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METHOD AND APPARATUS FOR COATING AND PROTECTING METALLIC OBJECTS SUCH AS PIPES, TANKS, AND THE LIKE FROM CORROSION OR OTHER INJURY

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Fig. 1.

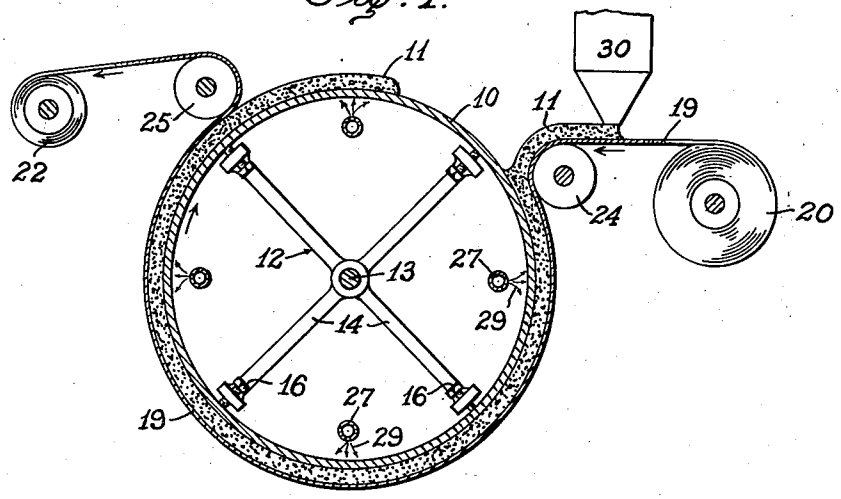


Fig. 2.

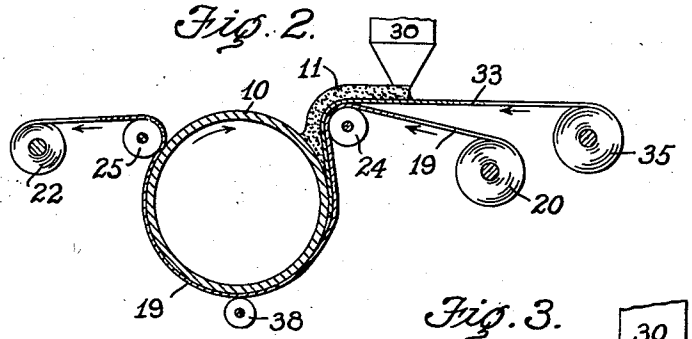


Fig. 3.

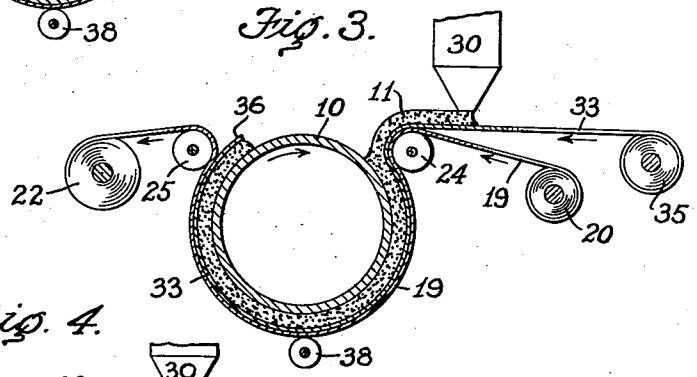
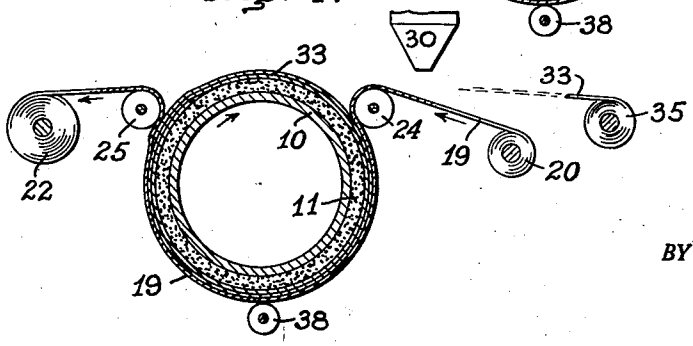


Fig. 4.



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METHOD AND APPARATUS FOR COATING AND PROTECTING METALLIC OBJECTS SUCH AS PIPES, TANKS, AND THE LIKE FROM CORROSION OR OTHER INJURY

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5 Claims. (Cl. 91—54)

The present invention relates to a method for coating and protecting metallic objects, such as pipes, tanks, and the like, from corrosion and other injuries. More particularly, the invention pertains to a method and apparatus for the application of filled asphalt or asphaltic mastic to cylindrical metallic objects having large diameters.

Previously, pure bitumen has been employed for the protection of pipe lines from corrosion. This pure bitumen was used in its various forms, such as coal-tar residues, natural asphalts and petroleum asphalts. Although these substances have good waterproofing and insulating characteristics, they have many disadvantages when used as pipe coatings in conjunction with the various methods of the prior art. Thus, the coatings obtained by the use of pure bitumens are incapable of completely protecting the pipe from corrosion when subjected to mechanical abrasions, soil pressure and/or temperature fluctuations. Furthermore, it has been found impossible to apply a thick coating of pure bitumen to pipes, or to similar metallic cylindrical objects. Thus, the normal coatings of pure bitumen are only about $\frac{1}{16}$ of an inch in thickness. Obviously, these coatings are so thin that a slight depression, or a small wear of the coating surface, causes the bare pipe to be exposed to corrosion.

In view of the above disadvantages of using pure bitumen, it was previously proposed to use as a coating compound, a filled asphalt or asphaltic mastic, said terms denoting a bituminous or asphaltic composition containing a relatively large percentage of inert mineral aggregates, as will be explained more fully hereinbelow. Such asphaltic mastics can be placed on pipes and other metallic cylindrical objects to provide a coating of a thickness much greater than that obtainable by the use of pure bitumens. Therefore, such asphaltic mastic coatings produce a protection for metallic surfaces which is more efficient and advantageous. However, since the asphaltic mastic must be heated to a semi-plastic consistency before it may be applied to the pipe surfaces, and because the mastic, at such consistencies, will flow and drop off the sides and lower portions of a pipe, it has been previously necessary to employ a fibrous material to keep the asphaltic mastic on the pipe surfaces. Such fibrous material was either wrapped around the asphaltic mass placed on the pipe surface, or the fibrous material was placed within the asphaltic mastic coating. Frequently, the pipes were coated with several layers of asphalt, these layers being separated from each other by strips or ribbons of the fibrous material. Obviously, such a procedure is costly.

Therefore, the main object of the present invention is to provide a method and apparatus of coating pipes and other cylindrical objects with asphaltic mastic wherein a fibrous material, such as a canvas, is employed only for the purpose of retaining the asphaltic mastic on the pipe during the period of cooling of said mastic. A further object is to provide a method and apparatus of coating and protecting pipes with an asphaltic mastic layer, wherein the fibrous material, employed only while the asphaltic mastic is cooling, also acts as the means for compacting the mastic.

The above and other objects may be attained by revolving the pipe to be coated, applying the asphaltic mastic in a heated semi-plastic condition, and retaining said mastic in place on the surface of the pipe by the use of a canvas sling. The above-mentioned fibrous or canvas sling is employed for the purpose of compacting the heated asphaltic mastic as well as to support the same and prevent it from flowing and/or dropping from the sides and lower portion of the pipe being coated. As soon as the asphaltic mastic has been compacted sufficiently on the pipe surface, and when said heated mastic has cooled to a temperature at which it becomes sufficiently solid to prevent its flowing off the pipe, the supporting canvas is removed, thus leading a pipe coated with the asphaltic mastic and having no fibrous material wrapped thereon.

Briefly stated, the invention therefore resides in a method and apparatus wherein a pipe or a similar metallic cylindrical object is rotated and simultaneously covered with a semi-plastic and/or soupy hot asphaltic mastic, said mastic being applied along the whole or a portion of the length of the pipe surface, and wherein a fibrous material, such as a canvas sling, is employed for the purpose of compacting said hot mastic and to support the same until the mastic has cooled to a temperature at which it will not flow or fall off the sides and lower portion of the pipe being coated. The invention still further resides in applying the mastic, as stated above, in a heated, semi-solid, granular, easily workable and plastic, or even soupy consistency, and cooling the thus applied mastic after its application and compaction but prior to the removal therefrom of the supporting fibrous material.

To obtain the above results, it is advantageous to support the pipe to be coated in a horizontal position, and to provide a sling which covers substantially more than the lower half of the length of the pipe being coated. Said sling is arranged so that it is spaced away from the surface of the pipe a distance equal to the desired thickness of the mastic to be applied. The sling is also provided with tensioning means to compact the mastic being applied to the pipe. Also, if so desired, special compacting means may be employed. The canvas sling moves together with the rotation of

the pipe. The heated asphaltic mastic is applied to the inner surface of the canvas, preferably just prior to the moment when said sling approaches the pipe surface. Thereafter, the sling, as stated above, moves at substantially the same rate as the movement of the surface of the pipe being coated. During said rotation the pipe may be cooled, preferably on its inner surface, to cool the heated mastic. At a point where it is considered that the asphaltic mastic has cooled sufficiently to prevent its flow, the canvas is removed and wound up on a drum for further use. To prevent the sticking of the asphaltic mastic, the surface of the canvas is treated with a substance, such as wax, which is an asphalt repellant.

In view of the fact that the asphaltic mastic is applied to the pipe in a heated state, and since the canvas sling supports said mastic only during a portion of the complete revolution of the pipe (during which time the mastic may not cool to a temperature at which it will be solid enough to prevent its flow), it is sometimes advantageous to employ another fibrous element, which will be wrapped around the mastic and left until the mastic is sufficiently cooled.

The invention therefore still further resides in a method and apparatus wherein a pipe is covered with a heated asphaltic mastic, and wherein one fibrous element, such as a piece of canvas is employed to wrap the asphalt coated pipe while the asphalt is being cooled, and another fibrous element for the purpose of compacting the asphaltic mastic while in a heated state, both of said fibrous elements being removed from said coated pipe when the mastic is sufficiently cooled.

To obtain a perfect bondage between the asphaltic mastic and the metallic surface of the pipe, the latter must first be thoroughly cleaned and then primed with an asphalt paint or hot asphalt.

In the accompanying drawing, wherein certain embodiments of the invention are disclosed by way of illustration:

Fig. 1 is a diagrammatic end elevation, partly in section, of one device whereby the method of applying a thick coat of asphaltic mastic may be realized; and

Figs. 2, 3 and 4 are similar diagrammatic end elevations, partly in section, of a modified embodiment wherein a second fibrous element is employed to wrap the asphaltic coat; the various figures presented showing the various stages of applying such an asphaltic coating and of the auxiliary fibrous element.

Referring now to the drawing, and more particularly to Fig. 1 thereof, the pipe **10** to be coated with a layer of asphaltic mastic **11**, is supported in a horizontal position by means of a chuck or other mechanical means **12** adapted to hold and rotate said pipe **10**. As shown in the drawing, the chuck consists of a shaft **13** carrying spiders or cross-arms **14**. The outer ends of these cross-arms are provided with bolts **16** projecting through said cross-arms and adapted to grip the inner surface of the pipe **10**, and thus hold same during its rotation. The supporting and compacting fibrous element or convas **19** (which may be of a width equal to the length of the pipe to be coated), is wound on a roll or spool **20**, and passes around the lower portion of the pipe **10**. The other end of said canvas **19** is wound on another spool **22**. For purposes of keeping the canvas **19** in tension, as well as for the compaction of the asphaltic mastic **11** (as described more fully hereinbelow), the canvas passes over rollers **24** and **25** disposed a certain predetermined distance away from the surface of the pipe **10**, this distance being substantially equal to the desired thickness of the asphaltic coating. The interior of the pipe **10** may be provided with pipes **27** adapted to spray a cooling medium **29**. A suitable hopper **30** or other feeding means are provided over the canvas **19**, said hopper being adapted to feed the asphaltic mastic onto said canvas **19** at a point prior to that at which the canvas passes over roller **24**.

The operation of the above described apparatus is quite obvious. Thus, a pipe **10** preliminarily primed with asphaltic paint as described hereinabove, and arranged on the chuck **12** as shown in the drawing, is slowly rotated in the direction indicated by the arrow. Simultaneously with said rotation, the canvas **19**, which as stated previously may be of a width equal to the length of pipe **10**, is unwound from spool **20** and wound on spool **22** at such a rate that the portion of said canvas between rollers **24** and **25** is travelling substantially at the same peripheral speed as the movement of the outside surface of the rotating pipe **10**. The asphaltic mastic, heated as aforesaid to a semi-solid, granular, easily workable and plastic consistency, is distributed simultaneously along the whole width of canvas **19** by means of the hopper **30**. The thickness of the layer of mastic **11** thus distributed uniformly and continuously onto canvas **19** should be somewhat greater than the desired thickness of the final mastic coating. This is due to the compaction caused by the rollers **24** and **25**, as well as to the tension on canvas **19**. The mastic thus placed on the canvas is then brought (by the movement of said canvas) against the surface of pipe **10**. It is thus obvious that the rotation of pipe and the movement of the canvas on which the mastic is placed, cause the pipe to be coated with said mastic, and that the rollers **24**, **25** and the tension on the canvas compact said mastic **11**. Simultaneously with this, the mastic is cooled so that when the coated portion of the pipe passes roller **25** (at which point the canvas is withdrawn from the mastic), the latter is sufficiently cool to prevent its flowing off the pipe. The above application is continued until the whole surface is thus covered, at which time the operations are stopped, the mastic is allowed to cool, and the thus coated pipe is removed.

To prevent the sticking of the mastic, the upper surface of the canvas **19** may be treated with an asphalt repellant, such as wax.

The modification shown in Figs. 2–4, discloses a structure substantially similar to that described hereinabove, with the exception that the canvas **19** does not come in contact with the asphaltic mastic **11**. Thus, as shown in the drawing, the pipe **10** is rotated by any known means, such as the chuck **12** shown in Fig. 1, in the direction indicated by the arrow. Simultaneously, and as in the apparatus described above, a canvas **19** moves from spool **20**, over roller **24**, around pipe **10**, over roller **25**, and onto spool **22**. However, in this case the mastic **11** is distributed by hopper **30**, not on the canvas **19**, but onto a second or auxiliary fibrous element or canvas **33**. This canvas, which may also be of a width equal to the length of pipe **10**, is first wound on a spool **35**, and one of its ends **36** is placed over roller **24** and between the outer surface of pipe **10** and the canvas **19**. Thereupon the mastic is distributed as aforesaid on said canvas **33** which latter moves together with the rotation of the pipe **10**. Contrary to the method disclosed hereinabove

in conjunction with the description of the apparatus shown in Fig. 1, the second canvas remains on the pipe, and over the applied mastic during the rotation of said pipe. As shown in Fig. 2, the mastic 11 is just coming in contact with pipe 10, while in Fig. 3 the mastic has covered substantially the whole portion of the pipe enclosed by canvas 19. This latter is wound on spool 22, while canvas 33 continues to rotate together with the pipe until the whole pipe 10 is covered with the mastic 11 compacted by rollers 24, 25, and until canvas 33 has been wound on said pipe and asphaltic coat 11. This is shown in Fig. 4. At this stage of operations, the coated and wrapped pipe may be removed and stored until the mastic is cool, at which time canvas 33 is removed. It is obvious that this modified embodiment may be advantageously used when the heated asphaltic mastic cannot be cooled sufficiently rapidly to permit the use of the structure shown in Fig. 1, and where it is necessary to keep the mastic covered with a protective fibrous element for a period of time longer than that in which a pipe, rotated as described above, moves from roller 24 to roller 25.

If desired, rollers 38 may be placed to support the pipe being coated, as well as for the purpose of further compacting the mastic. Also, if desired, the mastic 11 may be applied to pipe 10 according to the process described in connection with Fig. 1, i. e., by applying the mastic onto canvas 19, followed by the use of the auxiliary canvas 33 inserted between the canvas 19 and the outer surface of mastic 11 after the latter has been placed on pipe 10 and compacted thereon.

In the above described method of pipe coating, a mastic having the following composition may be suitably employed:

	Per cent by weight
Aggregate (rock, sand, gravel, etc. passing a 6 mesh sieve and retained on a 200 mesh sieve)	65–80
Filler (material passing a 200 mesh sieve)	5–15
Asphalt	15–20

However, these percentages are to be considered merely illustrative, and in no way limiting, since many other types of mastic may be employed in connection with the above described method of pipe coating.

Many other variations may be made within the scope of the present invention. Thus, strengthening elements, such as chicken wire nets may be placed within the asphaltic mastic. In such a case the wire net may be introduced or fed at the point where the mastic is extruded from the hopper onto the canvas. Also, special means may be provided for the purpose of centering such strengthening elements within the mastic layer. Furthermore, means may be provided for compacting the mastic before it comes in contact with the pipe to be coated.

As another variation, a canvas of a width equal to the length of the pipe to be coated may be spread on a flat surface; a desired thickness of asphaltic mastic may then be spread on said canvas; and the pipe may then be laid at one end of said canvas on top of the mastic, and the canvas and mastic may then be wrapped around the pipe. After the necessary cooling of the mastic, the canvas may then be removed.

If desired, the above methods of pipe coating may be employed for coating the internal surfaces of pipes. Obviously, the apparatus must then be slightly modified, as for example, by placing the coating and compacting means within the space enclosed by the pipe, and by supporting the pipe from the exterior.

This invention is not limited by any theory of its mechanism, nor by any details which have been given merely for purposes of illustration, but is limited only in and by the following claims in which we wish to claim all novelty inherent in the invention.

We claim:

1. An apparatus for coating pipe and the like, which comprises means for rotating the pipe to be coated in a horizontal position, a fibrous element of a width substantially equal to the length of the pipe to be coated, means to support said fibrous element in substantial juxtaposition with a portion of the surface of the pipe, means associated with said fibrous element and adapted to move it in the direction of rotation of the pipe and in said substantial juxtaposition with a portion of the surface of the said pipe, means for applying an asphaltic mastic to said fibrous element at a point prior to its coming in juxtaposition with the pipe, said fibrous element compacting said mastic on the pipe after it is brought in contact with the pipe by said movement of the fibrous element, and means associated with the fibrous element and adapted to withdraw said element from its position adjacent the surface of the pipe.

2. In an apparatus according to claim 1, wherein means are provided to maintain the fibrous element in tension and thereby compact the asphaltic mastic.

3. In an apparatus according to claim 1, wherein the mastic applying means continuously extrude onto said fibrous element a layer of such mastic of a width substantially equal to that of said fibrous element.

4. A method for coating pipe and the like which comprises rotating the pipe to be coated while in a horizontal position, moving a flexible element substantially in juxtaposition with the lower portion of the outer surface of the pipe, applying a layer of a heated mixture of bituminous material and aggregate to the surface of said element to coat simultaneously substantially the entire length of the pipe to be coated, said heated mixture of bituminous material and aggregate being applied to said element immediately prior to its coming in juxtaposition with said pipe surface, compacting said mixture after it has come in contact with the pipe surface, cooling said mixture and subsequently removing the flexible element from the mixture thus compacted on the pipe.

5. A method for coating pipe and the like which comprises rotating the pipe to be coated while in a horizontal position, moving a flexible element adjacent the lower portion of the outer surface of the pipe, moving a flexible sheet adjacent the surface of the pipe and between said element and pipe, applying a layer of heated bituminous material and aggregate to the surface of said sheet to coat simultaneously substantially the entire length of the pipe to be coated, said heated mixture of bituminous material and aggregate being applied to said sheet immediately prior to its coming in juxtaposition with said pipe surface, compacting said mixture after it has come in contact with the pipe surface through the influence of said element and subsequently removing said flexible sheet from the thus coated pipe.

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