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WATERPROOF FIBER ARTICLE AND METHOD OF MANUFACTURING THE SAME

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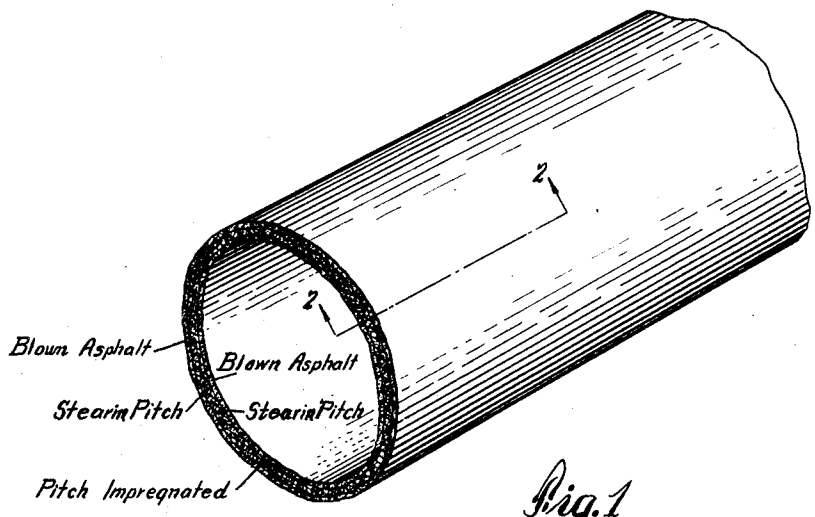


Fig. 1

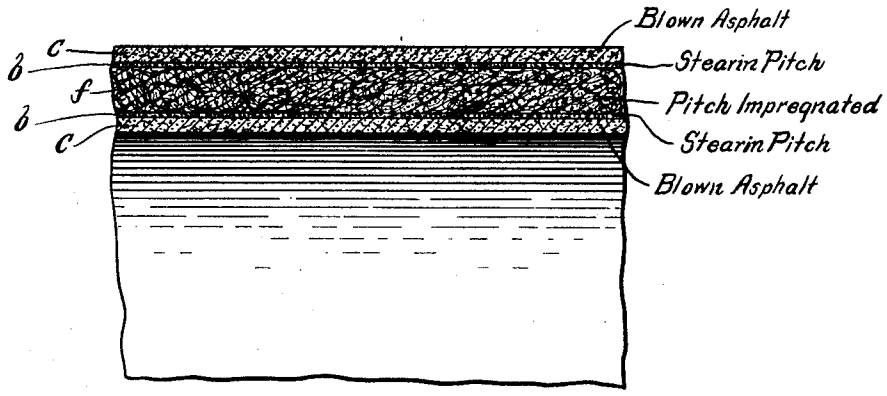


Fig. 2

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UNITED STATES PATENT OFFICE

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WATERPROOF FIBER ARTICLE AND METHOD OF MANUFACTURING THE SAME

Application filed December 12, 1928. Serial No. 325,428.

This invention relates to the manufacture of waterproof fiber articles, such as those made from cellulose pulp. While not restricted thereto, it is especially concerned with the waterproofing of fiber tubes or conduits made, for example, by winding a wet web of cellulose pulp or paper on a mandrel to the desired wall thickness, and then removing the tube from the mandrel and drying it. When tubes of this type are used for certain purposes, for instance as conduit for electric cables or as piping for water or aqueous liquids, it is necessary to waterproof the fiber wall. The tube wall, being composed of layers of interfelted fiber compactly matted together, is comparatively dense, especially when the pulp used as a raw material has been beaten or gelatinized to ensure strength and rigidity. It has been the custom to waterproof the tubes by impregnating with waterproofing material such as pitch, which not only renders them resistant to deterioration by the action of water, but increases their strength, rigidity, and insulating properties. It has been found, however, that it is difficult to incorporate sufficient pitch to afford satisfactory protection against water when such tubes are used, for example, as pipes for conducting water or aqueous liquors. In such case, therefore, a waterproof coating is applied to the surface of the impregnated tube, a coating suitable for this purpose comprising blown asphalt, which is a tough, rubbery solid under usual atmospheric conditions, and which affords sufficient resistance against the action of water to maintain the integrity of the tube wall.

One of the problems arising in connection with tubes thus waterproofed is that the coating does not bond well with the pitch used to impregnate the tube wall. Thus, the asphalt coating is liable to flake and chip when it receives sharp blows, particularly under freezing weather conditions, when it becomes brittle. This may result in the exposure of the imperfectly impregnated wall so that the tubes become rendered liable to deterioration by the action of water. Under the usual conditions of handling and shipping, the tubes are likely to receive many impacts, so that this lack of a satisfactory bond for the coating is serious.

We have found that there are certain substances which bond well with both pitch and blown asphalt, and that when such substances are applied to the surface of pitch-impregnated fiber articles, such as tubes, before coating with blown asphalt, chipping or flaking of the asphalt may be practically eliminated. While there are various substances available for this purpose, such as natural or artificial gums including chicle, elastica, and "aroban," and the oxidation product of turpentine, we prefer to use stearin pitch, as it is comparatively inexpensive and easy to handle and gives eminently satisfactory results. The stearin pitch may be made to flux superficially with both the pitch used to impregnate the fibrous material and and with the blown asphalt used as a coating, to effect a bond so tenacious between the asphalt and the tube wall that there is little likelihood of chipping or flaking of the coating taking place, even under extremely cold weather conditions.

With the foregoing and other objects in view, the invention may be best understood from the following more complete description thereof when considered in connection with the accompanying drawings, in which—

Figure 1 represents in perspective a portion of a fiber tube treated in accordance with the process of the present invention.

Figure 2 is a section through the tube wall along the line 2—2 of Figure 1.

Referring to the drawings, *f* represents the fiber wall of a tube impregnated with pitch, such as a coke-oven or water-gas pitch. The tube may be impregnated by immersion, preferably under pressure, in a hot bath of pitch until the wall has been completely penetrated. To the surface of the impregnated tube is then applied a comparatively thin layer of stearin pitch *b* or equivalent materials such as hereinbefore described, as by dipping the tube into a suitable volatile solvent solution of such pitch. Any considerable excess of impregnating pitch on the surface of the tube is preferably removed before applying stearin pitch, since unless this is

done, the layer of excess impregnating pitch itself will constitute the weakest part of the coating, and a sharp blow will cause fracture in this layer. Removal of excess impregnating pitch may be accomplished as by draining the tube for a time in the hot vapors of such pitch or by sand-blasting or scraping it after it has been allowed to cool down.

It is preferable that the pitch-impregnated tube be heated to a temperature of, say, 120° to 150° F., before dipping in the solution of stearin pitch, as this promotes the fluxing of the stearin pitch solution with the pitch present on the tube wall and a firm bonding with the fibrous material by reason of more or less penetration of the stearin pitch thereinto. Thus, the tube immediately after impregnation with pitch is hot, so that while still hot it may be dipped into the stearin pitch solution, e. g., a toluene solution of 20% pitch. The dipped tube may then be allowed to drain free of excess pitch solution, whereupon the solvent may be removed as by exposure to currents of air heated to, say, 120° to 150° F., so that the solvent may be rapidly vaporized and fluxing of the stearin pitch with the pitch present in the tube wall again promoted. The air should not be heated to a temperature above the softening point of the pitch present in the tube wall, as this would cause an oozing of such pitch to the surface. One or more layers of stearin pitch may be applied to the tube, but it is unnecessary to build up a thickness of more than, say, about .006" on the tube wall. While the layer of stearin pitch is still quite sticky, finely powdered inert material, such as carbon black or slate dust, may be sprinkled on the stearin pitch, as this avoids melting away of the stearin pitch from the tube wall when the higher melting point blown asphalt used as a coating is subsequently applied. The particular concentration of pitch solution used in any case depends upon the solubility of the stearin pitch chosen and/or the thicknesses of the layer which it is desired to produce, it being possible to use a variety of stearin pitches of different degrees of solubility, hardness and other characteristics. Preferably, a stearin pitch which is completely soluble in toluene at room temperature and having a softening point of 175° to 185° F. is used as a raw material.

While the treatment of a tube with stearin pitch is most easily and conveniently accomplished with solutions of such pitch at room temperature, if desired the tube may be dipped into molten stearin pitch, or the molten pitch may be sprayed thereon. If liquid material, such as turpentine, is used in lieu of stearin pitch, the tube may be dipped into the turpentine and then oxidized as by exposure to air until a gummy, varnish-like coating is formed.

After the tubes have been treated with stearin pitch or its equivalent, they may be coated as shown in the drawings at *c*, with blown asphalt or blown asphalt compositions, for instance those compositions described in patent application Serial No. 133,517, filed September 3, 1926, by Wallace B. Van Arsdel, and issued May 28, 1929, as Patent No. 1,714,702, or in patent application Serial No. 325,651, filed December 12, 1928, by Everett W. Lovering. The coating may be applied by immersing the tube in a bath of molten blown asphalt or blown asphalt composition at a temperature of, say, 300° to 450° F., under which conditions a fluxing of the asphalt with the stearin pitch and an even coating of the asphalt may be produced. The asphalt is thus firmly bonded through the stearin pitch with the impregnating pitch which lies in the interstices of the tube wall, so that the asphalt is bonded to the fibrous material of the tube wall.

Having thus described the product and process of our invention, it should be evident to those skilled in the art that various changes and modifications might be made therein without departing from the spirit and scope of the invention as defined by the appended claims.

We claim:

1. A product comprising pitch-impregnated fibrous material, a coating comprising blown asphalt on such material, and a substance under said coating firmly bonding it to the fibrous material.

2. A product comprising pitch-impregnated fibrous material, a coating comprising blown asphalt on such material, and a substance under said coating firmly bonding it to the pitch.

3. A product comprising pitch-impregnated fibrous material, a coating comprising blown asphalt on said material, and a layer of substance under said coating superficially fluxed with the pitch and the coating.

4. An article of manufacture comprising a tube of cellulose fibers impregnated with pitch, a coating comprising blown asphalt on said tube, and a comparatively thin layer of stearin pitch under said coating firmly bonding it to the wall of the tube.

5. An article of manufacture comprising a tube of cellulose fibers impregnated with pitch, a coating comprising blown asphalt on said tube, and a comparatively thin layer of stearin pitch under said coating firmly bonding it to the pitch in said fibrous material.

6. An article of manufacture comprising a tube of cellulose fibers impregnated with pitch, a coating comprising blown asphalt on said tube, and a layer of stearin pitch under said coating and fluxed superficially therewith and with the pitch in the tube wall.

7. An article of manufacture comprising a tube of cellulose fibers impregnated with

pitch, a coating comprising blown asphalt on said tube, said tube carrying stearin pitch and finely powdered inert material under said coating and firmly bonding said coating to the tube wall.

8. A process which comprises impregnating fibrous material with pitch, treating with a material capable of bonding with the pitch and with blown asphalt, and then applying a coating comprising blown asphalt.

9. A process which comprises impregnating fibrous material with pitch, treating with a substance capable of fluxing with the pitch and with blown asphalt at a temperature resulting in a superficial fluxing of such substance with the pitch, and applying a coating comprising blown asphalt at a temperature resulting in the superficial fluxing of the asphalt with such substance.

10. A process which comprises impregnating fiber articles with pitch, treating with stearin pitch, and applying a coating comprising blown asphalt.

11. A process which comprises impregnating fibrous material with pitch, treating with stearin pitch solution, removing the solvent, and applying a coating comprising blown asphalt.

12. A process which comprises impregnating fibrous material with pitch, treating with stearin pitch solution, removing the solvent at a temperature sufficiently high to effect superficial fluxing of the stearin pitch with the pitch in the fibrous material, and applying a coating comprising blown asphalt.

13. A process which comprises impregnating fibrous material with pitch, treating the impregnated material while in heated condition with stearin pitch solution, removing the solvent, and applying a coating comprising blown asphalt.

14. A process which comprises impregnating fibrous material with hot pitch, treating the impregnated material while still hot with stearin pitch solution, removing the solvent, and applying a coating comprising blown asphalt.

In testimony whereof we have affixed our signatures.

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WALLACE B. VAN ARSDEL.