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APPARATUS FOR REMOVING GASES FROM LIQUIDS

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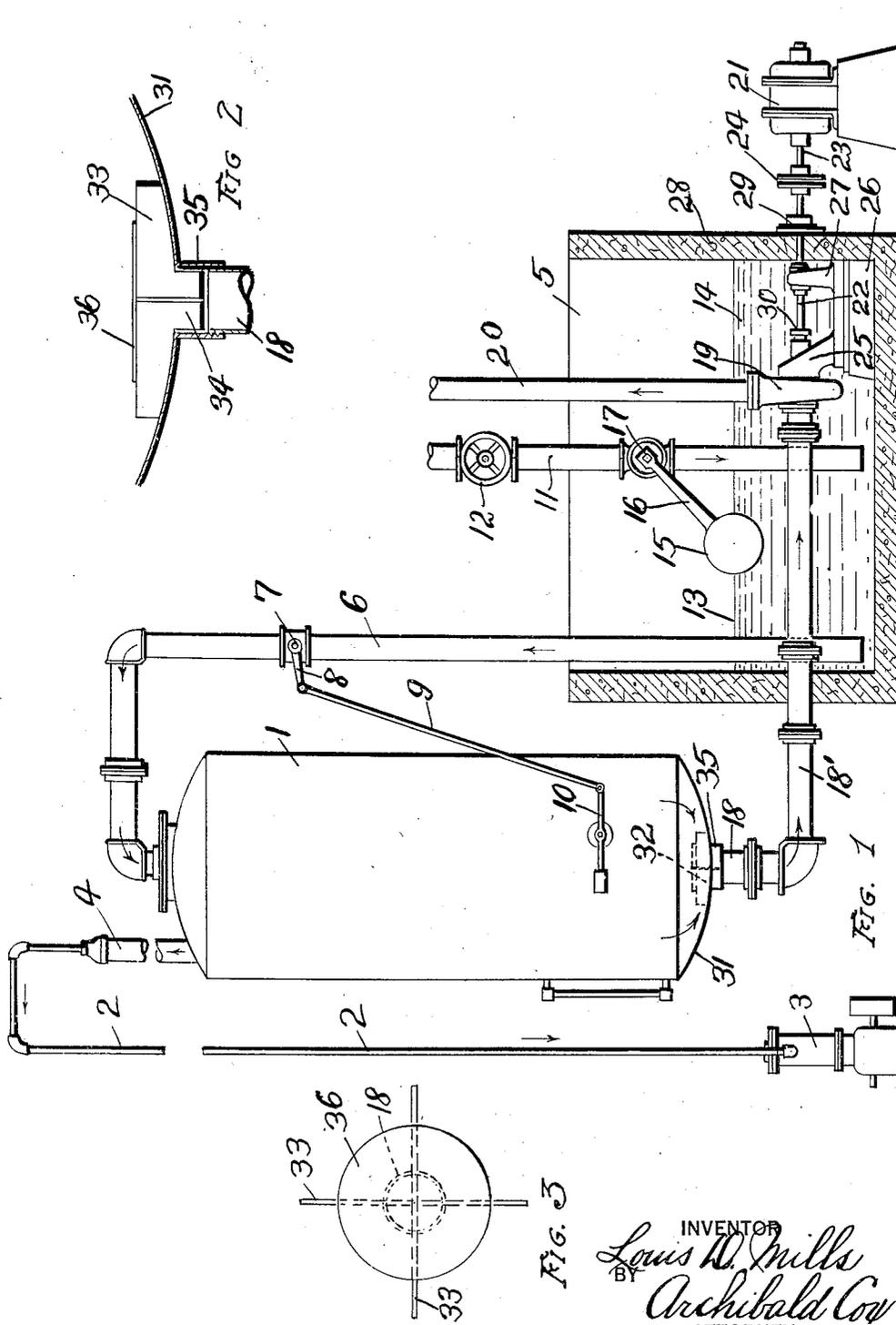


FIG. 3

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APPARATUS FOR REMOVING GASES FROM LIQUIDS

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The invention relates to an improvement in apparatus for removing dissolved gases from liquids and more especially from cyanide solutions prior to precipitating the dissolved metals, such as gold and silver, from such solutions.

It is common practice to remove dissolved gases from cyanide solutions by passing the solution through a closed vessel, technically called the receiver, within which a high vacuum is maintained. The receiver usually contains grids or checker work over which the solution is flowed and by means of which it is broken up into thin films and finely divided streams, thus exposing a maximum of surface of the solution to the relatively low absolute pressure within the receiver, with the result that the dissolved gases are evaporated or removed from the solution and are withdrawn from the receiver by the vacuumizing means. The solution from which the dissolved gases have been removed accumulates in the bottom of the receiver and is withdrawn therefrom by any suitable means, as by elevating the receiver to a sufficient height to permit free discharge of the solution from the receiver through a submerged outlet. Or the solution may be withdrawn by means of a pump suitably sealed to prevent ingress of air. The amount of solution introduced into the receiver and withdrawn therefrom is usually automatically controlled, and the solution gathering in the bottom of the receiver is maintained at a sufficient depth to prevent gases which have been removed from the solution from mixing with the solution being discharged through the outlet orifice.

It has been found in the actual operation of apparatus of this character that where relatively large volumes of solution are passed through the receiver, and consequently there is a rapid flow through the outlet, a vortex or swirl is thereby created in the solution in the bottom of the receiver, even though the solution is maintained at a considerable depth. This vortex or swirl of the solution being discharged through the outlet in the bottom of the receiver frequently causes substantial amounts of the gases which have been removed from the solution to mingle with

and be entrained in the solution leaving the receiver, thus defeating in large measure the purpose of removing the gases from the solution.

One object of the invention is to prevent the gases which have been removed from the solution in the receiver from mingling with or being entrained in the solution discharging from the receiver. Another object of the invention is to prevent the entraining of removed gases in the discharging solution by preventing the formation of a vortex or swirl in the solution at the outlet of the receiver. A further object of the invention is to accomplish this purpose without increasing the depth of the solution maintained in the bottom of the receiver.

In the accompanying drawings Fig. 1 is a diagrammatic representation of a deaerating apparatus in which the vortex preventing device of the present invention is incorporated; Fig. 2 is a section through the discharge outlet of the receiver and showing the vortex preventing device in side elevation; and Fig. 3 is a top plan of the vortex preventing device.

The apparatus illustrated in the drawings and to which the vortex preventing device of the invention is applied, comprises a receiver 1, in the form of an upright tank, connected by the pipe 2 with a vacuum pump 3. An enlargement 4 in the pipe 2 provided with baffles prevents moisture from being drawn from the receiver 1 into the pump 3. The receiver 1 receives its supply of solution to be deaerated from a storage tank 5 through the pipe 6, the lower end of which is located in the lower part of the tank 5, and the upper end of which discharges into the top of the receiver 1. The flow of solution through the pipe 6 into the receiver 1 is controlled by a butterfly valve 7 provided with an arm 8 pivotally connected by a link 9 with the arm 10 of the usual float (not shown) within the receiver 1 for controlling the level of the solution therein.

The tank 5 is supplied with solution to be deaerated through the pipe 11 provided with the hand operated valve 12. The level 13 of the solution 14 in the tank is controlled by a float 15 mounted on the outer end of an arm

16 connected with a valve 17 in the pipe 11. The vacuum pump 3 causes the pressure in the receiver 1 to be reduced and the solution to flow from the tank 5 up through the pipe 6 and into the top of the receiver 1, whence it passes down through the usual means for dividing it into small particles so that the vacuum may be effective in withdrawing the dissolved or entrained air therefrom. When the valve 7 in the pipe 6 is closed by the rising of the float in the receiver 1, thereby permitting the level of the solution in the tank 5 to rise, the supply of solution to the tank 5 is shut off by the rising of the float 15 and the closing of the valve 17 in the pipe 11.

The deaerated liquid is drawn from the bottom of the receiver 1 through the pipes 18 and 18' by means of a centrifugal pump 19 which is located in the tank 5 and submerged under the solution 14 therein. Connected with the discharge end of the pump 19 is an upright pipe 20. The pump 19 is driven by the motor 21 through the shaft 22, the outer ends of the shaft 22 and the shaft 23 of the motor being provided with the flexible coupling 24. The pump 19 is supported by the bracket 25 rising from the base 26 and the outer end of the shaft is supported by the upright bracket 27. The point where the shaft 22 passes through the wall 28 of the tank 5 is sealed by a gland 29. And the point where the shaft 22 enters the side of the pump 19 is sealed by the gland 30. The gland 30 prevents any of the untreated solution 14 in the tank 5 from entering the pump 19 and mixing with the deaerated solution withdrawn from the receiver 1 and discharged from the pipe 20. Thus air in any form is effectually prevented from entering the deaerated solution discharged from the receiver.

The means of the present invention for preventing the formation of a vortex in the solution discharging from the bottom of the receiver comprises a series of thin, radial walls or baffle plates, four in the present instance, mounted in the bottom 31 of the receiver 1. The baffle plates, indicated generally at 32, are vertically arranged and comprise a laterally extending part 33 supported on the bottom surface 31 of the receiver 1 and an inner downwardly extending part 34 received within the upper part of the discharge orifice or outlet 35 of the receiver and with which the pipe 18 is connected. The baffle plates 32 are arranged in the form of a cross and are spaced substantially equi-distant apart. The bottom surfaces of the laterally extending parts 33 of the baffle plates curve in conformity with the curved bottom 31 of the receiver 1, and the top edges of the baffle plates are straight and all arranged on substantially the same plane. A cover part 36 preferably in the form of a circular disk,

is mounted upon the baffle plates 32 centrally of the discharge outlet.

When the receiver 1 has been provided with the vortex preventing device of the present invention, as described above, the solution may be discharged through the outlet 19 at high velocity without liability of creating a vortex or swirl in the solution in the bottom of the receiver although the solution be maintained at a relatively shallow depth. To form a vortex or swirl it is necessary for the solution to rotate and this the radially extending baffle plates 32 effectually prevent. Formation of the vortex is further prevented by the plate 36 secured to the upper edges of the central portions of the baffle plates. The baffle plates are of such height and the plate 36 of such diameter as to provide sufficient space for the solution to pass freely through the discharge orifice 35 and into the pipe 18.

Having thus described the invention what I claim as new is:—

1. In an apparatus of the character described including a tank having an outlet in the bottom thereof for the discharge of liquid therethrough, means located in the bottom of the tank for preventing the discharging liquid from swirling and forming a vortex in the liquid in the tank comprising a series of vertical, radially extending baffle plates, the inner parts of said baffle plates being located over the outlet and the outer parts of said baffle plates being supported by their lower edges on the bottom of the tank, and a flat, horizontally arranged plate supported on the upper edges of the baffle plates and arranged substantially co-axially with the outlet.

2. In an apparatus of the character described including the tank having a curved bottom with an outlet therein for the discharge of liquid therethrough, means for preventing the liquid discharging through the outlet from swirling and forming a vortex in the liquid in the tank comprising a series of vertically arranged baffle plates, the lower edges of the baffle plates being curved in conformity with the curve of the bottom of the tank and resting thereon and the upper edges of the baffle plates being straight and all lying in substantially the same plane, and a disk resting on the upper edges of the baffle plates and located substantially co-axially with the outlet.

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