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PIPE COATING

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8 Claims. (Cl. 91—18)

This invention relates to the protective coating of metal cylinders, and more particularly to improved method and apparatus for applying a protective hardenable liquid coating to metal pipe to inhibit corrosion, and is a continuation of my application, Serial No. 178,861 filed Dec. 9, 1937.

It has been the practice for many years to protect steel and iron pipe against corrosion by applying to the surface of the pipe, usually at the pipe fabricating plant, a protective air or heat hardenable coating of blown linseed oil or other suitable liquid coating material. Heretofore such protective coatings have generally been applied by spraying or brushing the liquid onto the pipe as the pipe is moved endwise in the direction of its longitudinal axis past the liquid applying apparatus. The methods now in use for coating pipe are in general defective in that they inherently involve application of a very thin non-uniform coating and marring and damaging of the coating by the pipe handling equipment which is used in conjunction with the coating method employed.

An object of the present invention is to provide improved method and apparatus whereby sections of steel pipe and other cylindrical objects may have a protective liquid coating rapidly and simply applied thereto. Another object of the invention is to provide pipe coating method and apparatus whereby thicker more uniform coatings may be applied than has been heretofore practicable, and with a minimum erasure or damaging of the coating after application.

With the above and other objects and features in view the invention resides chiefly in the improved method and apparatus for coating pipes which is hereinafter described and more particularly defined by the accompanying claims.

In the following description reference will be made to the accompanying drawing, in which:

Fig. 1 is a plan view of pipe coating apparatus built in accordance with the preferred design which forms the subject of the present invention;

Fig. 2 is a vertical side section, taken along line 2—2 of Fig. 1; and

Fig. 3 is a view in vertical end section taken along line 3—3 of Fig. 1;

Fig. 4 is an enlarged end view illustrating the manner of applying a coating to the external surface of a pipe section.

Referring to the drawing, the numeral 10 designates a tank adapted for holding a bath of the air or heat hardenable liquid with which the pipe is to be coated. Such liquid, for example, may be boiled or air blown linseed oil of suitable

consistency for insuring application of a coating of desired thickness on the pipe for protection against corrosion. The tank 10 has side walls 12 and end walls 14, and is open at the top. The tank is proportioned with a length somewhat longer than the greatest length of pipe section to be coated, and a width which is preferably at least one and one-half times the circumference of the largest pipe to be coated. The side walls 12 have their upper edges extending preferably only a few inches (say two inches to three inches) above the normal top level 16 of the bath of coating liquid.

For the purpose of supporting a length of pipe 15 A in the bath during the coating operation, a plurality of rails or apertured plates 18 are mounted transversely and vertically in the tank 10, extending from side wall to side wall of the tank. The upper edges of the rails 18 are preferably sharpened to substantially knife edge thinness and are all located in the same horizontal plane at an immersion depth of about one-eighth to one-quarter inch below the surface 16 of the liquid bath.

A length of pipe which is to have its outside surface coated with the bath liquid is placed in the tank 10 on the supporting rails 18 with the longitudinal axis of the pipe extending substantially parallel and close to one side wall of the tank. As so supported in the tank a longitudinal section of the pipe wall at the point of support is immersed in the coating liquid a sufficient depth to insure application of a coating to the external surface of the pipe by rolling the pipe transversely across the tank on the supporting rails. By limiting the depth of immersion of the rails below the top level of the bath to less than the thickness of the pipe wall, a protective liquid coating can be applied to the outer surface of the pipe without wetting the inner surface of the pipe with the coating liquid.

Since the apparatus of the present invention is designed particularly for coating pipe sections of large dimensions, as for example, twenty foot lengths of pipe eighteen or twenty inches in diameter, it is necessary to provide mechanical pipe handling equipment whereby to roll the pipe on the supporting rails for a distance at least equivalent to the circumference of the pipe, and thereafter to elevate the pipe section from the bath over the upper edge of the opposite side wall of the tank; from which point the pipe section can be conveyed by rolling with a minimum of delay to and through a drying and baking furnace wherein the coating is hardened.

The preferred equipment for accomplishing the above specified object comprises a crank shaft 22 which is journaled in bearings 24 located along the side wall 12 over which the pipe section is removed from the tank. As shown in the drawing, the longitudinal axis of the shaft 22 is positioned in a line which is closely spaced from and parallel to the said side wall of the tank and which is also closely spaced from and parallels the normal upper level of the liquid in the coating bath. A crank 26 is shown as attached to an end of the shaft 22 which extends beyond the end wall of the tank, by means of which power may be applied to rotate the shaft.

The pipe rolling and elevating elements of the mechanism comprise at least two spaced finger-like cams 28 which are rotatable by the shaft 22 in spaced vertical planes. The free unsupported ends of the cams 28 extend substantially the full width of the tank, and in their normal inoperative position are held by gravity with all but their extreme ends immersed in the bath. The upper or working edge of each cam is so shaped that as the shaft 22 is rotated through a substantially 90° angle in the direction in which it is desired to roll the pipe, the upper edge 29 of the free end of the cam 28 will engage and push the pipe along the rails 18 toward the convexly curved cam shoulders 30. As the cam continues to rotate the pipe is raised from the rails 18 on to the cam shoulders and is thereby elevated over the upper edge of the adjacent tank wall and discharged over the side of the tank on to tracks 32 over which the coated pipe is rolled into a drying oven 34. Tracks 32 are aligned with cams 28 in order that the pipe coating applied in the tank may not be marked except in rings at the line of contact of the pipe with the cam shoulders 30 and tracks 32. These rings may be later coated over by an automatic applicator.

By suitably adjusting the viscosity of the coating liquid in the bath and by continually rolling the pipe section through and out of the bath into and through the drying oven, the pipe can be given a thick and full flood coating of substantially uniform thickness. The rolling of the pipe permits a greater thickness of coating film to be held on the pipe without draining off.

It will be understood that a tank 10 suitably proportioned for handling pipe sections twenty feet in length by twenty inches diameter would have side walls 12 much longer in proportion to the length of the end walls 14 than the tank which is illustrated in Fig. 1. Likewise it will be understood that for handling pipes of greater diameter the relative dimensions and shape of the cam 28 illustrated in Fig. 3 would have to be modified to some extent. The important features of the cam mounting and shape would however remain substantially as illustrated, with the shaft 22 journaled in the tank in a position closely adjacent and parallel to the surface of the coating bath and the side wall of the tank over which the coated pipe is discharged. The working surface 29 of the free end of the cam preferably has a radius of curvature more than double the radius of curvature of the convex pipe elevating surface 30, and the two surfaces 29 and 30 intersect to form an angle therebetween greater than 90° (preferably 120°-130°). Since two or more cams 28 are mounted on the same shaft 22 at spaced distances along the lengths of the tank, these cams in operation serve to align the pipe "A" with the sides 12 of the tank before the pipe is elevated on the edge 30 of the cams

preliminary to discharge from the tank on to the rails 32.

The invention having been thus described what is claimed as new is:

1. In pipe coating apparatus, an open top tank for coating liquid, work supporting rails mounted at spaced intervals transversely of said tank with their upper edges in the same horizontal plane, the upper edges of said rails being slightly immersed below the normal level of liquid in the tank, and means for rolling a length of pipe upon said rails from one side of the tank to the other and for then elevating the pipe over the side of the tank, said means comprising a crank shaft rotatably journaled in a position adjacent and parallel to the normal surface of the liquid and to the side of the tank toward which the pipe is rolled, and at least two finger like cams each having an end rotatably journaled at spaced points on said shaft with their free ends extending across the tank and rotatable in vertical planes, the upper pipe rolling edge of the free end of each cam having a concave curvature and a length at least equal to the circumference of the pipe while the journaled pipe elevating end of each cam has an upper convexly curved edge of shorter length.

2. Apparatus as described in claim 1 in which each pipe rolling cam in its normally inoperative position is held by gravity with most of its length immersed below liquid in the tank, and in which the curvature of the convex upper edge of the journaled portion of the cam is more than twice the curvature of the concave pipe rolling edge and intersects the concave edge to form an angle greater than 90°.

3. An apparatus for coating a cylindrical object including a tank for coating liquid, means in said tank providing a support for the object and maintaining the same parallel with the surface of the liquid in the tank and slightly immersed therein, and cam means mounted to contact the outer surface of said object and roll the same upon said supporting means.

4. An apparatus for coating cylindrical objects including a tank for coating liquid, means in said tank providing a support for the object and maintaining the same parallel with the surface of the liquid in the tank and slightly immersed therein, and cam means mounted to contact said object at a point adjacent the submerged portion thereof and roll the same across said tank.

5. An apparatus for coating cylindrical objects including a tank for coating liquid, means for supporting the object parallel to the surface of the liquid in the tank and slightly immersed therein, and cam means having a portion submerged in said liquid and mounted to contact said object upon the submerged portion thereof to roll the same across the tank.

6. An apparatus for coating cylindrical objects including a tank for coating liquid, means for supporting said object parallel to the surface of the liquid in the tank and slightly immersed therein, and cam means having a portion submerged in said liquid and mounted to contact said object upon the submerged portion thereof to roll the same across the tank, said cam means having a portion adapted to elevate and remove said object from said tank at the end of said rolling operation.

7. An apparatus for coating cylindrical objects including a tank for coating liquid, means for supporting the object parallel to the surface of the liquid in the tank and slightly immersed

therein, cam means having an element shaped and positioned to contact the object and roll the same across the tank, and a second cam element, shaped and positioned to contact said object and elevate and remove the same from the tank at the end of said rolling operation.

8. An apparatus for coating cylindrical objects including a tank for coating liquid, means for

supporting the object parallel to the surface of the liquid in the tank and slightly immersed therein, a plurality of cam means mounted to contact said object at spaced points along the length thereof to roll the same across the tank for a distance at least equal to the circumference of the object.

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