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METHOD OF LINING CONCRETE PIPES

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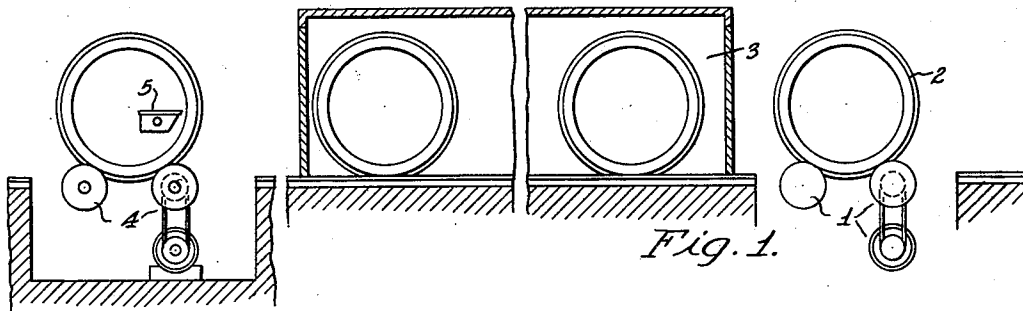


Fig. 1.

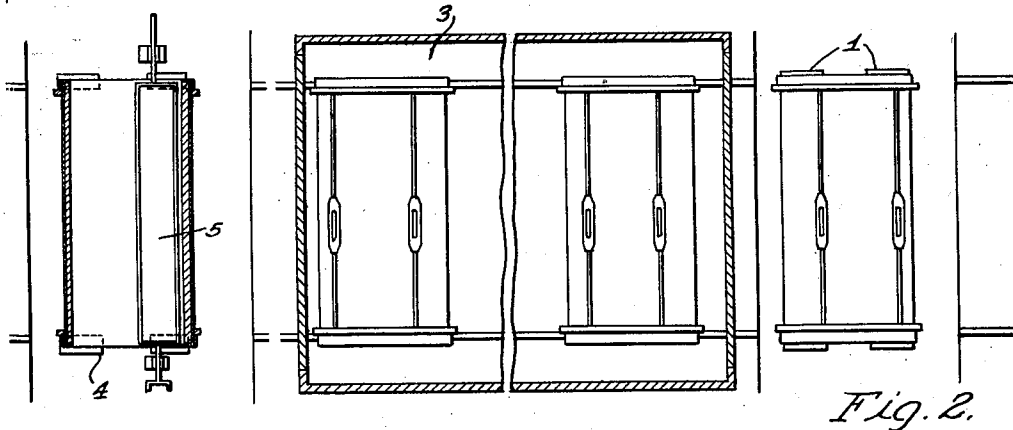


Fig. 2.

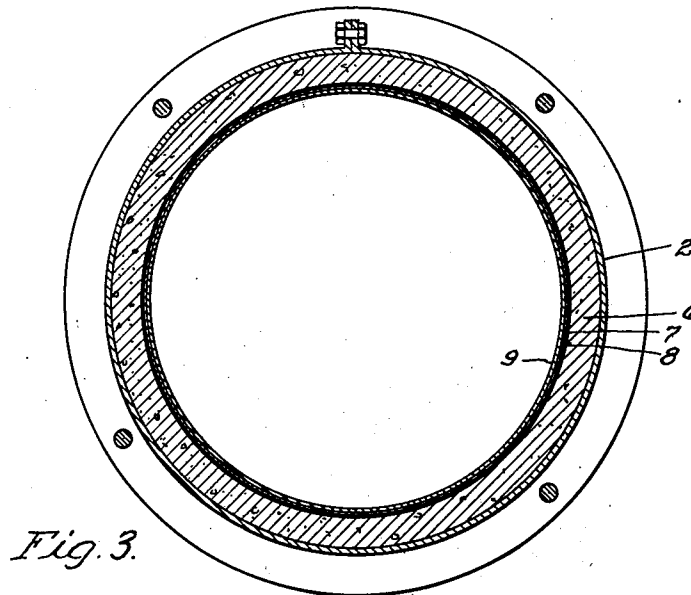


Fig. 3.

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METHOD OF LINING CONCRETE PIPES

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3 Claims. (Cl. 91-70)

The present invention relates to a method of lining concrete pipes and the like whereby such pipes may be used for conveying liquids containing acids and other destructive materials, sometimes present in sewage, which attack, and in time destroy, the walls of concrete pipe.

The primary object of the present invention is to provide for the lining of a concrete pipe with a coating material of which the essential constituent is coal tar and other resinous materials with properties to increase elasticity, resist attack by acids and other erosive materials. This material is available on the market and is commercially known as water works enamel and the invention pertains more particularly to the method of treating the pipe prior to the application of this material and to the particular method of applying the material.

The invention is more fully disclosed with reference to the accompanying drawing, in which Fig. 1 is a diagrammatic vertical section of a plant for treating pipes according to the present method;

Fig. 2 is a plan, partly in cross section, of the plant, and

Fig. 3 is a transverse section of a pipe.

Like characters of reference are employed throughout to designate corresponding parts.

Referring to Fig. 1 there is illustrated mechanism 1, well known in the art and therefore not shown in detail here, for receiving and rotating cylindrical forms or molds 2. As the mechanism 1 rotates the form concrete is poured thereinto and is distributed throughout the form by the centrifugal forces created by rotation thereof. As the form is rotated the concrete therein is trowelled to provide the pipe, thus formed, with a smooth inner surface, free from loose scale and slurry, after which the pipe is removed from the mechanism 1 and is placed while still in the form or mold 2, in a kiln 3 at a temperature of approximately 120° F. After being properly cured in the kiln 3 the pipe, still in the form or mold 2, is placed in a dry atmosphere where it is allowed to stand for a period of time approximating twenty-four hours, after which it is ready for the first primer treatment according to the present invention. However, before being treated with primer according to the present method all loose shale or slurry formed on the inner surface of the pipe during the curing is completely removed by the use of a scraping implement or a wire brush. The surface is cleaned after wire brushing with dry compressed air, care being exercised that the air so used is free from oil.

The pipe after having been conditioned as above described is treated by coating it with a thinned primer. The essential constituent of the primer employed is coal tar, thinned by the addition of solvents or chemicals which evaporate readily. The primer may consist of three parts water works primer, as available on the market, and one part primer thinner, the latter being also available on the market. The primer is applied to the inner surface of the tube either by brush or spray, care being exercised to provide equal distribution thereof and to avoid flooded areas which will not dry properly. The coverage of primer varies somewhat, according to the particular method of application, but it has been found that ordinarily a coverage of three to four hundred square feet per gallon of primer provides for satisfactory results.

After a period of time, not less than six hours and not more than seventy-two hours, a second coat of primer is applied. A convenient procedure, under normal weather conditions, is to apply the first, thinned coat of primer in the morning and from six to eight hours later, to apply the second coat. The following day the primer is usually sufficiently dry for the enamel application to be presently described.

The second coat of primer consists of regular water works primer (as commercially known) without the addition of thinner as in the case with the first coat. The dryness of the second coat of primer before application of the enamel may be determined by sliding the hand under moderately hard pressure over the surface of the primer. If the primer has set so that it will not deform or rub off on the hand it is sufficiently dry for the purposes of the invention.

The enamel, which provides the erosion resisting coating when subjected to contact with liquids containing acids and other erosive materials is applied centrifugally in much the same manner as the concrete of the pipe was originally placed in the form. For this purpose the pipe, still in the form 2 is placed on the mechanism 4 for rotating the form. The enamel, consisting essentially of coal tar and other resinous materials with properties to increase elasticity and to resist attack by acids and other erosive materials is heated to a temperature of 425° F. to 475° F. and is placed in a trough which extends throughout the entire length of the pipe and which has a straight pouring edge. The trough is designated by the numeral 5 in the drawing.

By pouring the enamel over a straight edge the enamel is distributed evenly throughout the en-

tire length of the pipe and the trough is positioned with its straight edge as near as is practical to the downwardly moving internal surface of the pipe. The trough should be uniformly heated during the enamel application.

During the pouring of the enamel into the pipe the latter is being rotated and it has been found that a peripheral speed of one thousand to fifteen hundred feet per minute is satisfactory for pipes forty-eight to eighty-four inches in diameter. After application of sufficient enamel to form a coating approximately one quarter of an inch in thickness rotation of the pipe is continued until the enamel has become firmly bonded to the pipe surface and has set or hardened sufficiently to avoid sagging thereof when the rotation is stopped.

The enamel, being poured on the pipe surface at a temperature between 425° and 475° and in sufficient quantity to provide a layer approximately one quarter of an inch thick, causes the wall of the pipe to be heated, and it also heats the primer to a temperature higher than its normal melting point so that the enamel uniformly bonds therewith. The enamel solidifies at a temperature of approximately 200° F. and the fact that it is poured at a temperature whereby it heats the walls provides for a comparatively slow cooling action. That is to say, the pipe wall retains the heat longer than the enamel does, and the enamel is maintained liquid by the heated wall of the pipe for a period of time whereby the centrifugal action removes all ridges, surface irregularities and blisters which result from air pockets or bubbles in the enamel.

Before shipping or storing the lined pipe out of doors where it might rest in the rays of the sun the inner surface is completely whitewashed. The purpose of the whitewash is to minimize the excessive temperature which results when a black surface is exposed to the sun, due to the inability

of the black surface to reflect the sun's rays. Such treatment is deemed important in the present method because the enamel employed is black in color and excessive temperatures would cause the lining to soften and run.

Referring to Fig. 3 wherein a completed pipe is shown in cross section, the numeral 6 designates the concrete pipe, 7 the first primer, 8 the second primer and 9 the enamel lining.

Although a specific embodiment of the invention has been illustrated and described it will be understood that various changes may be made within the scope of the appended claims without departing from the spirit of the invention, and such changes are contemplated.

What I claim is:

1. The method of lining a kiln dried and subsequently cooled pipe which consists in, applying a coal tar base enamel at temperatures from 425°-475° F. to a primed surface of a concrete pipe while rotating said pipe at a rate of 1000 to 1500 peripheral feet per minute, and cooling said enamel to atmospheric temperature.

2. The method of lining a kiln dried and subsequently cooled pipe which consists in, applying a coal tar base enamel at temperatures from 425°-475° F. to a primed surface of a concrete pipe while rotating said pipe at a rate of 1000 to 1500 peripheral feet per minute, and rotating said pipe while cooling said enamel to the temperature of said pipe.

3. The method of lining a kiln dried and subsequently cooled pipe which consists in, applying a coal tar base enamel at temperatures from 425°-475° F. to a primed surface of a concrete pipe while rotating said pipe at a rate of 1000 to 1500 peripheral feet per minute, rotating said pipe while cooling said enamel to the temperature of said pipe, and subsequently covering said enamel with whitewash.

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