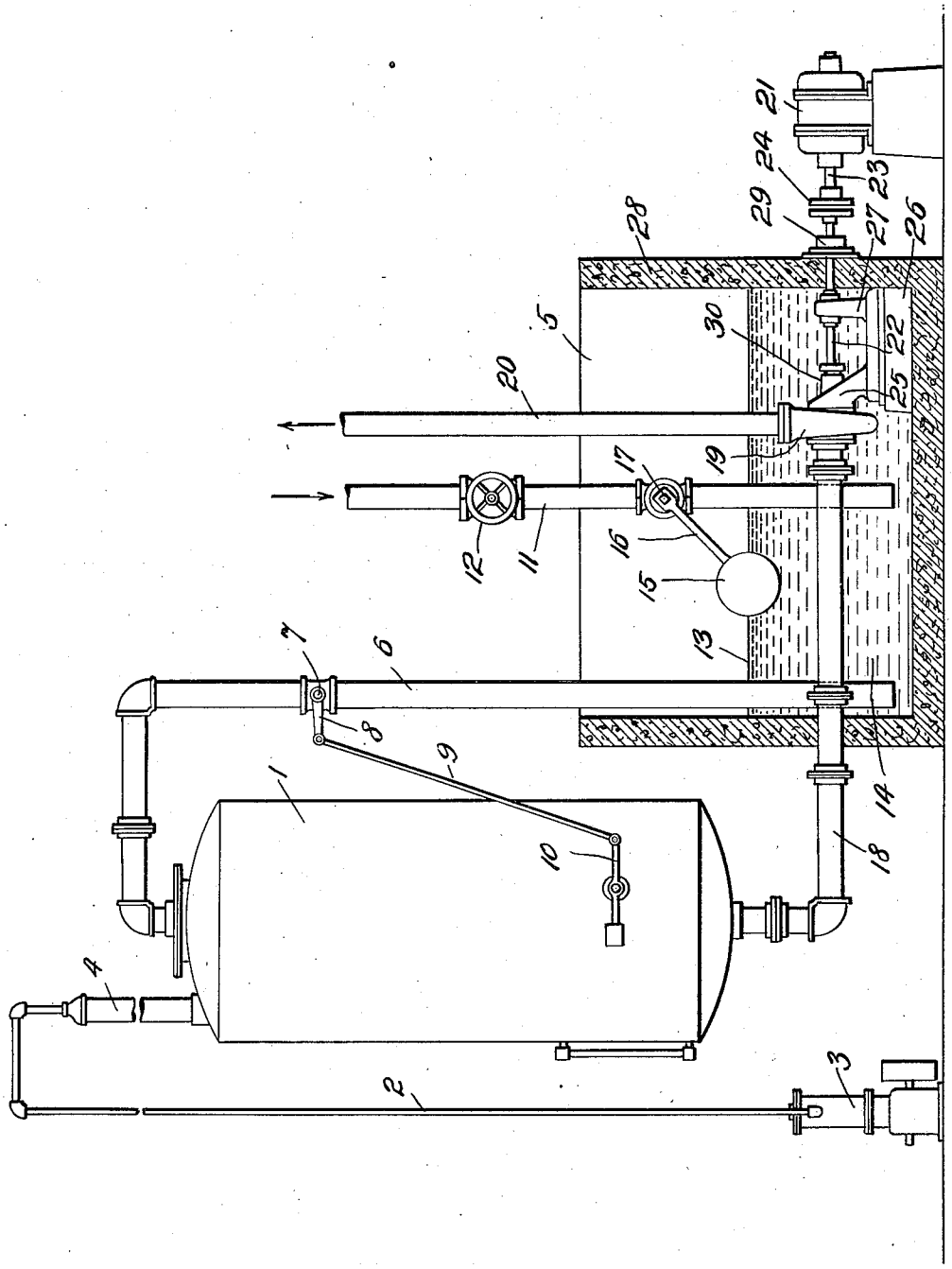
May 29, 1928. **1,671,601**

L. D. MILLS

APPARATUS FOR REMOVING GASES FROM LIQUIDS

Filed July 16, 1925



INVENTOR
Louis D. Mills
BY
Archibald & Co
his ATTORNEY

Patented May 29, 1928. 1,671,601

UNITED STATES PATENT OFFICE.

LOUIS D. MILLS, OF PALO ALTO, CALIFORNIA, ASSIGNOR TO THE MERRILL COMPANY, OF SAN FRANCISCO, CALIFORNIA, A CORPORATION OF CALIFORNIA.

APPARATUS FOR REMOVING GASES FROM LIQUIDS.

Application filed July 16, 1925. Serial No. 44,033.

The invention relates to an improvement in apparatus for removing dissolved gases from liquids, and more especially from flowing liquids.

Apparatus used for removing dissolved gases from flowing streams of liquid usually comprise a receiver or receptacle which is connected with a vacuumizing means and through which the liquid is caused to flow. The deaerated liquid is withdrawn from the receptacle by a pump or by the action of gravity. The use of a pump for this purpose has heretofore been considered objectionable because no efficient means has been found for preventing leakage of air and other gases into the deaerated liquid through the working parts of the pump. The use of gravity to withdraw the deaerated liquid from the receptacle is objectionable because, to overcome the holding action of the vacuum on the liquid in the receptacle, it has been necessary to locate the receptacle at the requisite height above the level at which the deaerated liquid is used, the height of the receptacle depending on the elevation of the locality above sea level. The arrangement of the receptacle at this relatively great distance above the point at which the deaerated liquid is used has required the employment of expensive supporting structure and apparatus, including pipes, suitable for feeding the liquid into the receptacle and withdrawing it therefrom.

One object of the present invention is to provide an apparatus for removing gases from liquids of such construction that the apparatus may be located as close to ground level as the limits of an ordinary building construction will permit. When a metalliferous solution is deaerated it is necessary for the most efficient recovery of the metals in the subsequent precipitation operation that all traces of air be removed from the solution. Hence it is necessary that air and other gases should be prevented from entering the deaerated solution after the latter has been withdrawn from the receptacle. To this end it has been proposed heretofore to prevent air and other gases from entering the solution through the bearings and other joints of the pump used to withdraw the solution from the receptacle. So far as known, however, the means heretofore used for this purpose have been ineffective. A further object of the invention is to so arrange the pump that air or other gases will be effectually prevented from entering the deaerated liquid. These objects are accomplished in the improved apparatus for removing gases from liquids hereinafter more fully described and particularly pointed out in the appended claims.

The preferred form of the invention is illustrated in the accompanying drawing which is a side elevation, partly in section, showing the various parts of the apparatus in diagrammatic outline. The various parts constituting the improved apparatus may be of usual construction and mode of operation.

The improved apparatus comprises a receptacle or 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 receptacle 1 into the pump 3. The receptacle 1 receives its supply of liquid 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 receptacle 1. The flow of liquid through the pipe 6 into the receptacle 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 receptacle 1 for controlling the level of the liquid therein.

The tank 5 is supplied with liquid to be deaerated through the pipe 11 provided with the hand operated valve 12. The level 13 of the liquid 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 receptacle 1 to be reduced and the solution to flow from the tank 5 up through the pipe 6 and into the top of the receptacle 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 re-

ceptacle 1, thereby permitting the level of the solution in the tank 5 to rise, the supply of liquid 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 receptacle 1 through the pipe 18 by means of a centrifugal pump 19 which is located in the tank 5 and submerged under the liquid 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 22 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 liquid 14 in the tank 5 from entering the pump 19 and mixing with the deaerated liquid withdrawn from the receptacle 1 and discharged from the pipe 20. Thus air in any form is effectually prevented from entering the deaerated liquid discharged from the receptacle 1.

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

1. An apparatus for removing gases from liquids comprising, a receptacle, means for creating a vacuum in the receptacle, a tank for containing liquid to be deaerated, means for supplying the tank with liquid, a pipe leading from the top of the receptacle into the tank through which the liquid to be deaerated is drawn into the receptacle, a pump, provided with a gland, submerged in the liquid in the tank, for withdrawing the deaerated liquid from the receptacle, a pipe leading from the bottom of the receptacle to the intake of the pump, and means for actuating the pump.

2. An apparatus for removing gases from liquids comprising, a receptacle, means for creating a vacuum in the receptacle, means for conducting liquid into the receptacle, a pump, provided with a gland, for withdrawing the liquid from the receptacle, and a tank for containing liquid in which the pump and gland are submerged to prevent leakage of air through the gland into the pump.

LOUIS D. MILLS.