Nov. 7, 1933. J. E. ANDERSON 1,933,543

APPARATUS FOR APPLYING CEMENTITIOUS MATERIAL

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Fig. 1.

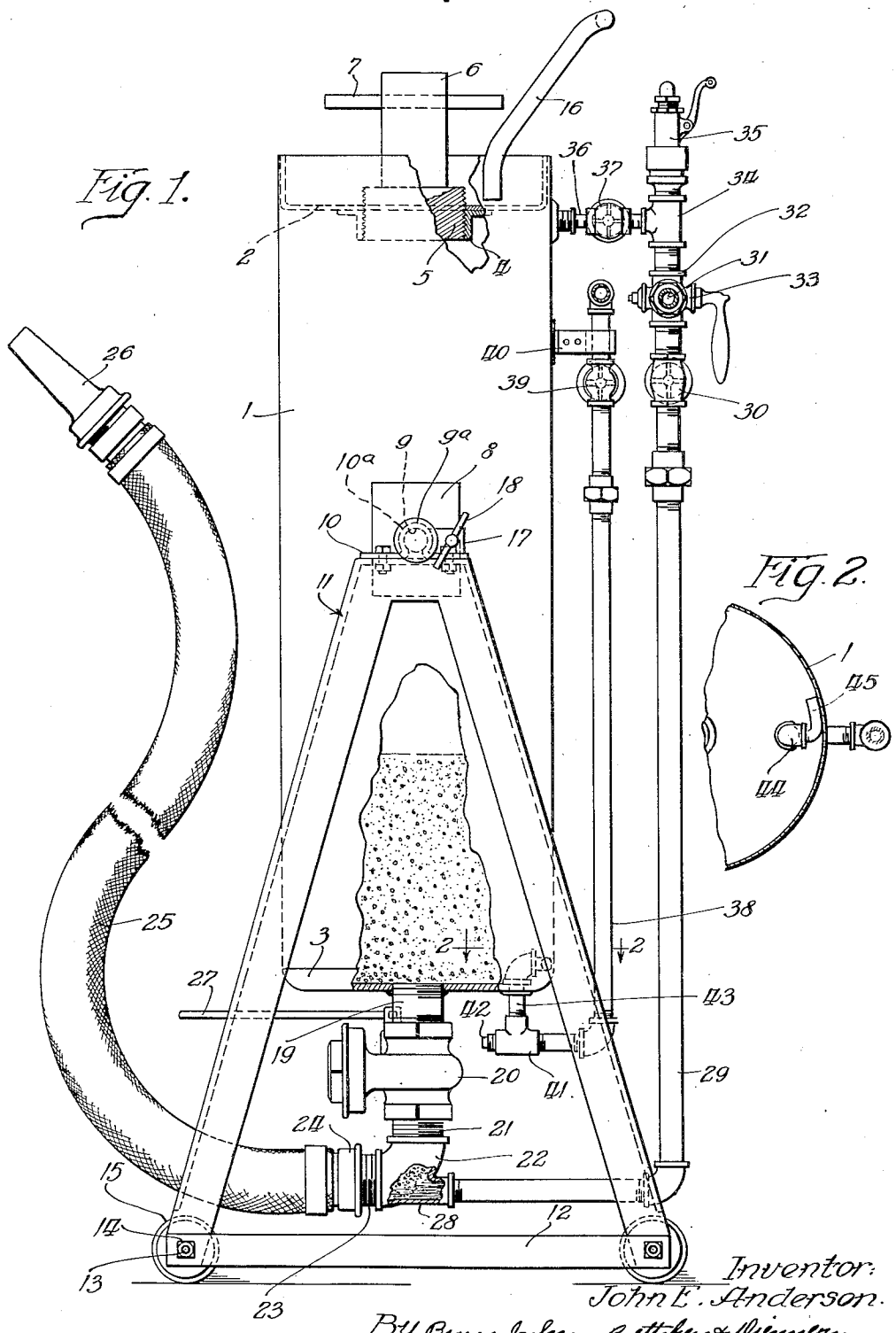


Fig. 2.

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APPARATUS FOR APPLYING CEMENTITIOUS MATERIAL

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2 Claims. (Cl. 91—45)

This invention relates to apparatuses for applying cementitious materials, and more particularly to an apparatus specially adapted for handling comparatively heavy or thick material.

The apparatus of my invention is particularly adapted for applying a refractory material known commercially as "Plibrico". This material contains clay and silica and is a ganister-like material which cannot be handled to advantage in spray guns of known construction.

In applying this material, it is necessary that it be in the form of a comparatively heavy or thick sludge or mud which is much thicker than the creamy-like mixtures ordinarily used in spray guns. Because of the nature of the material referred to, and the necessity of having the mixture comparatively thick, it is advantageous to have a special apparatus for applying this material by spraying or projecting it against the surfaces to be coated. Also, in using this material, there is a possibility of stoppage of the outlet of the container and I have, therefore, provided simple and convenient means whereby the outlet can quickly be cleared when stoppage occurs. The apparatus of my invention is particularly adapted for use with material which is first mixed with water to provide a mixture of the proper consistency, this mixture being then placed in a tank or container from which it is discharged and projected against the surface being coated. I also provide means whereby water may be admitted to the tank in the event that the mixture is too thick or heavy, this water being admitted in such manner as to assist mixing therewith with the mixture in the tank as well as assisting in clearing of the outlet.

A further object of my invention is to provide simple and efficient means for controlling the outlet member in such manner that communication between the tank and the portion of this member to which the air line is connected may be cut off thus permitting replenishing of the supply of material in the tank while the hose and nozzle for applying the material is being blown out and cleaned by the air so as to eliminate possibility of stoppage thereof. It is also an object of my invention to provide an apparatus in which the various parts are so arranged and related as to facilitate thorough washing and cleaning out of the tank and the outlet member and hose and associated parts so as to effectively remove the material therefrom when it is no longer desired to use the apparatus, thus preventing the possibility of setting or hardening of the material in the apparatus, which is highly objectionable as tending to rendering it unfit for use. Further objects and advantages of my invention will appear from the detailed description.

In the drawing:

Figure 1 is a side view of an apparatus in accordance with my invention, partly broken away and in section;

Figure 2 is a detail sectional view taken substantially on line 2—2 of Figure 1;

In constructing the apparatus I provide a cylindrical tank 1 provided at its upper end with a head 2 and, at its lower end, with a bottom head 3. The heads 2 and 3 are of thicker material than the wall of the body of the tank, which may conveniently be formed of sheet metal, and these heads are welded to the body. A flanged ring 4 is welded to the under face of head 2 and is interiorly threaded for reception of a screw plug 5 having an extension 6 through which is secured a suitable handle 7. This provides an opening at the top of the tank for placing the material therein.

A plate 8 is welded or otherwise suitably secured to tank 1 at each side thereof, and carries a headed trunnion 9. These trunnions are disposed diametrically opposite and at the approximate longitudinal center of the tank. A strap 10 extends about each trunnion, between the head 9*a* thereof and plate 8, this strap being shaped to provide an eye 10*a*. The strap 10 is bolted or otherwise suitably secured to the upper end of an angle iron frame 11 of inverted V-shape. The arms of frame 11 are connected, at their lower ends, by a brace 12, this brace and the arms being secured together by cross rods 13 upon the ends of which are secured nuts 14.

Supporting rollers 15 are suitably mounted upon rods 13 adjacent the arms of each of the frames 11. The side frames, together with the cross rods 13 and associated parts, provide a portable support or carriage for the tank 1 by means of which it can be moved about with facility. To assist in transporting the tank, a suitable handle structure 16 is secured, in a suitable manner, such as welding, to the upper end of the tank.

Tank 1 is mounted upon its supporting frame or carriage for movement about a horizontal axis, by means of the trunnions 9. Normally the tank is held in vertical position. One of the strap members 10 is provided with an upwardly projecting extension or flange 17. A T-screw 18 threads through flange 17 and bears against plate 8. This plate may conveniently be provided with a depression for reception of the end of screw 18,

this depression being disposed in operative relation to the screw when the tank is in its vertical position. It is not essential, however, that such a depression be provided as under ordinary conditions the screw will exert sufficient pressure against plate 8 to hold the tank 1 against undesirable looseness or play and in desired position.

Under certain conditions, as will be more fully explained, it is desirable to hold the tank in horizontal position. This is accomplished by releasing screw 18 and then turning the tank into the desired position, after which the screw is again turned into position to bear against plate 8. The screw 18 thus serves not only to hold the tank 1 in its normal vertical position, but to also hold the tank in any desired position of adjustment about the axis of trunnions 9.

A nipple 19 is welded in the lower head 3 of the tank, at the center thereof, and provides an outlet for material to be discharged from the tank. A gate valve 20 is screwed onto the lower end of this nipple and receives, in its lower end, a nipple 21 which constitutes an extension of a 90 degree elbow 22. The other arm of this elbow is exteriorly threaded at 23 for reception of a coupling collar 24 to which is secured a length of hose 25. A nozzle 26 is secured in the other end of hose 25. This nozzle and the manner of securing the same in the hose, as well as the coupling collar 24 and the manner of securing the collar in the hose, are known in the art and need not be illustrated nor described in detail. The gate valve 20 is of known type and is provided with an operating lever 27 whereby the valve proper may be operated with facility for controlling the outlet passage extending through nipple 19 and valve 20 into elbow 22.

Elbow 22 is provided with a reduced neck 28 extending from the angle thereof, this neck being disposed substantially at right angles to the vertical axis of nipple 19, that is, substantially horizontally and at right angles to the direction of flow of the material from tank 1. The neck 28 and the elbow 22 constitute, in effect, a T connection. An air line 29 is connected to neck 28. This air line is provided with a control valve 30 of known type. A supply pipe 31 is connected to air line 29 by a T 32 and is provided with a valve 33 of known type for controlling flow of air through pipe 31. The pipe 31 is connected in a suitable manner, as by a hose connection, to a suitable source of supply of compressed air. A T 34 is provided at the upper end of air line 29 and carries a relief valve 35 of known type. This valve is normally closed, as will be understood, and is adapted to open at a predetermined high pressure. Air line 29 is connected, by means of T 34 and a branch connection 36, to tank 1 adjacent the upper end thereof, this branch connection being provided with a suitable control valve 37.

A water line 38, provided with a suitable control valve 39, is mounted, adjacent its upper end, in a bracket 40 suitably secured, as by welding, to tank 1. This water line, like the air line, is adapted to be connected by means of a suitable hose or other suitable flexible connection to a suitable source of supply of water under pressure.

At its lower end the water line is provided with a T 41, the inner end of which is closed by a plug 42. A nipple 43 extends upwardly from the stem of T 41 through head 3 of the tank, this nipple being welded to the head. An elbow 44 is secured upon the upper end of nipple 43, within the tank, and a discharge nipple 45 is secured in the other arm of this elbow. The nipple 45 is bent so as to extend closely adjacent and substantially concentric with the inner face of the wall of tank 1. An important advantage is obtained by disposing the nipple 45 in this manner in that the water which enters the tank under pressure, by the nipple, has imparted to it a whirling motion which is of value as facilitating mixing of the water with the material in the tank and as imparting a desirable movement to this material which tends to cause movement of the heavier particles thereof outwardly by centrifugal action, thus preventing possible clogging of nipple 19 due to the heavier and larger particles of the material collecting at the outlet. This whirling motion imparted to the entering water is also of great assistance in thoroughly washing out the tank so as to effectively remove all of the cementitious material therefrom after a job has been finished and it is desired to discontinue the use of the apparatus for an appreciable time during which there would be the possibility of setting or hardening of the material in the tank.

In using the apparatus, the gate valve being closed, a suitable charge of the mixture of cementitious material and water is placed in the tank 1. The tank may be substantially completely filled, or only partially filled, as conditions require. In order to obtain the best results in applying the material for the application of which this apparatus is particularly adapted, such material should be mixed with only sufficient water to provide a comparatively thick mixture which is much thicker than mixtures ordinarily applied by spray guns and like apparatuses. The tank is then closed by means of plug 5 and valve 30 of the air line is adjusted to give the proper flow and pressure of air at neck 28 of elbow 22. The gate valve is then opened and the material flows from tank 1 into elbow 22 where it becomes intermixed with the air and is forced thereby through hose 25 and nozzle 26, being projected with appreciable force against the surface to be coated. The material leaving the nozzle 26 has the consistency of a thick mud and can be spread quickly and evenly over the surface being coated. If it be found that the mixture is too thick, this can readily be remedied by opening the valve 39 in the water line and admitting water to the mixture until the proper consistency is obtained.

The air flowing through neck 28 and across elbow 22 acts by suction or induction to cause the material to flow from tank 1. In order that a partial vacuum may not be created in the upper portion of the tank, valve 37 of branch connection 36 may be opened slightly to permit flow of air into the tank above the material. Under certain conditions it may even be desirable to open this valve sufficiently to create an appreciable pressure above the material, as when using a material of unusually thick consistency. The arrangement is such that the operator can readily vary conditions to suit requirements, thus providing a readily flexible means for controlling the discharge of the material. When it is desired to replenish the supply of material in tank 1, the gate valve is closed, after which the plug 5 may be removed and a new charge of material placed in the tank. While this is being done, the valves 30 and 33 remain open so that the flow of air through the air line, elbow 22, hose 25 and nozzle 26 continues. This is advantageous as blowing all of the material out of the elbow and hose and nozzle, as well as removing any material remaining below the gate valve, so as to

eliminate possibility of partial setting or hardening of such material while also providing a clear and unobstructed passage for discharge of the material from the tank when the gate valve is again opened.

After the charge of material has been placed in tank 1, plug 5 is again secured in position, after which the gate valve is opened and the operation continues as before.

As soon as the operator has finished the job, or if use of the apparatus is to be discontinued for an appreciable length of time, the tank and the hose connections and associated parts are thoroughly washed out so as to remove all of the mixture therefrom. This is desirable as leaving the apparatus in the best condition for use when it is again needed. For washing out the tank and hose and associated parts, after the material has been discharged from the tank, the plug 5 is removed and, gate valve 20 being closed, the tank is filled with water. This is readily accomplished by opening valve 39 in the water line. The water entering the tank has a swirling motion imparted to it, as previously described, which is highly effective in removing the material from the inner surfaces of the tank. When the tank has been filled with water, the gate valve is opened and the air flowing under pressure through the air line serves to discharge the water to the hose 25 and nozzle 26. In this manner the gate valve and elbow, as well as the hose and associated parts, are thoroughly washed and cleaned so as effectively to remove therefrom the cementitious material thus leaving the apparatus in a clean and unobstructed condition and ready for use when desired.

If clogging occurs at the outlet nipple 19, which is the only place where clogging is apt to occur, the tank 1 is turned into a horizontal position, or may be turned beyond horizontal into position to expose the inner end of nipple 19. Air is then admitted through branch connection 36 into the tank and a suitably high pressure is built up, the gate valve being closed, after which the gate valve is opened and the air in the tank serves, due to its pressure, to blow out of the nipple any material which may have collected therein. In this connection, the ability to swing the tank on the axis of trunnions 9, when screw 18 is in inoperative position, is of value as providing simple means for agitating the contents of the tank to facilitate flow of the material through nipple 19 whenever partial clogging of the nipple occurs, thus preventing the nipple from becoming closed or substantially so. Under normal conditions, the tank 1 is held in vertical position, as has been noted, but it can be released quickly for rocking movement on the trunnions when desired, or conditions require.

As will be noted, the air line 29 and water line 38 are disposed parallel and in alignment with each other and with the elbow 22 and associated parts. This leaves the side of the tank at which the hose 25 and nozzle 26 are disposed free from projections, with the exception of the gate valve lever, so that the tank can be disposed in such manner as to facilitate movement of nozzle 26 and the hose for applying the material to the surface being coated.

The apparatus as a whole is compact and convenient and may be adjusted with facility to meet varying conditions. When moving the apparatus from one location to another, screw 18 may be turned into inoperative position and the tank 1 tilted on trunnion 9 so as to be disposed at an inclination downwardly away from the operator who then grasps the handle structure 16. This disposes the tank and associated parts so as to facilitate manipulation of the apparatus. Obviously, the tank may be disposed in any position about the axis of the trunnions to suit the desires of the operator, when transporting the apparatus. When the apparatus is in use, however, the tank should be in a vertical position as previously described.

What I claim is:

1. In an apparatus of the character described, a tank, an outlet member at the lower end of the tank, a valve controlling said member, an air line opening into the outlet member at an angle thereto and outwardly beyond the valve, and a water line opening into the tank adjacent said outlet member and having a discharge nipple disposed to impart a whirling motion to water admitted to the tank.

2. In an apparatus of the character described, a supporting carriage, a tank mounted upon the cariage for movement on a horizontal axis, an outlet member extending from the lower end of the tank, a valve controlling the outlet member, an air line connected at its lower end to the outlet member at an angle thereto and outwardly beyond the valve, said air line extending upwardly along the tank and being connected thereto adjacent the upper end of the tank by a branch connection, and a water line opening at its lower end into the tank adjacent the lower end thereof, said water line extending upwardly along the tank and being secured thereto adjacent its upper end.

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