This invention relates to certain new and useful improvements in pipe-coating apparatus of the type designed for applying a protective coating or lining to the inner walls of steel pipe lines.  

One of its objects is the provision of a reliable and efficient apparatus of this character which is designed to travel through the pipe line and as it does so automatically applies an even and durable coating of plastic material onto the pipe wall by centrifugal force and at the same time trowels the coating so applied.

Another object of the invention is to provide a conveying means for the material which is so designed and constructed as to effectually and automatically release the head pressure on the material when it reaches a predetermined point to thereby provide for a constant and uniform feed of the material to the discharge end of the apparatus.

Another object of the invention is the provision of simple and effective means for troweling the material after it has been deposited on the pipe wall and to so mount the troweling means that it is self-aligning and self-adjustable to the surface of the applied coating material.

A still further object is to provide means for readily gagging at a glance the approximate thickness of the coating material as it is applied to the pipe wall.

Other features of the invention reside in the construction and arrangement of parts hereinbefore described and particularly pointed out in the appended claims.

In the accompanying drawings:

Figure 1 is a side elevation of my improved coating apparatus, the same being shown within a pipe line for treating the interior wall thereof with a protective coating.  

Figure 2 is a rear view of the apparatus arranged within the pipe.  

Figure 3 is a front end view of the same likewise arranged within the pipe.  

Figure 4 is an end view, partly in section, of the means for supporting the trowel.  

Figure 5 is a top plan view of the feed hopper and the conveyor screw.  

Figure 6 is a longitudinal section taken in the plane of line 6-6, Figure 5.  

Figure 7 is a cross section taken in the plane of line 7-7, Figure 5.

Similar characters of reference indicate corresponding parts throughout the several views.

While my apparatus may be employed for coating different kinds of work, it has been primarily designed for treating the inner walls of steel pipe lines with a protective coating, such for example as a plastic-like material as concrete.

To this end the apparatus consists generally of a carriage which is adapted to be propelled through the pipe line and which carries the working parts of the coating apparatus, such working parts comprising essentially a hopper for the coating material having a conduit or cylindrical feed chamber connected therewith; means for conveying the material from the hopper and through the conduit; a dispensing or discharge head into which the material is delivered from the conduit and from which it is discharged by centrifugal force onto the pipe wall; means for troweling the material after it has been applied to the pipe wall; and indicating means for gaging the thickness of the coating as it is applied to the pipe wall.

Referring now to the drawings, 16 indicates a section of the steel pipe line through which my apparatus is designed to travel for coating the inner wall thereof with a plastic coating of concrete or like semi-solid material.  

The carriage of the apparatus, which carries its working parts, may be of any appropriate construction, that shown in the drawings, by way of example, consisting of a structural steel frame 11 provided at one end with a hopper or feed hopper or container 12 for the coating material, and communicating with this hopper is a feed conduit or chamber 13 which is disposed lengthwise and centrally of the machine and approximately axially of the pipe.  

Extending through this hopper and its communicating conduit is a tubular shaft 14 having a screw-conveyor 22 applied thereto which forces the material through the feed conduit or chamber 13.  

This screw conveyor shaft may be driven from the electric motor 14 by suitable speed-reducing gearing 23.  

At its discharge end the feed conduit has a revolving dispensing head 24 which directs the material by centrifugal force onto the pipe wall.  

In order to deliver the material to the discharge head, it is conveyed through a hopper and a conduit which is partially shown in Figure 1 and further described hereinbelow.

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pens the head at a constant and uniform rate, that portion of the feed screw 22 disposed within the hopper 18 is so designed and constructed as to intermittently release the feed pressure on the material when it reaches a predetermined point.

To this end, the hopper-engaging portion of the conveyor screw is composed of approximately spiral-shaped flexible portions or blades 20 which are so arranged that as this arm 22 radially moves from the shaft 21, while their opposite ends are in contact, permit the blades to flex in a direction axially of the shaft and thereby release the pressure imparted to the material by the screw. These flexible blades together form a disconnected screw-section and while they normally effect the proper feed of the material from the hopper to the conduit 28, they effectively prevent any over-head pressure being imparted to the material, with the result that the material is delivered at a constant rate to the dispensing head 24. The bottom wall 28 of the hopper 18 preferably extends upwardly to meet the bottom of the conduit 28, as shown in Figure 6, and extending from the top side of the inlet end of said conduit in opposing relation to said bottom, a post 29 is provided at the end of said hopper which is oppositely inclined conduit 28. By this construction, the material in the hopper is properly directed to the conduit 28.

The troweling mechanism for smoothing down the coating material after it has been applied to the pipe wall preferably consists of a plurality of retractable trowels 34 which are so mounted as to revolve at a comparatively slow speed over the coated wall and to be automatically self-aligned to said surface. Each of these trowels is connected to a vertically-swinging lever 25 pivoted to a revolving arm 32 and free to turn about its longitudinal axis in a swivel fitting 33 pivoted to said arm, the swivel fitting and block forming a fulcrum about which the trowel-lever swings. For the purpose of adjusting the trowel-carrying levers to accommodate pipes of varying diameters, the arms 32 may be provided with a series of openings 34 for receiving the corresponding pivot blocks 33 of said levers. Each trowel carrier 25 is connected by a lever 31 in a direction to bring its trowel 30 into yielding engagement with the pipe wall by a spring 35 whose free end is coupled with the opposing end of the trowel-carrying lever by a swivel fitting 36. An adjustment may be employed for shifting the trowels into and out of engagement with the pipe wall. For example, the trowel-carrying lever may be connected by a link 37 with the arm 32 of a rock member 38 which is actuated in one direction or the other by a conical drum 40 to accordingly shift the trowel-carrying lever toward and from the pipe wall. The link 37 is likewise connected by a swivel fitting 41 to the trowel-carrying lever 31. The specific means for actuating the conical drum forms no part of the present invention and a detailed description thereof is therefore not deemed necessary.

By mounting the trowel-levers 31 in this manner, they are free to adjust themselves to the surface of the pipe coating and are adapted to swivel in their supporting fittings 33 without interfering with the spring and link connections 30 and 37, respectively.

For the purpose of gauging the thickness of the material being applied to the pipe wall, I provide a suitable indicator which is preferably in the form of an adjustable bar 42 pivoted at 43 to the revolving trowel-carrying arm 32 or like part and so disposed as to have its free end in cooperative relation with a part borne by said arm, such for example as one of the trowel-carrying levers 31, as shown in Figure 4. The pivot 43 is of a characteristic, say, to hold the indicator bar in an adjusted set position. To means for gauging this thickness gage, the operator sets the indicator bar 42 in abutting engagement with the adjoining portion of the trowel-carrying lever 31. This indicator bar 42 is then being made before the material is applied to the pipe wall. As the pipe wall 20 is applied to the pipe wall and the trowels 30 smoothly down the material, the latter are gradually shifted away from the pipe wall in accordance with the thickness of the coating material applied thereto, whereby a resulting space or gap will result between the indicator bar and the adjoining trowel-carrying lever, such space indicating or corresponding to the thickness of the material applied to the pipe wall.

Disposed rearwardly of the trowels to revolve about the same axis is a spray gun 44 for delivering a curing fluid onto the coated pipe-wall. I claim as my invention:—

1. An apparatus of the character described, a trowel-carrying lever 31 having a vertically-mounted lever 25 pivoted to said member to swing substantially in the plane thereof, a trowel applied to said lever, and means connected to said lever to swing the same and its trowel radially inward and outward, said means including swivel connections to said lever.

2. The combination with a pipe-coating machine having means for applying a lining to the pipe-wall, of a means engageable with the lining after it is applied, and an indicator disposed in cooperative relation to said lining-engaging means for gaging the thickness of the lining applied to the pipe-wall.

3. The combination with a pipe-coating machine having means for applying a lining to the pipe-wall, of a means engageable with the lining after it is applied, and an adjustable indicator member disposed in cooperative relation to said lining-engaging means for gaging the thickness of the lining applied to the pipe-wall, whereby, after the lining is applied, the distance between said means and the indicator member represent the thickness of the coating applied to the pipe-wall.

4. In a pipe-coating apparatus of the character described, a rotateable member, a trowel-bearing lever pivoted to said member to swing in a direction to bring the trowel toward and from the pipe-wall, and an indicator mounted on said member in cooperative relation to said lever for gaging the thickness of the coating applied to the pipe-wall.

5. In a pipe-coating apparatus of the character described, rotateable member, a trowel-bearing lever pivoted to said member to swing in a direction to bring the trowel toward and from the pipe-wall, and an adjustable indicator fulcrumed at one end to said rotateable member and cooperating at its opposite end with said trowel-bearing lever to gage the thickness of the coating applied to the pipe-wall.

6. An apparatus of the character described, comprising a hopper terminating at its discharge end in a feed to the pipe, the said hopper and extending through its feed conduit, that portion of the feed screw located in the hopper including disconnected spiral blade-sections flexible axially of the screw to
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lease the pressure on the material and the re-
mainin portion of the screw being continuous
to provide for a constant and uniform feed of
the material through the feed conduit.

7. An apparatus of the character described,
comprising a hopper having a straight portion
and a conical portion terminating at its dis-
charge end in a conduit, and a feed screw ar-
anged in said hopper and extending through
its feed conduit, that part of the feed screw lo-
cated in the straight portion of the hopper being
composed of disconnected spiral blade sections
flexible in the direction of the screw axis, and
the remaining portion of the screw being con-

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9. A troweling device for use in the coating

treatment of pipe-walls and the like, a revolv-
ing support, a trowel applied thereto and hav-
ing a smooth working face, and means for uni-
versally mounting said trowel on said support
to render it self-adjustable and self-alining to
the feed conduit.

10. A troweling device for use in the coating
treatment of pipe-walls and the like, comprising
a revolving arm having a retractable trowel ap-
plied thereto for smoothing down the material
after it has been applied to the pipe-wall, a

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trowel for delivering a curing fluid onto the coat-
ed pipe-wall, said material-delivering means, said
trowel, and said fluid-delivering means being all
revolvable about a common axis coincident with
the feed conduit.

3.trowel for delivering a curing fluid onto the coat-
ed pipe-wall, said material-delivering means, said
trowel, and said fluid-delivering means being all
revolvable about a common axis coincident with

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The printed specification of the above
numbered patent requiring correction as fol-
lores: Page 3, second column, line 12, claim 9,
for the words "feed conduit" read pipe wall; and
that the said Letters Patent should be read with this correction therein

that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 16th day of November, A. D. 1937.

Henry Van Arsdale,
Acting Commissioner of Patents.
lease the pressure on the material and the remaining portion of the screw being continuous to provide for a constant and uniform feed of the material through the feed conduit.

7. An apparatus of the character described, comprising a hopper having a straight portion and a conical portion terminating at its discharge end in a conduit, and a feed screw arranged in said hopper and extending through its feed conduit, that part of the feed screw located in the straight portion of the hopper being composed of disconnected spiral blade sections flexible in the direction of the screw axis, and the remaining portion of the screw being continuous.

8. An apparatus for coating pipe walls and the like, comprising a feed conduit adapted for communication with a source of coating material, means disposed at the discharge end of said conduit for delivering the material onto the pipe-wall, a revolving trowel disposed rearwardly of said material-delivering means for smoothing down the material after it has been applied to the pipe-wall, said trowel being self-adjustable and self-alining to the pipe wall, and means disposed rearwardly beyond and revolvable with said trowel for delivering a curing fluid onto the coated pipe-wall, said mutual-delivering means, said trowel, and said fluid-delivering means being all revolvable about a common axis coincident with the feed conduit.

9. A troweling device for use in the coating treatment of pipe-walls and the like, a revolving support, a trowel applied thereto and having a smooth working face, and means for universally mounting said trowel on said support to render it self-adjustable and self-alining to the feed conduit.

10. A troweling device for use in the coating treatment of pipe-walls and the like, comprising a revolving arm having a retractable trowel applied thereto for smoothing down the material after it has been applied to the pipe-wall, a trowel-carrying lever pivoted to said arm to bring the trowel toward and from the pipe-wall, an actuating member for shifting said trowel-carrying lever to a retracted position, a spring for urging said lever in the opposite direction, and swivel connections between the lever and the adjoining connecting ends of said actuating member and said spring, whereby the trowel is rendered self-alining to the pipe-wall.

ALBERT G. PERKINS.

CERTIFICATE OF CORRECTION.


ALBERT G. PERKINS.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, second column, line 12, claim 9, for the words "feed conduit" read pipe wall; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

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