March 13, 1934. D. A. CUMFER 1,951,085

PIPE COATING DEVICE

Filed May 4, 1931 2 Sheets-Sheet 1

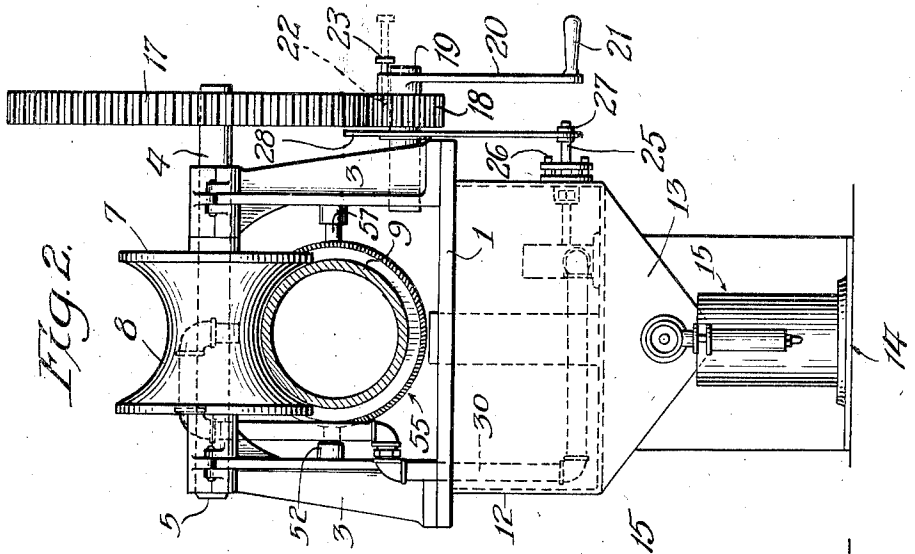


Fig. 2.

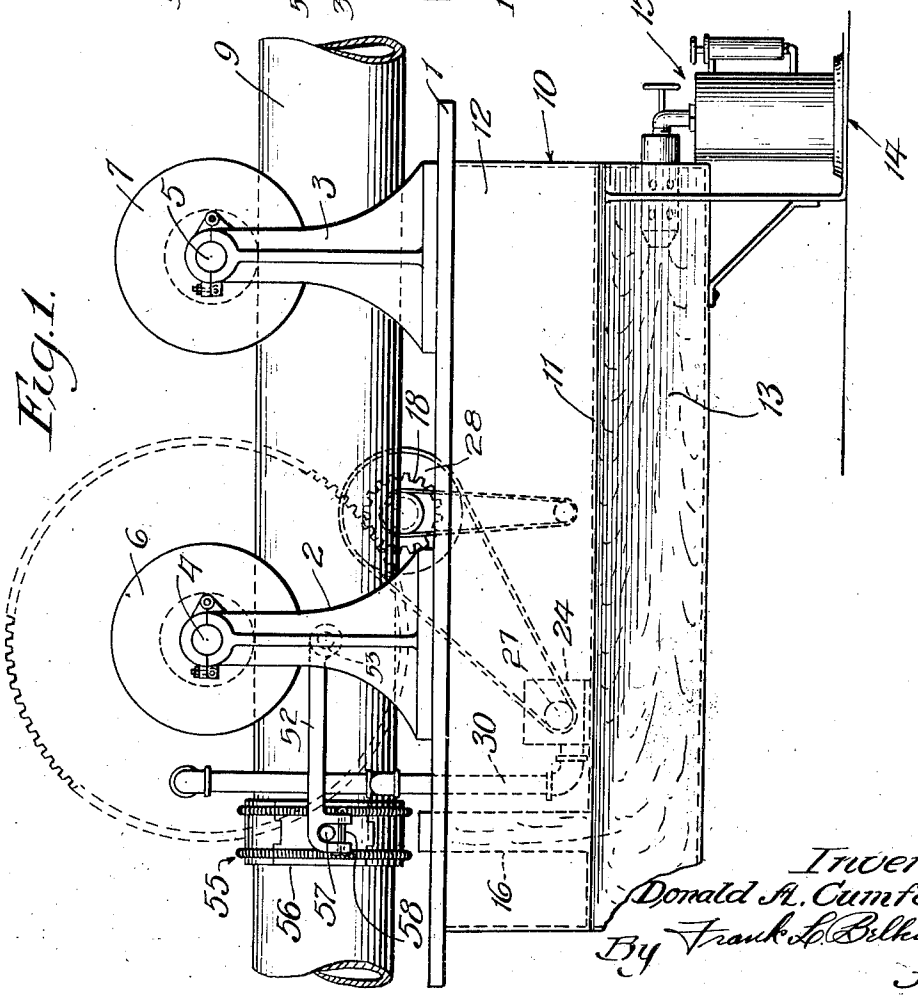


Fig. 1.

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Fig. 3.

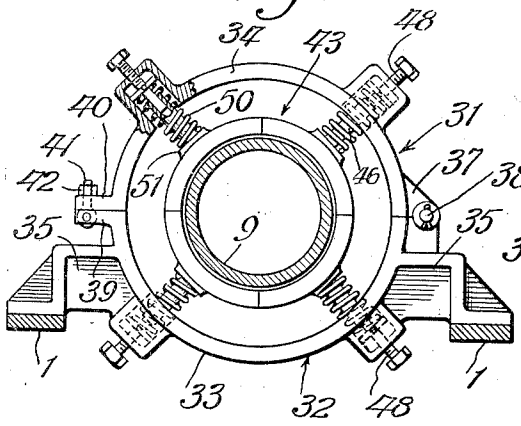


Fig. 4.

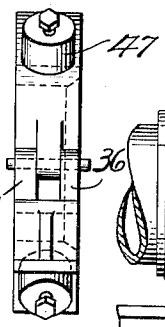


Fig. 5.

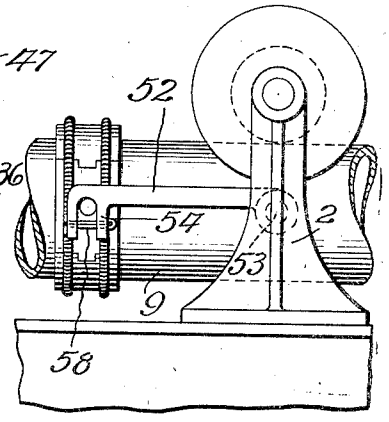


Fig. 9.

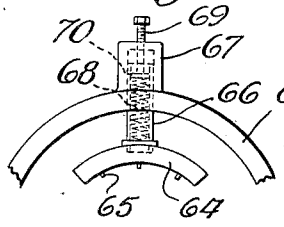


Fig. 10.

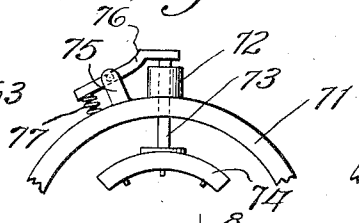


Fig. 11.

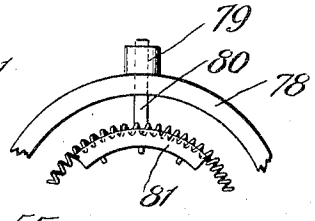


Fig. 6.

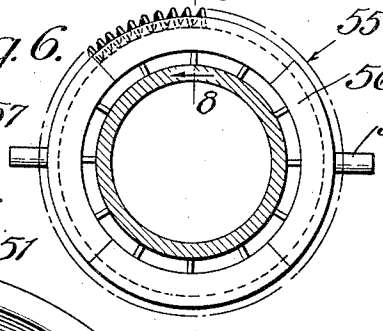


Fig. 7.

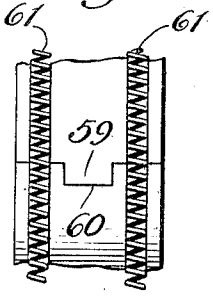


Fig. 12.

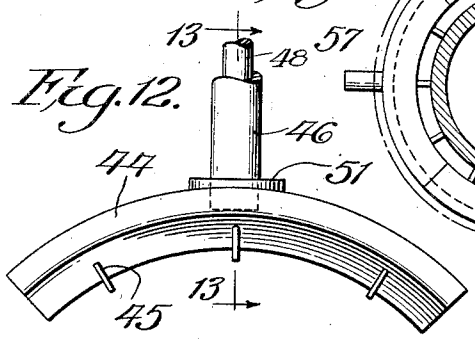


Fig. 8.

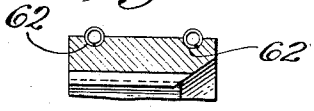
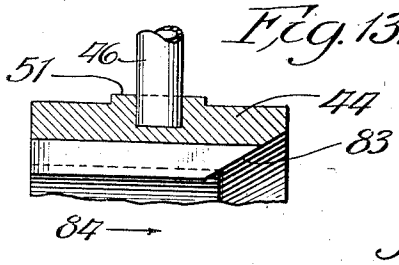


Fig. 13.



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UNITED STATES PATENT OFFICE

1,951,085

PIPE COATING DEVICE

Donald A. Cumfer, River Forest, Ill.

Application May 4, 1931, Serial No. 534,715

4 Claims. (Cl. 91—30)

This invention relates to improvements in pipe coating devices and refers specifically to the provision of a machine for coating a fabricated pipe line with a protective coating substance such as asphalt or the like, after the same has been laid and assembled in the field.

The utility, objects and advantages of my invention will be apparent from the accompanying drawings and following detail description.

In the drawings, Fig. 1 is a side elevational view of my novel coating machine.

Fig. 2 is an end elevational view of the device as shown in Fig. 1.

Fig. 3 is a detail front view of a doctor shoe assembly which may be utilized in conjunction with the device shown in Figs. 1 and 2.

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

Fig. 5 is a detail side elevational view of a slightly modified form of the doctor shoe assembly.

Fig. 6 is a front elevational view of the shoe shown in Fig. 5.

Fig. 7 is a fragmentary side elevational view of the shoe shown in Fig. 5.

Fig. 8 is a fragmentary sectional view taken on the line 8—8 of Fig. 6.

Fig. 9 is a fragmentary elevational view of another modified form of the doctor shoe assembly.

Fig. 10 is a further modified form of the doctor shoe assembly.

Fig. 11 is a still further modified form of the doctor shoe assembly.

Fig. 12 is a detail view of one segment of a doctor shoe illustrating particularly the spacing elements.

Fig. 13 is a sectional view taken on the line 13—13 of Fig. 12.

Referring in detail to the drawings, 1 indicates a plate which may be provided with a central aperture, not shown, the purpose of which will be hereinafter more fully described. Two pair of standards 2 and 3, may be mounted upon the plate 1 and may be spaced from each other longitudinally along said plate. The upper portions of said standards may serve as bearings or supports for shafts 4 and 5 respectively mounted upon the standards 2 and 3. Rollers 6 and 7 may be respectively mounted upon the shafts 4 and 5 and may be provided with curvilinear faces 8 which may be adapted to conform to the curvature of a pipe 9.

In the laying of pipe 9 for fluids such as petroleum oil, natural gas, water or the like, it has been the practice to lay the same in a trench or ditch as a continuous unit, the individual sections being welded end to end. Prior to covering the pipe in the trench, to avoid the destructive corrosion of the metal of which the pipe is composed, the same is coated with a water resistant impervious substance such as asphalt or the like. When asphalt is used as a coating substance, the same must be applied in liquid condition and, hence, must be applied to a relatively elevated temperature. The application of the asphalt is a purely manual operation and must be entirely performed by hand. Since the asphalt is in heated condition, and inasmuch as relatively little clearance is provided between the pipe and the sides of the trench, working conditions are extremely unfavorable. In consequence, the pipe is improperly coated, lack of uniformity of coating exists and a great waste of coating material is occasioned.

Accordingly my invention is directed to means for efficiently coating a pipe line of the character described in which a uniform coating may be applied in an efficient manner and, hence, a great saving of time, labor and material may be effected.

A tank or container 10 may depend from the lower surface of the plate 1 and may be divided by partition 11 into a compartment 12 adapted to contain a quantity of coating material and a heating chamber 13. A bracket or support 14 may be mounted upon the tank or vat 10 and may serve as a support for a heating means such as, for example, a gasoline torch 15 or the like, the heated products of combustion being discharged into the compartment 13. A flue 16 may connect into the compartment 13 and may pass through the compartment 12 discharging adjacent the lower surface of the pipe 9.

A spur gear 17 may be mounted upon an extended portion of the shaft 4 and may be adapted to mesh with a pinion 18 which, in turn, may be loosely mounted upon a stub shaft 19. A crank 20 having handle 21 may be rigidly mounted upon the shaft 19. The pinion 18 may be provided with a plurality of apertures 22 into which pin 23 carried by the crank 20 may be adapted to be inserted. In this manner when the pin 23 is engaged in the aperture 22, the shaft 19 and the pinion 18 will turn as a unit. Consequently it can be readily seen that by rotating crank 20, gear 17 will be actuated and will, in turn, rotate shaft 4 thereby imparting motion to the device as a whole.

A pump 24 may be mounted within the compartment 12 and may be provided with a shaft 25 which may extend outwardly through the side wall of the vat 10. A gland 26 may serve to prevent leakage of the material within the compartment 12 at the point where the shaft 25 extends outwardly through the wall of the vat. A sprocket wheel 27 may be mounted upon the end of the shaft 25 and may be adapted to be operatively connected to sprocket wheel 28 rigidly mounted upon the shaft 19 by means of a sprocket chain 29. The arrangement is such that upon rotation of shaft 19, pump shaft 25 may be rotated and consequently liquid within

the liquid compartment 12 may be pumped upwardly through pipe 30 which may discharge upon the upper portion of the pipe 9.

The pipe 30 may, if desired, be constructed in a plurality of sections connected together by a swivel coupling. By this provision, when the device is temporarily out of use the same may be collapsed and immersed in the liquid within the reservoir 12. In this manner, the coating material remaining in the pipe will be prevented from hardening.

Referring particularly to Figs. 3 and 4, a doctor device 31 is shown which may be utilized in conjunction with my invention. The device 31 may comprise a supporting ring 32 which may be divided into a plurality of sections 33 and 34, being respectively the lower and upper tabs of the ring. The lower half ring 33 may be mounted upon a bracket 35 which, if desired, may be constructed integral therewith, the ends of the bracket in turn being adapted to be mounted upon the opposite sides of the plate 1 bridging the aperture formed in said plate. The bracket 35 and the lower half ring 33 may carry on one side thereof a bifurcated lug 36. The same side of the ring 34 may carry a cooperating lug 37 which may be pivotally connected to the lug 36 by means of a pin 38 or the like.

The diametrical opposite side of the lower ring 33 may be provided with a lug 39 adapted to cooperate with a lug 40 mounted upon the upper portion 34 of the ring. A bolt 41 may be pivotally mounted upon the lug 39 and by means of nut 42 may be adapted to maintain lugs 39 and 40 in positive contact with each other.

The reference numeral 43 indicates a cylindrical doctor blade which may comprise a plurality of segmental sections 44. The cylindrical doctor blade 43 may be adapted to circumscribe the pipe 9 as shown best in Fig. 3 and each segment 44 comprising said doctor blade may be adapted for radial movement with respect to said pipe. The inner surface of the segments 44 may be provided with spacing strips 45 which may, if desired, be imbedded in the surface of the segmental sections as shown best in detail in Fig. 12. By the provision of the spacing members 45, the distance of the doctor surfaces from the outer surface of the pipe 9 may be controlled.

Each of the segmental sections 44 may be provided with a supporting and guiding shaft 46 which may be of hollow construction and may be suitably mounted upon the outer surface of the segment 44. The ring 32 may be provided with a plurality of housings 47, the number thereof corresponding to the number of segments 44 comprising the doctor member 43. Each of the housings 47 may be provided with an internally threaded opening into which a bolt 48 may be threadedly engaged. A plunger or washer 49 may be mounted intermediate the length of the bolt 49 and may be positioned within the housing 47. A coil spring 50 may circumscribe the shaft 46 of each segment and may abut at one end upon the boss 51 and at the other upon the plunger 49. The end of the bolt 48 may be adapted to be slidably positioned within the hollow portion of the shaft 46. It can readily be seen that the force of compression of the springs 50 may be controlled by suitably rotating the bolts 48. The arrangement is such that as the cylindrical doctor member 43 moves longitudinally along the pipe 9, if an upraised portion of said pipe is encountered for instance, a welded joint, the springs 50 permit radial movement of the segments 44 and consequently permit uninterrupted passage of the doctor member 43 over the weld.

Referring particularly to Figs. 5, 6, 7 and 8, a slightly modified form of doctor blade and mounting is shown. A pair of arms 52 may be pivotally mounted as at 53 upon the standards 2. The opposite ends of said arms may terminate in bifurcated members 54. A doctor ring 55 comprising a plurality of cylindrical segments 56 may be adapted to circumscribe a portion of the pipe 9 to be coated. Two of the segments 56 may be provided with projected pins 57 which may be normally inserted between the bifurcated arms 54 as shown best in Fig. 5. A cotter pin or the like 58, may serve to maintain the arms 52 in proper position with respect to the pins 57 in an obvious manner.

Each of the segments 56 may be provided at opposite ends with tongues 59 and cooperating grooves 60. In this manner relative axial movement of the segments with respect to each other is prevented inasmuch as the tongue 59 of one segment positively engages in the groove 60 of the adjacent end of the adjacent segment. To permit limited radial movement of the segments 56 with respect to the pipe 9, a plurality of continuous coil springs 61 may circumscribe the cylindrical doctor member 55. To prevent unintentional displacement of the springs 61, the same may be positioned within annular grooves 62 provided in the outer surface of the segments 56.

Referring particularly to Fig. 9, another modified form of doctor assembly is shown and may comprise a supporting ring 63 similar to the ring 32. A plurality of doctor segments 64 having spaced strips 65 and guide shafts 66 may be operatively associated with the ring 63. The ring 63 may be provided with housings 67 corresponding in number to the number of segments 64 comprising the doctor blade proper. The ends of the shafts 66 may be slidably mounted within the housings 67 and a coil spring 68 may be positioned within said shafts. A bolt or screw 69 may be threadedly engaged in the end of each of the housings 67 and may be provided at its inner end with a plunger 70 adapted to maintain contact with the end of the spring 68. It can readily be seen that a construction of this type permits of the desired radial movement of the segment 64 with respect to the pipe 9.

Another modified form of doctor device may be used in conjunction with my invention and may comprise a supporting ring 71 similar in its general details to the rings 63 and 32. This construction is shown in Fig. 10. The ring 71 may be provided with a plurality of collars 72 in which shafts 73 mounted upon segments 74 may be slidably positioned. Arms 75 may be mounted upon the outer portion of the ring 71 adjacent the collars 72 and may serve as fulcrums for levers 76. One end of each of the levers is adapted to bear upon the end of each of the shafts 73 whereas the opposite end of each of the levers contacts a coil spring or the like 77 positioned between said end and the outer surface of the ring 71. It can readily be seen that by this construction radial movement of the segment 74 may be permitted with respect to the outer surface of the pipe 9 over which said segments are adapted to slide. The number of units 72, 73, 74, 75, 76 and 77 mounted upon the ring 71 will depend, of course, upon the arcuate span of the members 74, the aggregate span of said members covering 360°.

Referring particularly to Fig. 11 a further modified form of doctor assembly is shown and com-

prises a supporting ring 78 somewhat similar in construction to the rings 71, 63 and 32. The ring 78 may be provided with a collar 79 in which a shaft 80 mounted upon a segment 81 is adapted to be slidably positioned. The ring 78 may be provided with a plurality of collars 79 corresponding in number to the number of segments 81 constituting the doctor blade proper. To permit radial movement of the segments 81 with respect to the pipe 9 over which said segments travel, a continuous coil spring 82 may circumscribe and bind the various segments. It is to be understood, of course, that one or more coil springs 82 may be utilized as desired. The number of units 79, 80 and 81 mounted upon ring 78, of course, will depend upon the arcuate span of each of the members 81, the aggregate span of said members covering 360°.

In the construction of the doctor blade proper, the same may be beveled, as shown best at 83 in Fig. 13, at the forward end of said blade, the direction of the motion of the blade with respect to the pipe being indicated by the arrow 84.

In utilizing my invention, the device as a whole may be mounted upon a pipe 9 as shown best in Figs. 1 and 2. To so mount said device the same may be positioned upon said pipe at one end thereof or, if desired, the bearings for the shafts 4 and 5 at the upper ends of the standards 2 and 3 respectively may be of the split type, as shown, which may permit the temporary removal of the rollers 6 and 7. Any other desirable means of mounting the device upon an intermediate portion of the pipe 9 is contemplated by my invention and will be apparent to anyone skilled in the art.

As has been hereinbefore described, the doctor assembly may be suitably positioned upon the pipe 9, the positioning thereof being dependent upon the particular type of doctor assembly.

A quantity of coating material such as asphalt or the like may be placed in the tank 12 and heated products of combustion may be passed through the combustion chamber 13. When the coating material has been reduced to the desired stage of fluidity, the crank 21 may be rotated thereby actuating pump 24 and discharging coating material through the pipe 30 to the upper surface of the pipe 9 immediately ahead in the direction of travel of the doctor blade. Simultaneously with the actuation of the pump 24, motion will be imparted to the coating device proper and the doctor blade will move longitudinally along the pipe 9 and will controllably spread a film of a desired uniform thickness of coating material upon the surface of the pipe 9. It can readily be seen that the thickness of said film will be dependent upon the distance that the spacing elements 45 project outwardly from the inner surfaces of the segments.

The movement of the device proper along the length of the pipe 9 will be dependent upon several factors among which may be mentioned the fluidity of the coating material, the longitudinal distance of the discharge pipe 30 from the doctor blade as measured in the direction of travel along the pipe 9, and the thickness of the film of coating material to be applied to said pipe.

It can readily be seen that the excess coating material removed from the pipe by the doctor blade will fall through the aperture in the plate 1 and into the tank 12. Consequently a saving of material is effected both by applying a uniform coating to the pipe and also by the return of the excess material removed from the pipe by the doctor blade.

By the provision of the flue 16 which may discharge relatively hot products of combustion adjacent the doctor device, proper fluidity of the coating material may be maintained at the point of doctoring regardless of atmospheric temperature conditions.

If it is desired the pump 24 may be operated independently of the movement of the carriage by moving the pin 23 into its outermost position as shown in dotted lines in Fig. 2. It can readily be seen that in this position the pinion 18 will be disengaged from the crank shaft 19 and hence shaft 4 will not move on movement of the crank 20. A similar means, not shown, but obvious to those skilled in the art, may be utilized to move the carriage and simultaneously render the pump inoperative.

Pipes of different diameters may be coated by one device merely by changing rollers 6 and 7 and doctor shoes. The doctor assembly shown in Figs. 5, 6, 7 and 8 particularly lends itself to the coating of pipes of various sizes due to the relatively simple cooperative relationship of the carriage proper and the doctor device.

I claim:

1. In combination, a device for coating a stationary pipe which comprises, a carriage movably supported upon the pipe to be coated, a reservoir carried by said carriage beneath said pipe for coating material, means for heating said material, means for uniformly spreading said material upon the surface of the pipe, and means for applying heat to the lower portion of said spreading means and pipe.

2. In combination, a device for coating a stationary pipe which comprises, a carriage movably supported upon the pipe to be coated, a reservoir carried by said carriage for coating material, means for delivering coating material from the reservoir to the pipe surface, and means for uniformly spreading said material upon the surface of the pipe comprising a doctor blade circumscribing said pipe, said doctor blade including a plurality of arcuate segments spaced a predetermined distance from the surface of the pipe.

3. In combination, a device for coating a stationary pipe which comprises, a carriage movably supported upon the pipe to be coated, a reservoir carried by said carriage for coating material, means for delivering coating material from the reservoir to the pipe surface, means for uniformly spreading said material upon the surface of the pipe comprising a doctor blade circumscribing said pipe, said doctor blade including a plurality of arcuate segments spaced a predetermined distance from the surface of the pipe, and means permitting limited radial movement of said segments with respect to said pipe.

4. In combination, a device for coating a stationary pipe which comprises, a carriage movably supported upon the pipe to be coated, a reservoir carried by said carriage for coating material, means for delivering coating material from the reservoir to the pipe surface, means for uniformly spreading said material upon the surface of the pipe, comprising a doctor blade including a plurality of arcuate segments conforming to the sectional contour of the pipe and encircling said pipe, and means for maintaining said segments a predetermined distance from the surface of said pipe.

DONALD A. CUMFER.