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WATER-RESISTANT FIBER CONDUIT AND METHOD OF MAKING THE SAME.

No Drawing.

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To all whom it may concern:

Be it known that we, GEORGE A. RICHTER, WALLACE B. VAN ARSDEL, and ALBERT W. CHASE, citizens of the United States, residing at Berlin, in the county of Coos and State of New Hampshire, have invented new and useful Improvements in Water-Resistant Fiber Conduits and Methods of Making the Same, of which the following is a specification.

This invention has relation to fiber pipes or conduits, and has for its object to increase the water-resistant or water-proof qualities thereof and at the same time to provide their surfaces with a dull exterior finish or surface coating which will not become sticky or slippery when subjected to solar heat.

In the manufacture of such conduits, it is customary to produce the tube by winding a web of aqueous cellulose pulp about a mandrel until the tube wall is of the desired thickness under such conditions that, when the tube is removed from the mandrel and dried, the tube consists of a substantially homogeneous fibrous mass. While we prefer to produce the tube in this manner, yet so far as the present invention is concerned, the fiber tube may be made in any other manner as by the use of a suitable paper wound in convolutions about a mandrel, with the convolutions cemented together.

After the tube is formed, it is impregnated with a water-proofing agent such as pitch, bitumen, or other hydrocarbon or resinous material which may be made liquid by the application of heat. Preferably the saturating compound is of medium hardness and is sufficiently liquefied at a moderate temperature, say 275° to 310° F., so that it will penetrate the tube without burning it. The impregnation or saturation of the tube may also, if desired, be accomplished in a closed vessel under pressure somewhat greater than atmospheric pressure. Preferably a plurality of tubes are immersed in the liquid saturating compound for a sufficient time under pressure to permit the compound thoroughly to saturate and impregnate the wall of the tubes and to fill the pores and interstices and coat the fibers thereof. On removing the tubes from the liquid water-proofing pitch or bitumen, to permit the surplus or excess material to

drain therefrom and to produce a dull exterior finish, more or less of the water proofing agent oozes from the skin or exterior of the wall or body of the tube, as a result of which that portion is capable of absorbing moisture to some extent, so that a tube immersed in water for 48 hours may take up from 5% to 8% of its weight of water. On the other hand, if the excess of water-proofing pitch or bitumen is not drained or removed, the exterior surface of the tube may become sticky under heat of the sun, particularly in a warm climate.

In accordance with our invention, we submit the drained tubes to a further treatment to water-proof the exterior portions of the walls, without materially altering their mat or dull appearance or causing them to become sticky under solar heat. This treatment consists in applying to the surfaces of the tubes a thin coating so hard that there is no appreciable flow at ordinary direct-sunlight temperatures, which is highly water-repellent and which is substantially dull and lusterless in appearance. To this end we preferably employ hard or comparatively high-melting-point pitch or bitumen, such as gilsonite, hard coal-tar pitch, or the like, dissolved in a suitable solvent such as benzol, carbon tetrachloride or their equivalents. To this solution is added a finely powdered material, such for example as carbon black, mineral black, lamp black or other dark-colored powder, the color of which will not detract from the desired appearance of the finished tube. Or, if such bitumen as Trinidad asphalt is used, the naturally occurring mineral matter in such asphalt takes the place of lamp black or other solid material.

As an example of the coating material, we may cite the following:—3 parts by weight of gilsonite are dissolved in about 10 to 11 parts of warm carbon tetrachloride, and 1 part of lamp black is stirred into the solution to produce a substantially homogeneous suspension or "paint". This paint is warmed to about 120° to 160° F., and the tube is immersed therein for a few seconds, and on being removed therefrom is permitted to drain in a warm space substantially saturated with the solvent vapor for about fifteen seconds to a minute, after which the tube is exposed to a current of air for the

evaporation and recovery of the solvent. The air is preferably, although not necessarily, warmed to a temperature of say 100° to 150° F. If benzol be substituted for carbon tetrachloride (the latter being preferred since it is not inflammable), an equal volume may be used, so that in the above example for 10 to 11 parts of carbon tetrachloride. If a pitch or bitumen is employed, which initially contains the mineral equivalent of carbon black or lamp black, such as Trinidad asphalt, the procedure is the same as described in the foregoing example, except that of course no additional lamp black, or the like, is added.

When a previously impregnated tube is treated as herein described, it has deposited thereon a coating which interlocks or coalesces to some extent with the saturating compound, which is heat-resistant and highly water-proof and which has a dull, substantially lusterless appearance. Such a coating, applied as described, preferably weighs about 1 to 3 pounds per 100 square feet of conduit surface covered thereby. The water absorption of a 6 inch length of conduit so coated does not exceed from 1% to 2% of its weight when the tube is immersed in water for 48 hours, and the coating does not soften so as to become sticky or slippery even under extreme climatic conditions.

The application of the coating material may be accomplished by spraying instead of by dipping. The proportion of the several ingredients of the material may of course be varied to suit varying conditions. In referring to the coating, we make use of the term "bituminous material" meaning thereby to include either a hard pitch of vegetable, animal or mineral origin, or a hard asphalt or a mixture or blend thereof.

What we claim is:—

1. A fiber conduit comprising a rigid non-laminated fibrous tubular body impregnated with and containing a thermoplastic water-proofing agent in the pores and interstices thereof, and having a dull-surface water-proof heat-resistant coating comprising a homogeneous admixture of an amorphous solid material and a bituminous material.

2. A fiber conduit comprising a rigid

homogeneous fibrous tubular body, impregnated with and containing a thermoplastic water-proofing agent in the pores and interstices thereof, and having a dull-surface heat-resistant water-resistant coating comprising a homogeneous admixture of a bituminous material and a powdered black solid material.

3. A fiber conduit comprising a rigid homogeneous fibrous tubular body saturated or impregnated with a bituminous material and having a coating comprising a homogeneous mixture of a finely divided solid material and a hard bituminous material.

4. A process of making a water-proof conduit, which comprises impregnating a tubular rigid homogeneous fibrous body with a thermoplastic hydrocarbon water-proofing material, and then applying to said body a coating comprising a finely-powdered solid material and a hard bituminous material in a liquid state, whereby the surface thereof is dull and non-shiny.

5. A process of making a water-proof conduit, which comprises impregnating a tubular fibrous body with a molten thermoplastic water-proofing material, removing the excess material from the surfaces of said body, coating said body with a paint comprising a powdered solid material, a bituminous material and a solvent for the bituminous material, and removing the solvent, in a warm atmosphere saturated with vapors of such solvent.

6. A process of making a water-proof conduit, which comprises impregnating a tubular fibrous body with a molten thermoplastic water-proofing material by immersing the body therein, then removing the body and permitting the surplus material to drain therefrom, then coating the body with a paint comprising a bituminous material, a solvent therefor and a finely-divided solid material which on-cooling forms a dull surface and then removing the solvent.

In testimony whereof we have affixed our signatures.

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