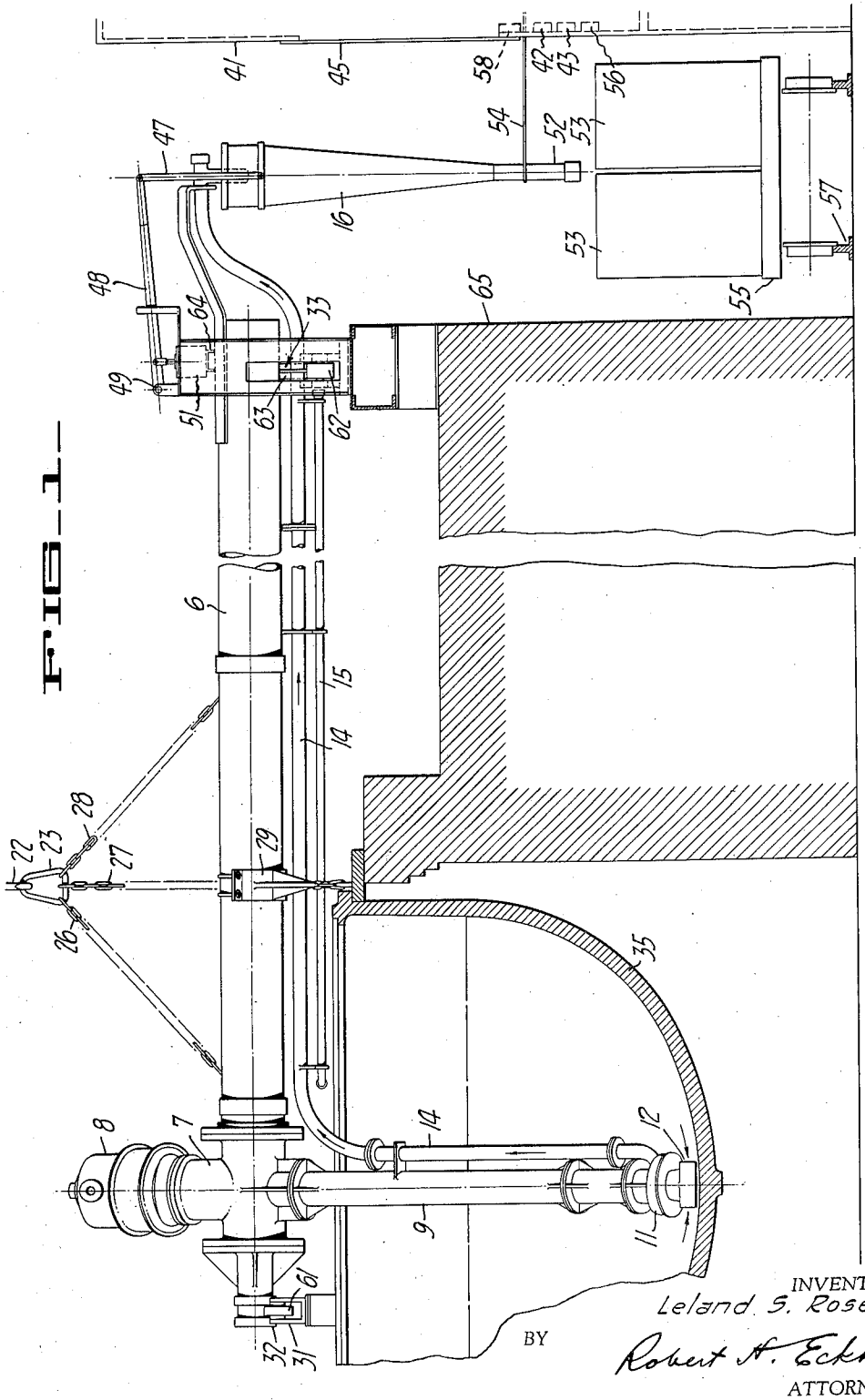
Aug. 23, 1938. L. S. ROSENER 2,127,962

LIQUID CAUSTIC HANDLING EQUIPMENT

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FIG. 1.



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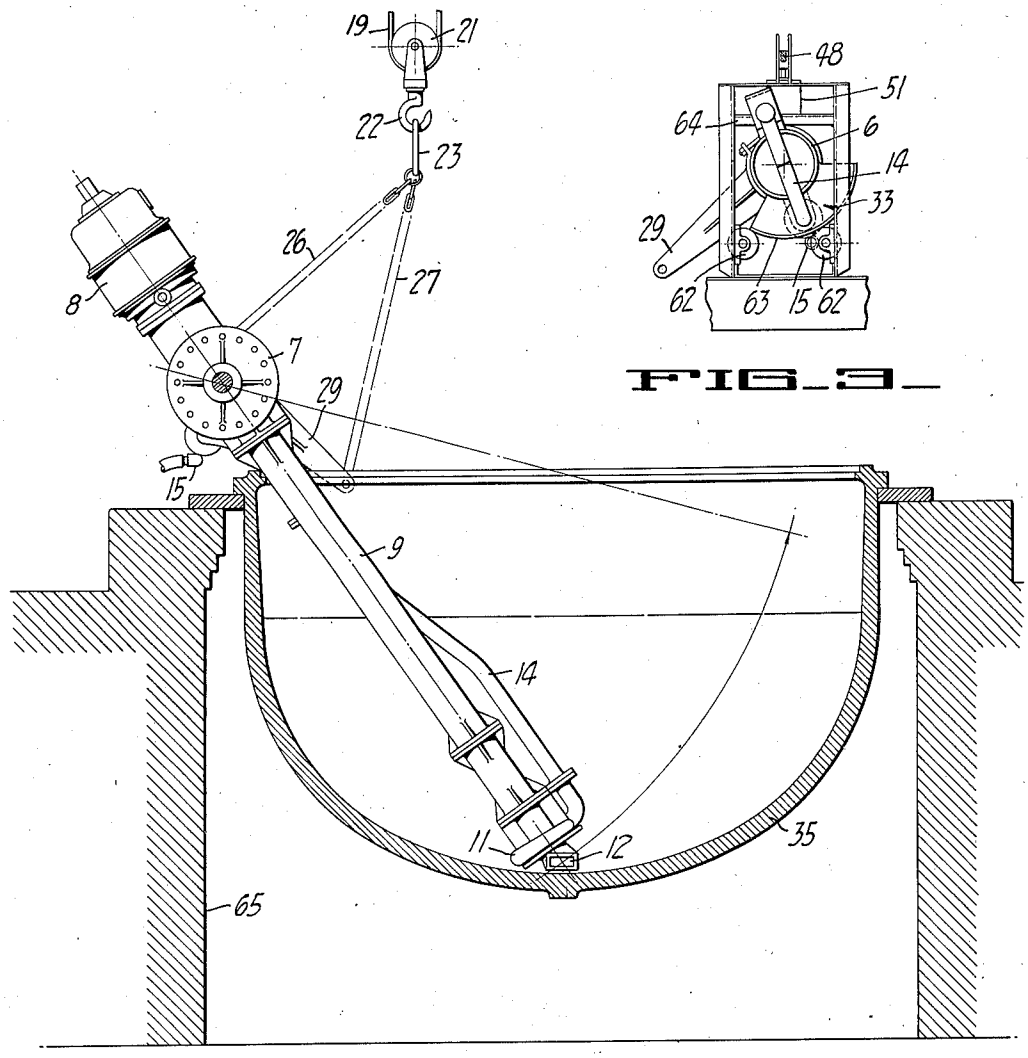


FIG_2_

FIG_3_

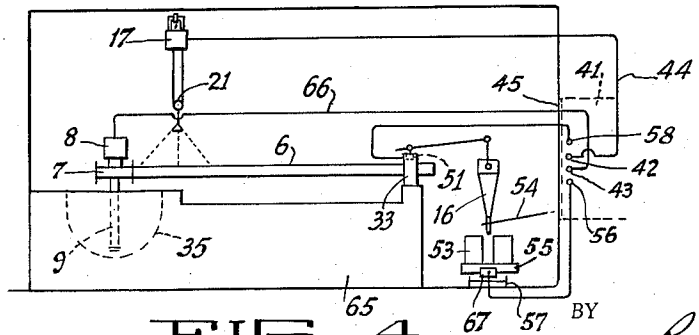


FIG_4_

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UNITED STATES PATENT OFFICE

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LIQUID CAUSTIC HANDLING EQUIPMENT

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4 Claims. (Cl. 226—94)

This invention relates to an apparatus for pumping out a caustic pot. As is well known, caustic soda and caustic potash, respectively the hydroxide of the alkali metals, sodium and potassium, are concentrated by heating in large iron pots, referred to as caustic pots. In pumping out these pots, when the caustic is sufficiently concentrated, particularly in filling drums from the pots, difficulty is encountered in control and frequent slop-overs and spills occur, presenting an industrial hazard. The present invention provides an apparatus which is simply and readily controlled, one with which a single operator can control the pumping out and drum filling operation without the necessity of operating any valves in a line carrying the hot caustic, or of exposing himself to the caustic.

In pumping out a pot it is desirable to pump from the top of the caustic level in the pot so that the caustic deposited in the containers is as pure as is obtainable. Dirt, scale, rust and other solid impurities, insoluble in the caustic, collect in the bottom of the pot. It is desirable to leave these in the pot so that the caustic removed from the pot is not contaminated and has a high degree of purity. This is accomplished by the apparatus of my invention for it enables caustic to be pumped from the caustic level at all times.

In addition to the foregoing objects and features of advantage, the invention includes others which will appear hereinafter, wherein the present preferred form of the apparatus of this invention is disclosed.

In the drawings accompanying and forming a part hereof, Figure 1 is a side elevation, partly in section, showing the apparatus as positioned in a caustic pot and in its relation to the control equipment.

Figure 2 is an end elevation, showing the arrangement of the pump in the caustic pot.

Figure 3 is another end elevation, taken from the outside end of the equipment.

Figure 4 is a diagrammatic view showing control of the apparatus for operation purposes.

In accordance with my invention, I provide a suitable support member, indicated generally at 6. This is usually a member fabricated from heavy pipe and suitable fittings. Adjacent one end of the support member is positioned a fitting 7 and upon this fitting is mounted a motor such as a variable speed electric motor 8. Opposite to the motor and extending from the fitting 7 is an arm 9 conveniently fashioned from pipe and suitable fittings. Positioned at the end of this arm is centrifugal pump 11. A drive shaft extends through the arm 9 from the motor 8, although this shaft is not shown in the drawings. The pump has an inlet indicated at 12, and a discharge line indicated by pipe 14, this pipe extending up pipe 9 and along support member 6 to discharge finally into a hopper 16. To ensure free caustic flow a gas burner 15 is supported beneath line 14 to heat this so that the hot concentrated caustic does not solidify in the discharge line.

In accordance with this invention, the support member 6 is so supported that it is possible to utilize the pump to draw from the top of the caustic layer at all times. This is accomplished by providing the presently described connection between the support member 6 and raising and lowering hoist means indicated generally at 17. This is suspended from a support 18. The hoist 17 includes a cable 19 passing about a pulley structure indicated at 21 and including a hook 22. A ring 23 is carried upon this hook and to the ring are attached three chains, 26, 27 and 28. Chains 26 and 28 are attached at spaced points to the support member 6 while chain 27 is attached to an extension 29 on the support member 6. It is to be noted that extension 29 is at an acute angle to the common plane of arm 9 and member 6.

At that end of member 6 adjacent the pump and motor, a support structure indicated generally at 31 is provided. This structure includes rollers 61 which engage an end 32 of support member 6 on opposite sides thereof and support this end of the member for rotation. At the other end of the member 6 is provided a roller support structure indicated generally at 33 so that the support member 6 is supported for rotation at its opposite ends. Structure 33 includes opposite rollers 62 engaging a quadrant 63 on the support member 6. The rollers and quadrant position the support member 6 in the structure 33, the member 6 abutting cross-member 64 in structure 33 so that while member 6 is rotatable in structure 33, member 6 carries structure 33. Structures 31 and 33 are supported upon the furnace structure indicated generally at 65 or upon members associated therewith.

If the raising and lowering means 17 is used and if it lowers support member 6 to a position wherein it is supported at its opposite ends for rotation, the arm and the member 6 will be in a horizontal plane, and extension 29 will lie slightly above this plane. This is so because the lengths of chains 26, 27 and 28 and their positions are so adjusted that this occurs. Thereafter, the

support member 6 being supported for rotation at opposite ends, further lowering of the raising and lowering means results in a gradual restrained rotation of the support member and a gradual movement of the pump down through the caustic pot 35. In operation, therefore, an operator stationed in a control booth indicated generally by numeral 41 has merely to manipulate a control device indicated at 42 to control the vertical position of the raising and lowering means, control device 42 being connected by line 44 to hoist 17. This is effective to swing the pump through the caustic pot, as has been previously explained.

Motor 8 is connected by line 66 to a device 43 which enables the motor speed to be varied. Since the pump 11 is of a centrifugal type, it has the inherent characteristic of having a critical speed below which it will not force hot viscous caustic out through line 14. Discharge into the hopper 16 from pipe 14 is thus readily controlled, by varying the speed of the motor. The operator does not have to manipulate any valves or be near the hot caustic because he can observe everything which transpires through window 45, in his control cab.

The hopper 16 is carried upon and supported by a yoke structure indicated at 47, this structure being supported by an arm 48. This arm is pivotally mounted as at 49 on structure 33. A piston operated structure, indicated at 51, carried by structure 33, serves to raise and lower the hopper so that its discharge end 52 can be inserted and withdrawn from the opening in a container indicated at 53. Raising and lowering movement of arm 48 by the piston structure 51, whereby the hopper 16 is raised and lowered, is controlled by the operator. Device 58, at the operator's station, is connected by line 69 to the piston structure 51. The exact position of the discharge end of the hopper and its insertion into a container is controlled by the operator in the control cab, a suitable rod 54 being projected through the cab to permit the operator to push the hopper end over opening in the container whereupon the hopper is lowered. The containers 53 are carried upon a movable railway indicated at 55. This is preferably electrically driven and is remotely controlled, the operator having a control 56 in the control cab connected by line 67 to motor 68 on car 55. This enables him to readily run the railroad back and forth along the track indicated at 57 so that as the containers are filled the container-carrying truck can be advanced and this without any danger to the operator.

From the foregoing I believe it to be apparent that I have provided a very desirable type of apparatus which enables highly corrosive liquids such as caustic to be readily handled, packed and shipped without an operator having to come in contact with or being subject to the hazard industrially of the hot caustic.

I claim:

1. An apparatus for pumping out a caustic pot comprising a horizontal support member, means supporting said member for rotational movement in a fixed position about an axis substantially fixed with respect to said pot, an arm on said member adapted to extend and depend into said pot whereby said arm swings through said pot from the top to the bottom thereof on rotational movement of said member about said axis, means for raising and lowering said support member from and into said supporting means in a generally horizontal position and with said arm in a generally horizontal position, said raising and lowering means including a connection with said member to restrain rotational movement of said member to a desired extent only when said member is supported by said support means, a pump carried adjacent the extending end of said arm, and means for rotating said pump to remove the contents of said pot.

2. An apparatus for pumping out a caustic pot comprising a horizontal support member, means supporting said member for rotational movement in a fixed position about an axis substantially fixed with respect to said pot, an arm on said member adapted to extend and depend into said pot whereby said arm swings through said pot from the top to the bottom thereof on rotational movement of said member about said axis, an extension on said support member and extending therefrom in a plane substantially parallel to the plane of said arm and said member, raising and lowering means engaged with said member and said extension to raise and lower said member and to rotate said member in said support means to a desired extent to control the elevation of the extending arm and in said pot, a pump carried adjacent the extending end of said arm, and means for rotating said pump to remove the contents of said pot.

3. An apparatus for pumping a caustic pot comprising a pump, an arm for supporting said pump, a support for the arm at a right angle thereto, means supporting said support for rotation about an axis adjacent an edge of said pot, hoist means, connecting means extending between the hoist means and said support for use in raising and lowering said support, and another connecting means extending between the hoist and a connection to the support spaced therefrom and lying substantially in the plane of said arm.

4. An apparatus for filling vessels with a dangerous commodity as hot caustic comprising a centrifugal pump, means positioning said pump in a vessel to be pumped, a variable speed prime mover for driving said pump at selected speeds to effect delivery and non-delivery from said pump, control means at an operator's station for varying said prime mover speed, a glass shield for the operator at the operator's station, a carrier vehicle movable past said operator's station and carrying a plurality of vessels to be filled with said commodity in view of an operator behind said shield, means at said station for controlling movement of said vehicle, means for receiving the pump discharge and for directing said discharge into a vessel to be filled including a discharge spout insertable into a filling opening in said vessel, means for raising and lowering said spout from and into a vessel, control means for said spout raising and lowering means at said operator's station, and an operator operated means for positioning said spout accurately above the filling opening in a desired vessel carried past said spout by said vehicle.

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