOWARD GEORGE WALKER.
ALBERT THOMAS MARCH.