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APPARATUS FOR DEAERATION OF LIQUIDS

Filed April 4, 1924

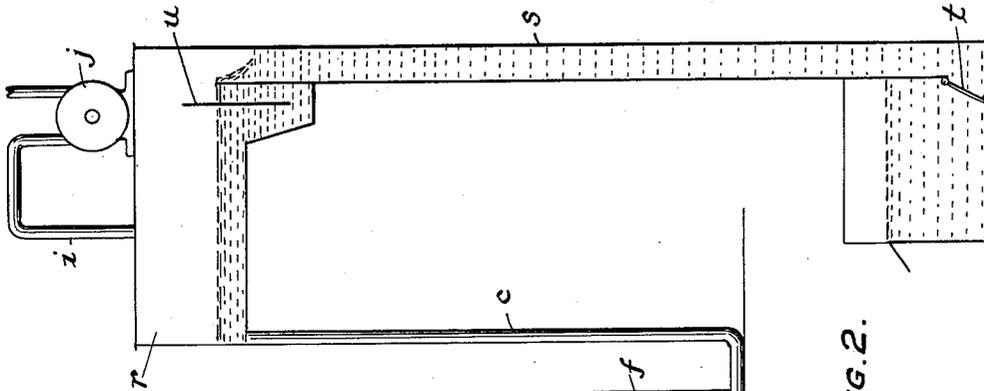


FIG. 2.

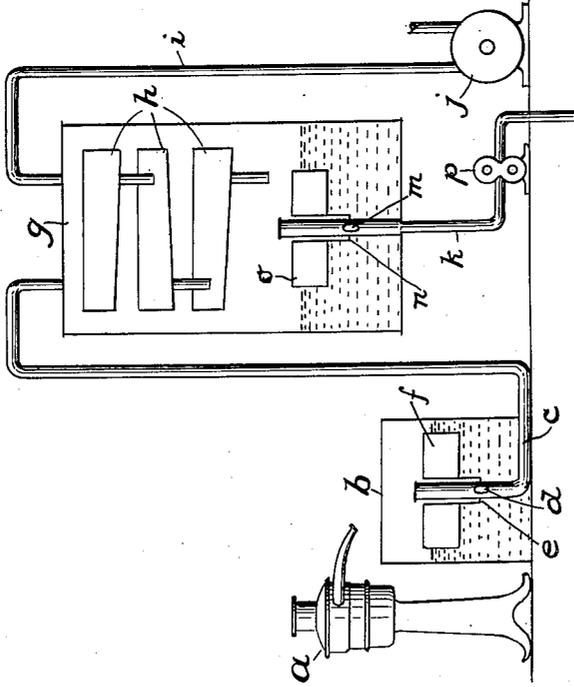


FIG. 1.

WITNESS:  
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BY  
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ATTORNEYS.

# UNITED STATES PATENT OFFICE.

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## APPARATUS FOR DEAERATION OF LIQUIDS.

Application filed April 4, 1924. Serial No. 704,290.

### To all whom it may concern:

Be it known that I, SELDEN H. HALL, a citizen of the United States, residing at Poughkeepsie, county of Dutchess, and State of New York, have invented a new and useful Improvement in Apparatus for Deaeration of Liquids, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

The object of my invention is the provision of simple and economical means to remove from liquids, air or other gases which may have been entrained by agitation, atomization, or from any other cause.

I have observed that when liquids like milk, water or oils are discharged from a centrifugal machine, they are broken up into a fine spray and entrain a considerable quantity of air in such very finely divided bubbles that it does not readily separate from the liquid. I have even proven the presence of a large quantity of air in oil that has stood quiescent for more than half an hour and I have seen milk froth remain in a tank for several hours.

I have devised novel and effective apparatus wherein gassy liquid may be subjected to a partial vacuum, which will cause such expansion of the air bubbles that they will expand, break and escape, leaving a gas-free liquid. The invention is adapted to the removal of gas from foamy liquids as well as from liquids which, while not substantially foamy, have small bubbles of air entrained therein which are more or less uniformly distributed throughout the bulk of the liquid. It will be understood that the word "gas" is used in its physical sense to include air or any other gaseous fluid. It will also be understood that in using the term "de-gasifying" I mean to include, as well as de-foaming, the substantial removal of gas in whatever form it may be entrained.

The drawings show two apparati embodying my invention.

Fig. 1 is a diagram, in vertical section, of one such apparatus, and Fig. 2 is a similar view of another such apparatus.

$a$  is a centrifugal machine which discharges into a tank  $b$  having an outlet pipe  $c$ , the inlets  $d$  to which may be closed by a valve  $e$  operated by a float  $f$ . The pipe  $c$  leads to the top of a chamber  $g$  provided with shallow pans  $h$ , through which the liq-

uid flows consecutively, thus being spread out in shallow layers. From the top of chamber  $g$  a pipe  $i$  leads to a vacuum pump  $j$  for exhausting gases. From the bottom of chamber  $g$  a pipe  $k$  leads to a liquid pump  $p$ . The pipe  $k$  extends up inside the chamber, has its upper end closed, and has ports  $m$  in its sides that are closed by a valve  $n$  when the liquid in the chamber allows the float  $o$  to drop.

When in operation the aereated liquid from the centrifugal machine  $a$  enters the tank  $b$ , where the large bubbles rise to the top. The liquid from the bottom, containing only smaller bubbles, flows through the inlets  $d$  and pipe  $c$  to the chamber  $g$ , where it is spread out in thin layers on the pans  $h$ , giving an opportunity for rapid separation of the bubbles greatly enlarged by the reduction of pressure caused by the vacuum pump  $j$ . With a vacuum of 15" of mercury, the bubbles are about twice normal volume; with 22" vacuum nearly 4 times; with 26" nearly 8 times; and with 28" nearly 16 times normal volume. The above data are predicated on a 30" barometer. The liquid, freed from air or gas, falls to the bottom of the chamber, raises the float  $o$  and valve  $n$ , opening the ports  $m$ , and then flows through these ports and the pipe  $k$  to the pump  $p$ , which forces it to any desired location.

In Fig. 2, which shows another form of apparatus for carrying out my invention, the tank  $r$ , corresponding in function to the tank  $g$  of Fig. 1, is placed at an elevation, and instead of having in it a number of shallow trays, the tank itself is made long and wide so as to obtain an equivalent area and provided with a baffle  $u$ . The pipe  $s$ , which corresponds to the pipe  $k$  of Fig. 1, is also made so long that, when it is filled with liquid, the weight of the liquid will overcome the atmospheric pressure outside and cause a flow from the tank  $r$ . A non-return valve is provided at  $t$  to prevent the entrance of air when the apparatus is being started.

The operation of the two apparati is the same except that no pump is needed to draw the liquid from the tank ( $r$ ) in the apparatus shown in Fig. 2.

In the claims, where reference is made to a high vacuum, I mean to include a vacuum of twenty inches of mercury or higher.

Having now fully described my invention, what I claim and desire to protect by Letters Patent is:

1. Apparatus for degasifying liquids comprising a preliminary tank provided with an inlet to receive the liquid to be degassed and an outlet for the escape of such liquid, means adapted to close said outlet before the level of liquid in said tank falls to the level of said outlet, a second treating chamber, a pipe connecting said outlet with the second chamber, means to maintain a high vacuum in the second chamber, means providing a passage for the withdrawal of degassed liquid from the second tank, and means preventing the escape of gases with the withdrawn liquid.

2. Apparatus for degasifying liquids comprising, in combination, two tanks, pipes

extending upward into the respective tanks and adapted to communicate respectively with the same below the liquid levels therein, float-controlled valves, one for each tank adapted to shut off communication between the body of liquid in each tank and said pipe when the level of the liquid drops below a predetermined height, the pipe communicating with the first tank communicating also with the upper portion of the second tank, means within the second tank and above its bottom portion adapted to spread the liquid in a relatively thin layer over a relatively large area, and a vacuum pump communicating with the second tank.

In testimony of which invention, I have hereunto set my hand, at Poughkeepsie, on this 31st day of March, 1924.

SELDEN H. HALL.