

April 5, 1938.

E. M. CONVERSE ET AL

2,112,825

GREASE TYPE PIPE LINE COATING MACHINE

Filed July 29, 1936

5 Sheets-Sheet 1

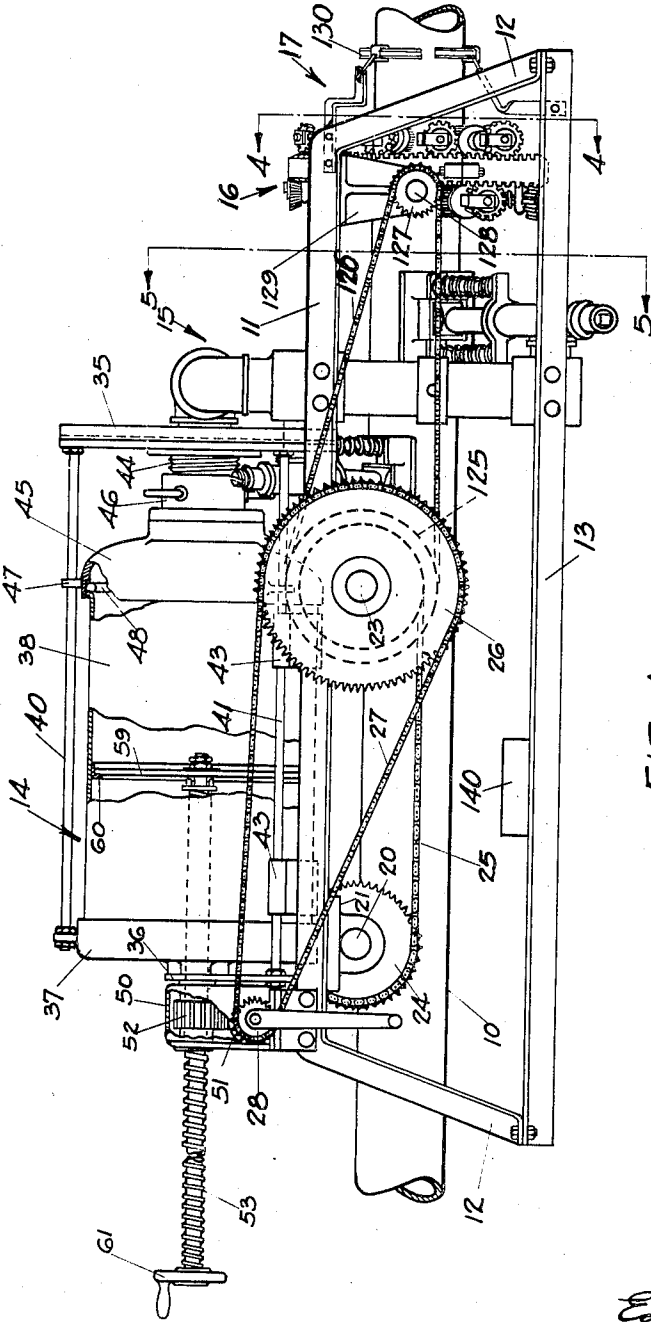


FIG. 1

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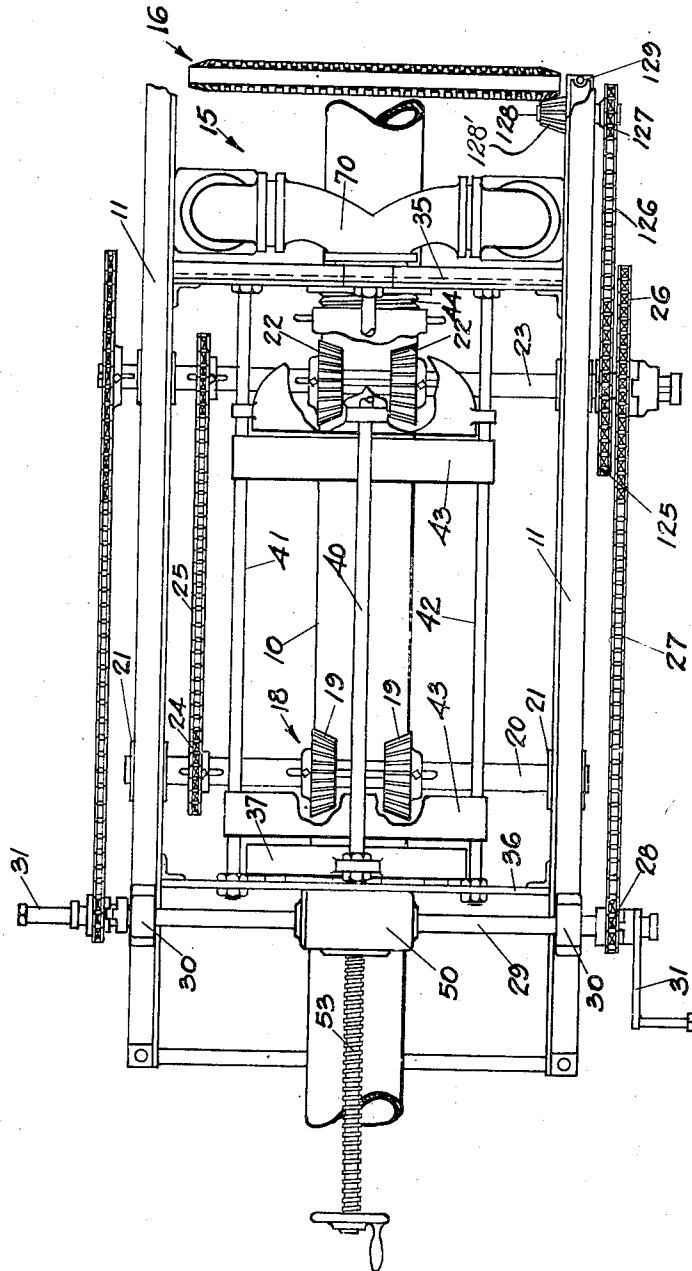
2,112,825

GREASE TYPE PIPE LINE COATING MACHINE

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5 Sheets-Sheet 2

FIG. 2



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GREASE TYPE PIPE LINE COATING MACHINE

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5 Sheets-Sheet 3

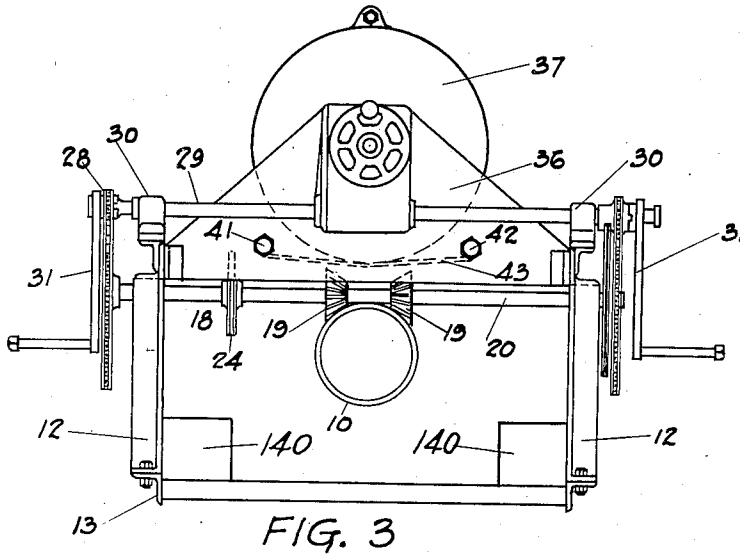
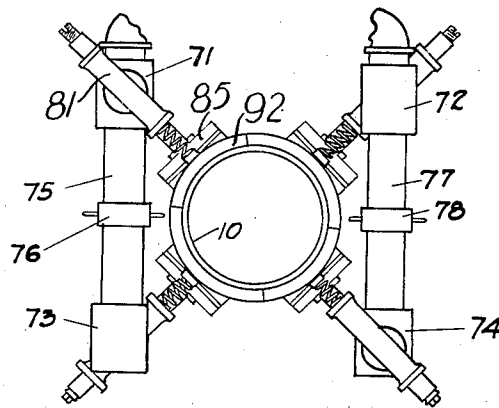


FIG. 5

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GREASE TYPE PIPE LINE COATING MACHINE

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5 Sheets-Sheet 4

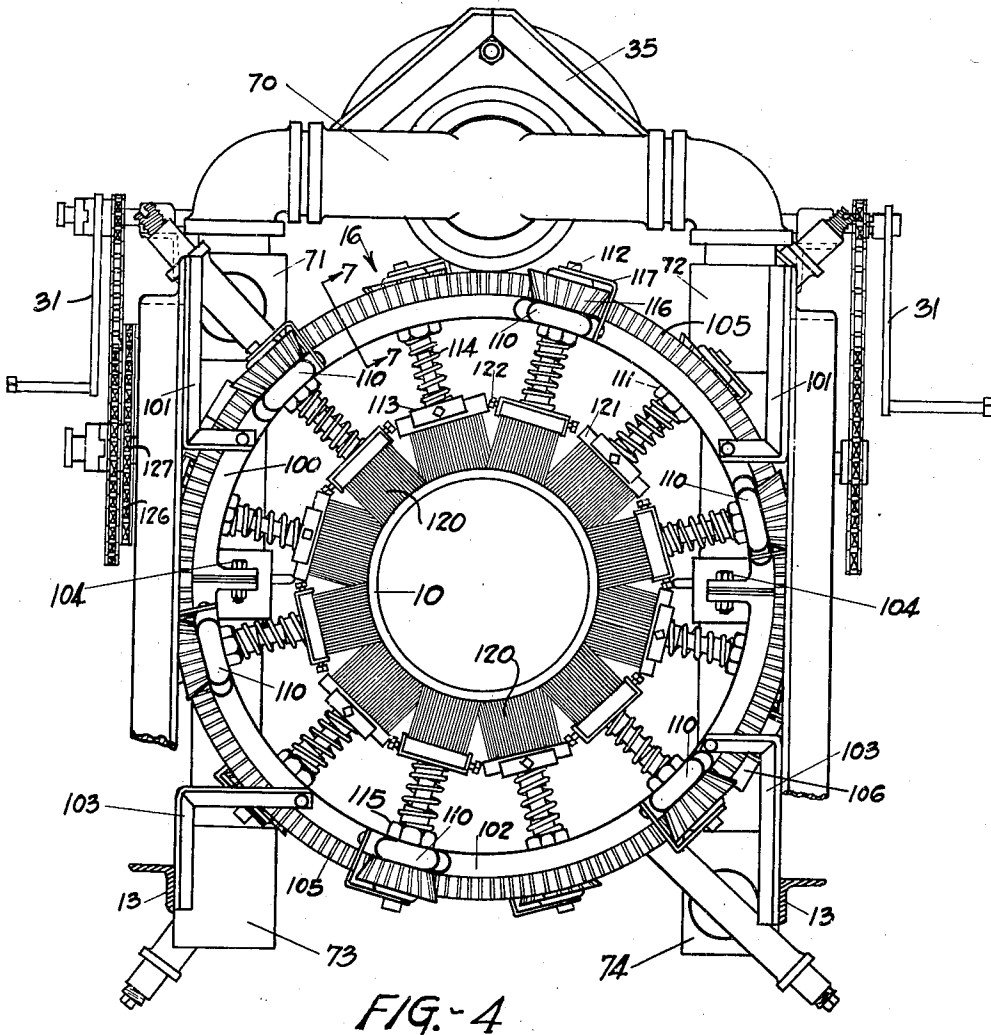


FIG. 4

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GREASE TYPE PIPE LINE COATING MACHINE

Filed July 29, 1936

5 Sheets-Sheet 5

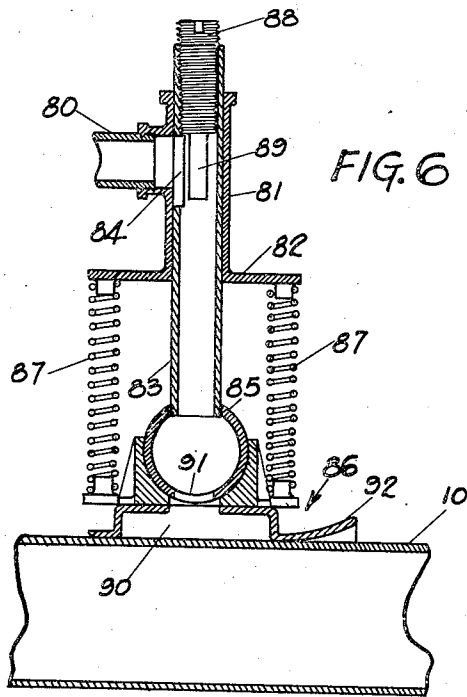


FIG. 6

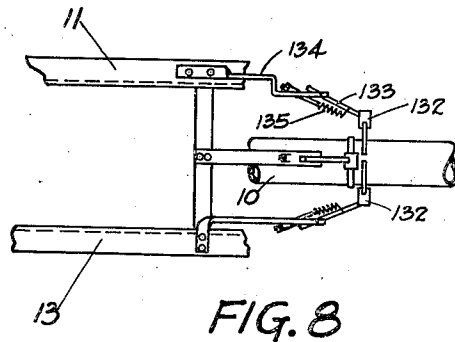


FIG. 8

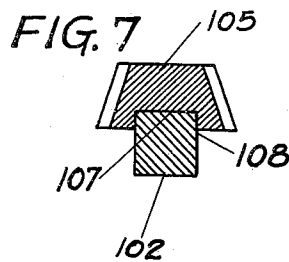


FIG. 7

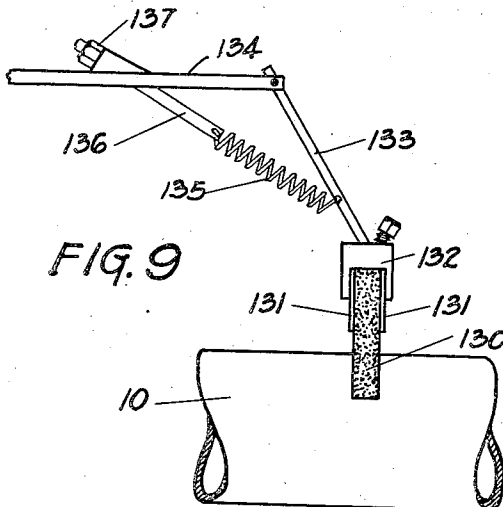


FIG. 9

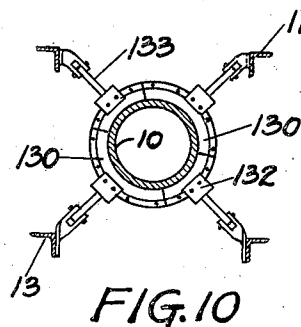


FIG. 10

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UNITED STATES PATENT OFFICE

2,112,825

GREASE TYPE PIPE LINE COATING
MACHINE

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Application July 29, 1936, Serial No. 93,226

17 Claims. (Cl. 91—20)

This invention relates to pipe line coating machines, and has for its principal object the provision of a machine suitable for applying, scrubbing-in and smoothing a cold applied coating material.

A further object of the invention resides in the provision of a traveling type machine separable into two sections to facilitate placing the machine upon a pipe line without disconnecting the pipe.

Another object of the invention is the provision of a machine, adapted to be hung on a pipe and to travel therealong, and having a minimum amount of equipment disposed beneath the pipe.

Still another object of the invention is the provision of a machine adapted to receive a manufacturer's standard drum containing the material to be applied, and to extrude the material from that drum through applicator shoes to the pipe, without the use of heat.

Still another object of the invention resides in the provision of an applicator shoe adapted to apply the coating material to the pipe under pressure, and containing provisions for movement of the shoe with respect to the pipe, so as to clear couplers or patches which may be encountered in the pipe line.

Still another object of the invention is the provision of adjusting means associated with the applicator shoe, and operable to regulate the amount of coating material applied to the pipe therethrough, under varying conditions of temperature.

Still another object of the invention resides in the provision of a scrubbing-in mechanism adapted to thoroughly scrub in the coating material that has been applied to the pipe, to insure that all cavities or other irregularities in the surface of the pipe will be thoroughly filled with the material.

Still another object of the invention is the provision of a wiping device arranged to engage the pipe after the scrubbing-in mechanism, and to smooth out the coating material thereon.

Still further objects of the invention, not specifically mentioned here, will be apparent to those skilled in the art, from the detailed description and claims which follow, reference being had to the accompanying drawings, in which a preferred embodiment of the invention is shown by way of example, and in which:

Fig. 1 is a side elevational view of the machine upon a pipe line;

Fig. 2 is a fragmentary plan view of the machine;

Fig. 3 is a front end view of the machine taken from the end toward which the machine travels on the pipe;

Fig. 4 is a rear end view of the machine, taken substantially along the plane 4—4 of Fig. 1, looking in the direction of the arrows, and showing particularly the details of the scrubbing-in mechanism.

Fig. 5 is a fragmentary cross-sectional view through the machine, along the plane 5—5 of Fig. 1, showing particularly the applicator mechanism;

Fig. 6 is a fragmentary elevational view, in cross-section, showing the details of one of the applicator shoes;

Fig. 7 is a fragmentary cross-sectional view through the ring and ring gear, taken along the line 7—7 of Fig. 4.

Fig. 8 is a fragmentary elevational view of the machine showing particularly the wiping mechanism;

Fig. 9 is a detail elevational view of the wiping mechanism, drawn to an enlarged scale;

Fig. 10 is a fragmentary and elevational view of Fig. 9, showing the wipers in detail.

Coating materials adapted to be applied to a pipe or pipe line to preserve the pipe from oxidation may be classed in two general classes: materials that are reduced to a liquid by an application of heat, and materials which are plastic at ordinary temperatures and are applied as plastic without the addition of heat. For convenience herein the materials are designated as hot applied and cold applied. Machines embodying the present invention are particularly adapted to the application of the second, or cold applied coatings.

Cold applied coating materials are semi-fluid or plastic at ordinary temperatures, being of the consistency of thick cream or soft putty, and must be applied to the pipe under pressure and thoroughly scrubbed in on the pipe so as to insure the complete filling of all pits, crevices, and other irregularities in the outer surface of the pipe. The material never completely dries, but, rather, remains somewhat plastic, as would a grease.

This type of coating material is particularly advantageous for use in coating a pipe that is in a pipe line that is carrying an explosive oil or gas, since no fires are required in the work, and the danger of explosions is minimized. Such an application of the material requires the use of a machine of the so-called "travelling type", that is a machine that is portable and is adapted to be threaded over the pipe line and to travel therealong as the work progresses. The material is

applied to the pipe in the field and oftentimes miles away from a shop or factory, and under conditions which are far from ideal, and, as a result of this condition, the machine must be
5 rugged and simple and not likely to be easily put out of order.

Although the embodiment of the invention herein shown and described by way of example refers to a travelling type of machine, the invention is not limited to a machine of this type. As
10 will be apparent to one skilled in the art, the invention lends itself equally well to a machine of the stationary type wherein the pipe is moved and the machine remains fixed, and we are not to be limited to the disclosure made by way of
15 example.

Manufacturers of coating material of this type pack the material in steel drums of a size sufficient to contain approximately 100 pounds of the material. The machine of the present invention is arranged to use the manufacturer's standard package as a storage tank or container in which the material that is to be applied to the
20 pipe by the machine is stored, pending its application. The drums used are cylindrical drums of metal, preferably steel, having rolled-over beaded ends. Both heads of the drum are removable, being held on the drum by ears which are crimped over the beads. The drum heads are removed
25 just before the drum is placed upon the machine.

The machine provides for applying pressure to the material in the drum to extrude it therefrom through a suitable series of ducts, leading to the shoes, by which the material is applied
35 evenly to the pipe. All of the material contained in the drum is removed therefrom, and the drum may be quickly and conveniently removed from the machine, and replaced by one that is freshly filled. By this arrangement, the waste, occasioned
40 by removing the material from the manufacturer's standard package and placing it in a tank or container on the machine, is entirely eliminated. In the preferred form, the machine is adapted to receive the drum of material in a saddle located
45 above the pipe that is to be coated, rather than below the pipe as has been the practice heretofore. By this arrangement, the clearance required beneath the pipe is minimized, and it is not necessary to raise the pipe line as high above the trench as formerly. This arrangement is
50 distinctly advantageous in a travelling type machine. In a stationary type machine, the heads are removed from both ends of the drum, and the drum may be otherwise located with respect
55 to the pipe, within the teachings of the invention.

Referring now to the drawings in more detail, particularly Figs. 1, 2 and 3, it will be seen that the machine shown by way of example comprises a
60 framework adapted to straddle and surround the pipe 10 that is to be treated. This framework consists of an upper section 11 having downwardly depending legs 12 extending well below the pipe. The lower section 13 of the frame is attached to these legs and extended beneath the
65 pipe. The two sections of the frame thus formed carry the essential parts of the machine, which consist of the material storing device, indicated generally at 14, Fig. 1, the material applying device, indicated generally at 15, Fig. 1, the scrubbing-in device, indicated generally at 16, Fig. 1, and seen in more detail at 16, Fig. 4, the wiping device, indicated generally at 17, Fig. 1, and the propelling device, indicated generally at 18,
70 Fig. 2.

The propelling device consists of front traction
75

wheels 19, Fig. 2, supported upon a cross shaft 20, that is journaled on the section 11 of the frame by suitable journals 21, Fig. 1. A similar set of rear traction wheels 22, Fig. 2, are journaled upon and keyed to a main shaft 23, which is similarly supported upon the framework of the machine. Shaft 20 carries a sprocket wheel 24, and shaft 23 carries a similar sprocket wheel of the same diameter, these wheels being connected together by a chain 25 which insures that the two propelling shafts 20 and 23 will be moved at the same speed.
5 10

Shaft 23 carries a sprocket wheel 26 disposed outside of the frame member 11, and connected by chain 27 to a small sprocket wheel 28 that is located on the outer end of crank shaft 29. This latter shaft is journaled in suitable journals 30 located upon the side rails 11 of the frame. Cranks 31 are keyed to the shaft 29 to turn it as the cranks are operated thereby to drive the machine along the pipe through the chains 25 and 27.
15 20

The traction wheels 19 and 22 are shown as bevel gears composed of metal, preferably steel and having teeth that engage the surface of the pipe to pull the machine therealong. The wheels are keyed upon their respective shafts and are capable of limited adjustment therealong, as will be best seen in Figure 2, to accommodate the machine to pipes of different sizes. If desired the traction wheels may be made of friction material, such as rubberized fabric, and the teeth thereon may be omitted, within the teachings of the invention.
25 30

As will be seen in Figs. 1, 2 and 3, frame members 11 are connected by a cross member 35 which extends above the members 11 and serves as a support for one end of the manufacturer's standard package, or drum, and a second cross member 36, Figs. 1 and 2, which serves as a support for the opposite end of the package.
35 40

A stationary drumhead 37 is fixed upon the cross member 36 and adapted to receive one end of the manufacturer's drum 38. The drumhead 37 consists of a disc-like portion of substantially the same diameter as the outer diameter of the drum 38, and a flange adapted to overlies the outer surface of this drum. This flange contains a radially projecting ear adapted to receive a tie rod 40 which extends to the frame member 35 to fix the drum head 37 with respect thereto.
45 50

Members 35 and 36 are also tied together by rods 41 and 42, which are disposed beneath the drumhead 37 and are connected together by strips or bands 43, which form a saddle for receiving the drum 38.
55

Member 35 serves as a support for a threaded bushing 44 which extends therefrom in the direction of drumhead 37, and upon which a movable drumhead 45 is collared by a threaded retaining ring 46, Fig. 1. Drumhead 45 is provided with ears 47 which are pierced, and through which tie rods 40, 41 and 42 are extended.
60

When it is desired to insert a drum 38 in the machine, retaining ring 46 is turned to draw the drumhead 45 to the right, Fig. 1, away from stationary drum head 37. The drum is then placed upon the saddle members 43 and registered within the stationary drumhead 37, and retaining collar 46 turned in the opposite direction, to force the movable drumhead 45 against the free end of the container. The inner surface of drumhead 45 is shouldered and equipped with a gasket 48 which fits between the shoulder
65 70 75

and the end of the drum 38 to form a pressure tight connection therebetween.

Cross member 36 also serves as a support for a gear box 50, which contains a worm 51 mounted upon the crank shaft 29 and a gear nut 52 through which is threaded a pressure screw 53. Screw 53 extends through the stationary drum-head 37 and is adapted to be moved longitudinally along the axis of drum 38 as the cranks are rotated.

A pressure plunger 59 is removably fitted upon the end of screw 53 and shaped to conform to the inside cylindrical surface of the drum. A flexible gasket 60 is fixed to the plunger 59 and adapted to lie between the outer periphery of the plunger and inner wall surface of the drum, and to form a pressure tight joint therebetween. Gasket 60 may be composed of leather, rubberized fabric or other suitable material that will not contaminate the coating material with which it comes in contact. As the cranks 31 are rotated to drive the machine forwardly along the pipe line 10, plunger 59 is driven to the right, Fig. 1, into the drum 38, thereby to extrude the material contained in that drum through the movable drum head 45, and into the nipple 44. When the drum is emptied, cranks 31 are turned a few turns in an opposite direction, to free the plunger 59 from screw 53, after which the shaft is rotated by hand wheel 61 to withdraw it from container 38 into stationary drumhead 37, thereby to permit removal of the drum from the machine as explained above. The plunger 59 is removed from the empty drum and refixed upon the screw 53, and then backed into stationary drum head 37 to set the machine for receiving a freshly filled drum of material.

In order to apply the material thus extruded from the drum 38 to the pipe, there is provided a cross duct 70 with which bushing 44 communicates. The duct 70 is T-shaped and has two branches which extend to the right and left sides of the machine, respectively, as will be seen in Figs. 2, 4 and 5. The frame members 11 carry two feeder headers 71 and 72, Fig. 5 with which the duct 70 communicates, and framework 13 carries similar headers 73 and 74. A pipe 75 connects headers 71 and 73 on the one side of the machine, this pipe being provided with a quick detachable coupling 76 to permit disconnecting the two headers when the frame member 13 is removed from the frame member 11 to permit threading the machine over the pipe. Similarly a pipe 77 connects said headers 72 and 74 and is provided with a coupling 78 to facilitate disconnecting that side of the duct system. Each of the headers 71 to 74, inclusive, is equipped with an outlet pipe 80, Fig. 6, upon which is threaded a T-shaped bushing 81 which has projecting arms 82 located at one end thereof. A feed pipe 83 is telescoped into bushing 81 and is provided with a slot 84 disposed within the bushing to provide a passageway from the feeder header into the pipe.

At the lower end of the pipe 83 is a cylindrical swivel drum 85 that is disposed with its longitudinal axis transverse of the axis of the pipe 10. An applicator shoe, indicated generally at 86, is fitted upon this drum, the fitting forming a swivel connection which permits limited rotation of the shoe around the axis of the drum. Springs 87 are extended between the arms 82 on the nipple 81 and the shoe 86, and are tensioned to force the shoe away from bushing 81 so as

to maintain it in connection with the pipe 10 under pressure.

The opposite end of the said pipe 83 is provided with a threaded plug 88 which is collared at its lower end 89, adjacent the slot 84. The portion 89 of the plug serves to partially obstruct the slot 84 so as to regulate the quantity of material that may be caused to flow through the said pipe 83 under a particular condition of pressure.

The applicator shoe indicated generally at 86, Fig. 6, comprises an arcuate shaped casting which has an internal cavity 90 that extends a part way around the pipe, and communicates with the drum 85 which is slotted at 91 to complete a passageway for the coating material. The leading end of the shoe 86 is upturned slightly, as shown at 92, so as to permit the shoe to be raised by rotating it around the axis of drum 85 against the tension of the springs 87, when the shoe encounters a coupler or patch upon the pipe. Preferably the shoe is composed of cast iron or steel, and is of sufficient length circumferentially of the pipe to embrace an arc of slightly more than 90° on the pipe. Thus, with four such shoes engaging the pipe, there will be sufficient overlap to insure that the entire surface of the pipe will receive a coating of the material.

Springs 87 and the telescopic connection between the said pipe 83 and the bushing 81 permit considerable movement of the shoe radially of the pipe 10, so that the shoe will not catch on patches or couplings which are of greater diameter than the diameter of the pipe. Furthermore, this arrangement permits the one machine to be adapted to coating pipe of several outside diameters, the shoe being backed away from the center of the pipe against the tension of springs 87 for the larger sized pipes.

From the foregoing it will be apparent that a rotation of the cranks 31 will cause the machine to extrude the coating material from the drum in which it is contained and to apply it to the pipe, and will also cause the machine to travel along the pipe. The coating material thus applied on the pipe is smooth and of substantially uniform thickness. However, if the pipe is pitted or otherwise irregular in its outer surface, or if it is coated with a foreign substance such as dew, particles of rust or dust, the coating will not prevent rusting of the pipe to the full extent to which the material is capable. To be fully effective the coating material must be in intimate contact with the surface of the pipe both on the surfaces and in the bottom of the pits, and all foreign substances must be removed from the line of contact of the material and pipe.

The coating material can be brought into this intimate contact with the pipe surface by a scrubbing-in operation, which will work the foreign material into the coating material and away from the line of contact with the pipe. The presence of the foreign material in the coating material is not serious since there is an ample supply of coating material on the pipe, and the amount of foreign material is small. The scrubbing-in operation definitely brings the coating material into intimate contact with the areas in the pits, so that the material will be effective to prevent an enlargement of those pits.

To this end, as will be seen in Fig. 1, the applicator system hereinbefore described, is followed immediately by a scrubbing-in mechanism, best seen in Fig. 4. This comprises a stationary sup-

porting ring consisting of an upper section 100 fixed by suitable brackets 101 to the upper section 11 of the frame, and a lower ring section 102 fixed by suitable brackets 103 to the lower portion 13 of the frame. The two sections of the ring are coupled together in any suitable manner, such as by bolts 104. The mounting ring thus formed serves as a support for a ring gear 105, which is made in two sections and bolted together, as shown at 106. The ring gear 105 is provided with a central groove 107, Fig. 7, into which is fitted the outer portion 108 of the ring 102 to prevent movement of the ring gear at right angles to the plane of the ring, and to permit rotation of the ring gear around the ring.

The ring sections 100 and 102 serve as a mounting for a plurality of bushings 110 located on the front side of the ring, Fig. 4, and a similar plurality of bushings 111 located on the back side of the ring, Fig. 4. Bushings 110 are uniformly spaced around the ring, as also are bushings 111, the latter being spaced midway between adjacent ones of the bushings 110 so as to effect a uniform spacing of the bushings around the ring and pipe 10.

Each bushing serves as a journal for a shaft 112, upon the inner end of which is mounted a brush holder 113. A spring 114 surrounds the shaft and abuts against the brush holder 113, and an adjusting nut 115 that is threaded upon the inner end of the bushing. A pinion gear 116, preferably a bevel gear, as shown in Fig. 4, is keyed upon the shaft 112, and meshed with the teeth of ring gear 105. A bracket 117 is fixed upon the bushing and extended around the pinion 116 and shaft 112, and serves to hold the pinion upon the shaft. Thus it will be seen that the shaft may be moved longitudinally of its own axis against the tension of spring 114.

Each brush holder is equipped with a suitable brush, having bristles 120 that engage the pipe 10 under the tension of spring 114. As shown in the drawings, the brush units are equipped with oval-shaped backs 121 which are held in the holders 113 by stud screws 122.

The brushes employed in this machine may be varied within the teachings of the invention. However, we have found that a brush unit consisting of a wooden back and steel bristles is quite satisfactory for the purpose intended.

As will be seen in Figs. 1 and 2, shaft 23 is equipped with a sprocket wheel 125, around which is threaded a chain 126 that extends to a smaller sprocket wheel 127 mounted upon a shaft 128 that is journaled in a suitable bracket 129 upon the frame member 11. A pinion gear 128' is keyed to shaft 128 and engaged with the teeth of ring gear 105. As a result, as shaft 23 is rotated by an operation of crank 31, as hereinbefore explained, pinion 130 will be rotated and the ring gear 105 turned about its axis, which substantially coincides with the axis of the pipe 10. Brushes supported upon shafts journaled in bushings 110 will be rotated in one direction, and brushes supported upon shafts journaled in bushings 111 will be rotated in an opposite direction. As will be seen in Fig. 4, there is considerable overlap between the brushes so that all of the area of the outside surface of the pipe will be scrubbed by the rotation of the brushes. As shown in the preferred embodiment of the invention, the individual brushes 120 are driven at such a speed with respect to the travel of the machine along the pipe 10, that they make several revolutions while moving along the pipe a

distance equal to the longitudinal axis of the brush head 121. By this arrangement, each set of bristles describe a helical path along the pipe, and each individual section of the pipe engaged by those bristles is traversed thereby several times, and in opposite directions. The unit thus formed thoroughly scrubs in the material that has been applied on the pipe by the shoes 86.

As a result of this scrubbing action, the coating of material on the pipe is apt to be rough and irregular, and it is desirable that this coating be smoothed out to finish the operation of the machine. To this end there is provided a wiping mechanism best seen in Figs. 1, 8, 9 and 10, which consists of four spring mounted wipers, each arcuate in shape and embracing an arc of more than 90° on the pipe. As the wipers are pulled along the pipe by the forward movement of the machine therealong, the entire outer surface of the pipe is wiped over and the coating material thereon smoothed out.

To this end, in the preferred embodiment of the invention, as shown in Figs. 8, 9 and 10, each of the four wipers consists of a soft, flexible wiping member 130, which is arcuate in shape, the inner edge being formed on a radius substantially equal to the radius of the pipe 10. Metallic plates 131 overlie the outer edge of the wiper 130 and are affixed together in a suitable manner, as by bolts or rivets, to securely clamp the member 130. We have found that the wiper may be conveniently formed of sponge rubber, which is soft and resilient enough to prevent scratching the coating material from the pipe, and at the same time, stiff enough to thoroughly smooth out the material thereon.

A mounting bracket 132, located on the median line of the wiper and clamping plates 131, serves as a journal for a pivot pin by which the wiper assembly is attached to the free end of a supporting arm 133. The upper end of this arm is journaled in a bracket member 134 which is fixed upon the frame of the machine. A spring 135 is fixed to the supporting arm 133, near the free end thereof, and the opposite end of the spring is fixed to a bolt 136 that extends through the bracket member 134 and is equipped with an adjusting nut 137, by an operation of which the tension of spring 135 may be regulated.

In the preferred embodiment of the machine shown in the drawings, the four wipers, each of which is identical with the one just described by way of illustration, are mounted on opposite ends of the diagonal diameters of the pipe 10, that is, they are located at positions 45° above and below the horizontal diameter of the pipe. This particular arrangement is chosen because of convenience since it lends itself well to mounting two of the wiper units upon the upper section of the frame, and two upon the lower section of the frame, so that when the frame is separated to thread the machine over the pipe line, the wiper assemblies will be separated without additional operations. Fig. 8 is somewhat diagrammatic in that it shows the wipers located upon vertical and horizontal diameters through the pipe 10, this particular arrangement being chosen to simplify the drawings and thereby more clearly show the details of the invention.

The machine, best seen in Figs. 1 and 2, is obviously top-heavy for the reason that the majority of the instrumentalities of the machine and a majority of the weight of the machine is located above the axis of the pipe. In Fig. 1 we have indicated counter-weights 140 which may be affixed

to the lower frame member 13. These counter-weights are preferably sufficiently heavy to more than counterbalance the weight of the machine, thereby to lower the center of gravity of the machine to or below the axis of the pipe. In certain instances, especially on smaller sized pipe, the addition of the weight of counter-weights 140 may be objectionable for the reason that the machine then becomes too heavy to be supported by the pipe. In such cases a well known "walking wheel" may be affixed to the machine to steady it on the pipe. As is well understood by those skilled in the art, the "walking" wheel consists of a shaft that is fixed at one end to the frame of the machine and carries a wheel at the opposite end which engages the ground to steady the machine on the pipe. The "walking wheel" has been omitted from the drawings, to avoid an unnecessary complication thereof and since it is well known to those skilled in the art and is not an essential part of the present invention.

From the foregoing it will be apparent that we have provided a pipe coating machine of the traveling type which is possessed of many advantages over the machines of the prior art. The material to be applied is not removed from the drums or containers in which it is placed by the manufacturer until it is started in its movement to the pipe. The material is extruded from these drums under pressure and applied to the pipe under pressure. The amount of material applied to the pipe may be regulated. The container or drum, when emptied, can be readily removed from the machine and replaced by a filled container. No material is wasted.

The material thus applied to the pipe is thoroughly scrubbed into the pipe so as to completely fill any pits, crevices, or other irregularities that may occur in the outer surface of the pipe. The scrubbing unit consists of brushes which are quickly detachable from the machine to permit replacement when the bristles become worn to such an extent as to render further use of the brush unsatisfactory.

The material applied to the pipe is smoothed out after the scrubbing-in operation so that the completed work done by the machine leaves the pipe with a smooth coat of material, a coat which is substantially uniform in thickness.

The machine is of light weight so that it may be used on pipes of relatively small diameter without danger of injury to those pipes. There is very little of the machine beneath the pipe, and as a consequence it is not necessary to elevate the pipe to a considerable height above the trench to permit operation of the machine.

A further advantage of the machine resides in its simple, durable construction, and the arrangement whereby the machine may be separated into two units, an upper and a lower unit, each complete in itself. None of the driving chains or other mechanisms of the machine must be completely dis-assembled in order to permit placing the machine upon or removing it from a pipe line.

It will be apparent to one skilled in the art that the invention described is not limited to a machine of the travelling type and that it may be modified readily to form a stationary type machine. Such modification is contemplated to adapt the invention to further use. Throughout the description the object upon which the coating material is placed has been designated as a pipe or pipeline. This designation has been for convenience only as rods and other elongated objects of substantially regular contour may be coated

equally well with the machine shown, and by simple modification well within the province of one skilled in the art, the machine may be used to coat objects of irregular contour.

While we have chosen to show our invention by illustrating and describing a preferred embodiment of it, we have done so by way of example only, as we are aware of many modifications and adaptations which can be made by one skilled in the art within the teachings of the invention.

What we consider new and desire to have protected by Letters Patent is pointed out in the appended claims.

What is claimed is:

1. A machine for applying a cold applied coating material to a cylindrical member comprising a frame work, means for fixing the relative positions of the member and frame work, means for placing the material onto the member under pressure, means rotatable on axes radial of the member for scrubbing in the material on the member, and means for smoothing said material after said scrubbing operation.

2. A machine for removing a coating material from a manufacturer's drum and applying the same to a pipe comprising a frame, means for holding the drum on the frame, means for forcing the material out of the drum and on to the pipe under pressure, means rotatable on axes radial of the pipe for scrubbing in the material on the pipe, and means for smoothing said material after said scrubbing operation.

3. A machine for applying a coating material to a pipe line comprising traction means for supporting the machine on the pipe line and for moving the same therealong, means for applying the material to the pipe under pressure, means rotatable on axes radial of the pipe for scrubbing in the material on the pipe, and means for smoothing said material after said scrubbing operation.

4. A machine for applying and scrubbing in a coating material on a pipe line comprising means for supporting the machine on the pipeline and for moving the same therealong, applicator shoes engaging the pipe to apply material thereto, means for supplying coating material under pressure to said shoes to coat the pipe, scrubbing means rotatable on axes radial of the pipe for scrubbing in said material on said pipe, and wiping means engaging said pipe to smooth out said material thereon after said scrubbing in operation.

5. A machine for applying and scrubbing in a coating material on a pipe line comprising, a framework, traction wheels engaging the pipe to support the frame thereon, means for rotating the traction wheels to move the machine along the pipe, application shoes engaging the pipe to apply the material thereto, a removable tank for containing the material to be applied, means connecting said tank to said shoes, means for forcing said material from said tank through said connecting means and shoes to the pipe, a plurality of brushes engaging said pipe, means for rotating said brushes about axes disposed radially of the pipe to scrub in said material on said pipe, and wiping means mounted on said frame and engaging said pipe to smooth out said material after said scrub-in operation.

6. The combination with a framework built in an upper and lower section adapted to be taken apart, to permit the frame to be placed over a pipe line, and traction means for supporting and moving said frame on said pipe line, of drum

heads mounted upon the upper section of said frame and adapted to receive a manufacturer's standard drum containing pipe coating material, applicator shoes for applying the material to the pipe, means connecting one of said drumheads to said shoes, means extending through the other one of said drumheads for forcing the material from said drum through said connecting means and shoes to said pipe, and scrubbing means mounted on said frame and adapted to rotate about axes radial to the pipe to scrub in said material on said pipe.

7. The combination with a framework built in an upper and a lower section adapted to be taken apart, to permit the frame to be placed over a pipe line, and traction means for supporting and moving said frame on said pipe line, of drumheads mounted upon the upper section of said frame and adapted to receive a manufacturer's standard drum containing pipe coating material, applicator shoes for applying the material to the pipe, means connecting one of said drumheads to said shoes, means extending through the other one of said drumheads for forcing the material from said drum through said connecting means and shoes to said pipe, scrubbing means mounted on said frame and including means rotatable around axes extending radially of the pipe and adapted to scrub in said material on said pipe, and wiping means mounted upon said frame and engaging said pipe to smooth out said material after said scrubbing has been completed.

8. Means for scrubbing in a coating material on the surface of a pipe comprising, a plurality of brushes, means for supporting said brushes in substantially uniformly spaced relation around said pipe, and means for rotating the brushes around axes extending radially of the pipe.

9. Means for scrubbing in a coating material on the surface of cylindrical member comprising, a supporting ring disposed concentrically of said member, brush spindles journaled on said ring and disposed radially of said member, brush means fixed on said spindles, and means for rotating said spindles and brushes.

10. A mechanism for scrubbing in a coating material on a pipe comprising, a plurality of spindles, means for supporting said spindles half in one row and half in a second row around said pipe, a brush mounted on each spindle, and means for turning said spindles half in one and half in the opposite direction.

11. The combination with a pipe line coating machine having a frame separable into two sections to facilitate placing the machine on a pipe line, of scrubbing means comprising a stationary ring composed of two sections, means for supporting each of said sections on a corresponding part of said frame, a ring gear journaled upon said ring and rotatable therearound, a plurality of brush sets each comprising, a journal boss fixed upon said ring, a spindle journaled on said boss, a brush holder fixed on said spindle, a brush clamped in said holder, a spring engaging the boss and holder and tensioned to move the holder away from the boss, and a gear keyed to the spindle and meshed with said ring gear, and means on said frame for rotating said ring gear thereby to rotate said brushes.

12. The combination with a pipe line coating machine having a frame separable into an upper and lower section to facilitate placing the machine on a pipe line, of scrubbing means comprising a stationary ring separable into an upper section and a lower section, means for mounting said

ring sections upon the corresponding frame sections, a ring gear mounted upon said ring for rotation therearound and separable into an upper and a lower section, journal means fixed upon said ring and adapted to support brush spindles radially of the ring in planes parallel to the plane of the ring, a plurality of brushes, a spindle fixed to each brush and journaled in one of said journals, a gear fixed upon each one of said spindles and meshed with said ring gear, and means on said frame for rotating said ring gear thereby to rotate said spindles and brushes.

13. The combination with a pipe line coating machine having a frame separable into two sections to facilitate placing the machine on a pipe line, of scrubbing means comprising a stationary ring separable into two sections, means for supporting said ring sections on respective frame sections substantially concentrically of the pipe line, a ring gear separable into two sections and journaled upon said ring for rotation therearound, a plurality of journal bosses fixed on one side of said ring and uniformly spread thereon, a like plurality of journal bosses fixed on the other side of said ring and spread midway between adjacent ones of said first journal bosses, a plurality of brushes corresponding in number to said bosses, a spindle fixed to each brush and extending through one of said journal bosses, spring means surrounding each one of said spindles and engaging the boss and brush to tension the brush inwardly of the ring, a gear fixed on each spindle and meshed with said ring gear, and means on said frame for rotating said ring gear thereby to rotate said brushes.

14. Means for applying a coating material to a cylindrical member comprising a shoe adapted to engage the member and shaped to conform thereto, said shoe having ducts for conducting the material to the member, spring means for pressing the shoe against the member, means for forcing the material to and through the shoe, and means individual to said shoe for regulating the quantity of material delivered to the shoe.

15. Means for applying a coating material to a pipe comprising a hollow shoe shaped to embrace a portion of the pipe, swivelled mounting means for said shoe arranged to permit limited rotation of the shoe about an axis normal to the axis of the pipe, said mounting means including a pipe through which the material is forced to the shoe, and means including a plug in said pipe for regulating the amount of material delivered to the shoe.

16. Applicator means for applying a coating material to a pipe comprising, a plurality of feed headers disposed around the pipe, a bushing leading out of each header and disposed with its axis radial of the pipe, a feed pipe telescoped into each bushing, there being an opening in the pipe within the bushing communicating with the header, a shoe fixed upon the free end of the pipe, spring means extending between said shoe and bushing for maintaining the shoe against the pipe under pressure, and means for forcing the material through the header, bushing pipe and shoe to the pipe.

17. Means for applying a coating material to a pipe comprising, a hollow shoe of arcuate section adapted to engage the pipe, a hollow cylindrical swivel drum disposed with its axis at right angles to the pipe, means connecting the shoe to said swivel drum, said means permitting limited rotation of the shoe about the axis of the swivel drum, there being an opening in the swivel

5 drum communicating with the hollow portion of the shoe, a pipe leading from said swivel drum, a supporting bushing into which said pipe fits for sliding movement longitudinally, a pressure header upon which said bushing is supported, said pipe being slotted within said bushing to provide a passage way from the header through the bushing, pipe and drum to the shoe, through which

coating material may be forced, a plug threaded into said pipe and extending across the slot therein to regulate the quantity of material allowed to pass through the shoe, and springs engaging said bushing and shoe and tensioned to maintain the shoe parallel to the axis of the pipe.

EARL M. CONVERSE.

ALEXANDER J. DUAEL.