

PATENT SPECIFICATION

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(54) METHOD AND APPARATUS FOR COATING PIPE

(71) We, H. C. PRICE Co., a corporation duly organized under the laws of the State of California, and having our principal place of business at Price Tower, Washington County, Oklahoma, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

This invention relates to a coating apparatus and method, and more particularly but not especially, to a method and apparatus for expediting the coating of pipe sections.

It has long been the practice to provide a protective coating for pipe sections to be buried in the ground and also for pipe lines placed in marine applications. The coating is usually either a concrete aggregate material or a mastic material with a bituminous asphaltic base.

While several methods of coating the pipe sections have been utilized, one of the most desirable from a cost standpoint makes use of a rapidly rotating brush to impinge the coating material onto the pipe sections as the latter move relative to the rotating brush. This method, which was initially limited to concrete coatings, has recently been successfully extended to mastic coatings.

According to the present invention there is provided a method of coating a pair of pipe sections comprising the steps of providing a coating station from which a coating material is delivered; moving the pipe sections to be coated along spaced paths of travel on opposite sides of said station, said sections being spaced from each other in their directions of travel so as to alternately bring said sections into alignment with said station; and alternately directing the coating material in opposite

directions on to the pipe sections as the latter move into alignment with the coating station.

Further according to the present invention there is provided pipe coating apparatus comprising first and second pipe-supporting vehicles for moving first and second pipe sections along spaced, fore-and-aft extending paths of travel; first and second coating applicators disposed adjacent to the respective paths of travel of said vehicles; a coating preparation station disposed intermediate said paths of travel; and delivery means for alternately transporting coating material from said station to said first and second applicators.

An embodiment of the present invention will now be described by way of example with reference to the accompanying drawings in which:—

Figure 1 is a top plan view of a coating apparatus; Fig. 2 is an enlarged cross-sectional view of the apparatus taken along line 2-2 of Fig. 1;

Fig. 3 is an enlarged front elevational view of one of the control gates which maintain a uniform level of the coating material along the feeder belt, with portions being broken away from purposes of illustration; and

Fig. 4 is a partial side elevational view of the apparatus shown in Fig. 3.

Referring initially to Figure 1, a pipe coating plant is designated generally by the numeral 10 and includes a central coating station 12 from which coating material is delivered to a pair of identical coating applicators 14 and 16. A pair of spaced, parallel tracks 18 and 20 are disposed perpendicular and adjacent to the respective applicators 14 and 16. The tracks 18 and 20 are longitudinally extending past a pair of loading stations where pipe sections 22 and 22' are supported upon two sets of pipe racks 24 and 26 respectively.

A pair of pipe-coating vehicles 28 and 30 are each comprised of a pair of individual coating buggies 32. The pipe sections 22 and 22' are moved from the supporting racks 24 and 26 and onto the vehicles 28 and 30 by loading jacks 34 and 36 respectively.

The coating station 12 includes a storage area which encloses a quantity of sand 38 used in preparing the concrete coating, and a pair of tanks 40 store a supply of cement which is fed through a conveyor 42 and a chute 44 to a pug mill 46. A pair of hoppers 48 provide structure for introducing the sand 38 into the pug mill 46 through the chute 44. Any of the concrete coating material which does not adhere to the pipe section being coated drops into areas 50 and 52 beneath the tracks 18 and 20 respectively from which it is conveyed to the pug mill 46 by conveyors 54 and 56 respectively.

Referring now to Figs. 2-4, wherein further details of the coating station 12 are shown along with details of the two applicators 14 and 16. The pug mill 46 includes a hopper 58 at the forward end thereof for delivering the concrete coating material onto a reversible feeder belt 60. The feeder belt 60 is supported by a pair of rollers 62 and 64 at opposite ends with each of the rollers having its shaft journaled in appropriate bearing housings 66 and 68. The bearing housings 66 and 68 are in turn supported by a frame 70 which is rigid with a first pair of C-channels 72 which are welded or otherwise rigidly secured to a second pair of C-channels 74. A plurality of upright standards 76 support the entire assembly of the belt 60 and rollers 62 and 64, along with the hopper 58 upon a platform 78. The belt 60 is driven by a reversible motor 80 through a pulley and belt assembly 82.

At each side of the hopper 58 a control gate designated generally by the numeral 84 is located for assuring that the coating material deposited upon the belt 60 is uniformly distributed. Each of the gates 84 comprises an upright support rod 86 which is operably coupled with a handle 88 for moving the gate 84 in a vertical plane. At the end of the rod 86 opposite the handle 88 a generally planar, vertically disposed gate member 90 extends transversely of the belt 60 in vertically spaced relationship to the latter. Extending rearwardly from the member 90 are a pair of outwardly flared vanes 92 which converge toward the member 90 in a V-shaped configuration.

It is also to be noted from Fig. 3 that a pair of legs 94 which depend from the hopper 58 are configured to form a slot for receiving the belt 60 and also include an inclined surface 96 for directing the coating

material onto the belt 60. A roller 98 at one side of the belt 60 restricts lateral movement of the latter and a similar roller is normally provided at the opposite side to restrict lateral movement of the belt in the opposite direction.

A pair of conveyor belts 100 and 102 which are driven by motors 104 and 106 respectively, transport the coating material from the feeder belt 60 to the respective applicators 14 and 16. The delivery belts 100 and 102 are supported by rollers 108, 110, 112 and 114 disposed to assure direct fore and aft alignment between the belts and the respective applicators.

As each of the applicators 14 and 16 are identical, only one of the same will be described in detail. Each of the applicators, such as 14, acts as an impinger and is comprised of a brush 116 and a belt 118. Both the brush 116 and the belt 118 are driven at relatively high speeds by an appropriate drive mechanism (not shown).

A pair of operator's platforms 120 are disposed upon upright supports 124 and 126 respectively which are in turn mounted upon platforms 128 and 130. From the platforms 120 and 122 the operator is in position to move the control gates 132 and 134 which are identical in construction to 95 control gate 84 previously described.

As will be noted from viewing the coating buggy 32 which is visible in the far left-hand corner of Fig. 2, each of the buggies is provided with a pair of rollers 136 upon which a pipe section 22 rests during the coating operation. The rollers 136 are rotated by an appropriate prime mover (not shown). This allows the section 22 to be rotated to permit its entire exterior surface to be coated as the coating vehicles moves the pipe section past one of the coating applicators.

In operation, the vehicles 28 and 30 are first loaded with the pipe sections 22 and 22' and then moved forwardly along the tracks 18 and 20 to the applicators 14 and 16. It is desirable to space the vehicles 28 and 30 apart in their directions of travel so that their paths of travel are approximately 180° out of phase with each other. In this manner, one of a pair of pipe sections being coated is at the forward end of its path of travel and adjacent the applicator 14 while the other section which has been previously coated is at the backward end of its path of travel and adjacent a load out area 138. Coating material is directed to either the applicator 14 or the applicator 16 depending upon the direction of rotation of the feeder belt 60. Movement of the feeder belt 60 in one direction delivers coating material to the belt 100 and applicator 14 while movement in the other direction delivers coating material to the 130

belt 102 and applicator 16. As the coating material drops onto the belt 118 which is moving at a high speed, it is flung onto a pipe section 22 by the action of the rapidly rotating brush 116. The latter also serves to assure that the coating material remains sufficiently particulate to provide a compactable, adherent mass for contact with the outer surface of the pipe section. It is to be understood, of course, that in applying certain coatings it is necessary to include a layer of reinforcing material (not shown) which is wrapped around the pipe section simultaneously with the coating operation. The control gates 88, 132 and 134 are raised or lowered to assure a uniform and evenly distributed layer of coating material upon the belts 60, 100 and 102.

It is to be understood that in normal operation the motor 80 will be timed to reverse its direction periodically to deliver coating material to either the belt 100 or the belt 102 depending upon which of the coating vehicles 28 or 30 is in alignment with an applicator 14 or 16. It will be appreciated that by utilizing the coating method of the present invention, which includes providing a central coating station from which a coating material is delivered, moving a pair of pipe sections forward and backward 180° out of phase along spaced, parallel paths of travel on opposite sides of the station, and alternately impinging the coating material onto the pipe sections as the latter are rotated and brought into alignment with the coating station, a pair of pipe sections can be coated in only slightly greater time than has been previously required for coating a single pipe section. This is accomplished with less than twice the equipment and labor that has previously been required for coating a single pipe section.

It will, of course, be apparent to those skilled in this art that the construction might be varied somewhat without departing from the principles of this invention. For example, a single belt could extend between applicators 14 and 16. This single belt would be reversibly driven to provide the feature of alternate directions of travel for the coating material to the respective applicators. Such construction, while capable of accomplishing most of the objects of the invention, would also permit elimination of the reversible belt 60. On the other hand, this construction is believed less efficient in overall operation because of the necessity for repeatedly reversing the direction of a single, relatively long belt rather than the substantially shorter belt 60 utilized in applicant's presently preferred construction.

Thus the embodiment described above

gives rise to a method and apparatus for coating pipe sections which includes throwing, spraying, or impinging the coating on to the sections and wherein the coating time per unit is substantially reduced by using spaced, parallel coating lanes on opposite sides of a central coating preparation station.

The embodiment also minimizes the equipment required for the coating of pipe sections by utilizing a central supply facility and pug mill for supplying dual applicators located on opposite sides of the pug mill, to permit handling of a pair of pipe sections with less than twice the equipment previously required to coat a single pipe section.

Further dual applicators are utilized and a reversible feeder belt allows both applicators to be applied from a single source by simply reversing the direction of travel of the belt.

WHAT WE CLAIM IS:

1. A method of coating a pair of pipe sections comprising the steps of: providing a coating station from which a coating material is delivered; moving the pipe sections to be coated along spaced paths of travel on opposite sides of said station, said sections being spaced from each other in their directions of travel so as to alternately bring said sections into alignment with said station; and alternately directing the coating material in opposite directions onto the pipe sections as the latter move into alignment with the coating station.
2. A method as set forth in Claim 1, wherein said moving step includes moving said sections along parallel paths of travel which paths are perpendicular to the line of delivery of material from said coating station.
3. A method as set forth in Claim 1 or Claim 2, wherein said moving step includes moving said sections forward to said coating station and backward away from said station along said paths of travel and removing said sections from said paths after said backward movement is completed.
4. A method as set forth in Claim 3, wherein is included the step of spacing said sections so that their paths of travel are 180° out of phase whereby one of said sections is at the forward end of its path of travel when the other of said sections is at the backward end of its path of travel.
5. A method as set forth in Claim 3, wherein said directing step includes impinging said coating on said pipe sections.
6. A method as set forth in any one of Claims 1 to 5, wherein is included the step

belt 102 and applicator 16. As the coating material drops onto the belt 118 which is moving at a high speed, it is flung onto a pipe section 22 by the action of the rapidly rotating brush 116. The latter also serves to assure that the coating material remains sufficiently particulate to provide a compactable, adherent mass for contact with the outer surface of the pipe section. It is to be understood, of course, that in applying certain coatings it is necessary to include a layer of reinforcing material (not shown) which is wrapped around the pipe section simultaneously with the coating operation. The control gates 88, 132 and 134 are raised or lowered to assure a uniform and evenly distributed layer of coating material upon the belts 60, 100 and 102.

It is to be understood that in normal operation the motor 80 will be timed to reverse its direction periodically to deliver coating material to either the belt 100 or the belt 102 depending upon which of the coating vehicles 28 or 30 is in alignment with an applicator 14 or 16. It will be appreciated that by utilizing the coating method of the present invention, which includes providing a central coating station from which a coating material is delivered, moving a pair of pipe sections forward and backward 180° out of phase along spaced, parallel paths of travel on opposite sides of the station, and alternately impinging the coating material onto the pipe sections as the latter are rotated and brought into alignment with the coating station, a pair of pipe sections can be coated in only slightly greater time than has been previously required for coating a single pipe section. This is accomplished with less than twice the equipment and labor that has previously been required for coating a single pipe section.

It will, of course, be apparent to those skilled in this art that the construction might be varied somewhat without departing from the principles of this invention. For example, a single belt could extend between applicators 14 and 16. This single belt would be reversibly driven to provide the feature of alternate directions of travel for the coating material to the respective applicators. Such construction, while capable of accomplishing most of the objects of the invention, would also permit elimination of the reversible belt 60. On the other hand, this construction is believed less efficient in overall operation because of the necessity for repeatedly reversing the direction of a single, relatively long belt rather than the substantially shorter belt 60 utilized in applicant's presently preferred construction.

Thus the embodiment described above

gives rise to a method and apparatus for coating pipe sections which includes throwing, spraying, or impinging the coating on to the sections and wherein the coating time per unit is substantially reduced by using spaced, parallel coating lanes on opposite sides of a central coating preparation station.

The embodiment also minimizes the equipment required for the coating of pipe sections by utilizing a central supply facility and pug mill for supplying dual applicators located on opposite sides of the pug mill, to permit handling of a pair of pipe sections with less than twice the equipment previously required to coat a single pipe section.

Further dual applicators are utilized and a reversible feeder belt allows both applicators to be applied from a single source by simply reversing the direction of travel of the belt.

WHAT WE CLAIM IS:

1. A method of coating a pair of pipe sections comprising the steps of: providing a coating station from which a coating material is delivered; moving the pipe sections to be coated along spaced paths of travel on opposite sides of said station, said sections being spaced from each other in their directions of travel so as to alternately bring said sections into alignment with said station; and alternately directing the coating material in opposite directions onto the pipe sections as the latter move into alignment with the coating station.

2. A method as set forth in Claim 1, wherein said moving step includes moving said sections along parallel paths of travel which paths are perpendicular to the line of delivery of material from said coating station.

3. A method as set forth in Claim 1 or Claim 2, wherein said moving step includes moving said sections forward to said coating station and backward away from said station along said paths of travel and removing said sections from said paths after said backward movement is completed.

4. A method as set forth in Claim 3, wherein is included the step of spacing said sections so that their paths of travel are 180° out of phase whereby one of said sections is at the forward end of its path of travel when the other of said sections is at the backward end of its path of travel.

5. A method as set forth in Claim 3, wherein said directing step includes impinging said coating on said pipe sections.

6. A method as set forth in any one of Claims 1 to 5, wherein is included the step



of rotating said pipe sections during impinging of said coating.

7. A method as set forth in any one of Claims 1 to 5, wherein is included the step of collecting any of said material not adhering to said sections and returning the same to said coating station.

8. Pipe coating apparatus comprising: first and second pipe-supporting vehicles for moving first and second pipe sections along spaced, fore and aft extending paths of travel; first and second coating applicators disposed adjacent to the respective paths of travel of said vehicles; a coating preparation station disposed intermediate said paths of travel; and delivery means for alternately transporting coating material from said station to said first and second applicators.

9. Apparatus as claimed in Claim 8, wherein said paths of travel are parallel and said applicators are disposed perpendicular to the respective paths of travel.

10. Apparatus as claimed in Claim 8 or Claim 9, wherein each of said coating applicators comprises an impinger for directing the coating material onto said pipe sections.

11. Apparatus as claimed in any one of claims 8 to 10, wherein said delivery means comprises a first delivery conveyor for transporting coating material from said station to said first applicator, and a

second delivery conveyor for transporting coating material from said station to said second applicator.

12. Apparatus as claimed in claim 11, including a feeder structure interposed between said station and said first and second delivery means for receiving coating material from said station and selectively supplying each of said first and second delivery conveyors with said material.

13. Apparatus as claimed in claim 12, wherein said feeder structure comprises a conveyor disposed in fore and aft alignment with said first and second delivery means; and reversible drive means for moving said conveyor in either one of two opposed directions.

14. A method of coating a pair of pipe sections substantially as hereinbefore described with reference to the accompanying drawings.

15. Pipe coating apparatus substantially as hereinbefore described with reference to the accompanying drawings.

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