(No Model.)

J. H. MINTO.

METHOD OF AND APPARATUS FOR AERATING LIQUIDS.

No. 483,259. Patented Sept. 27, 1892.

FIG. 1.

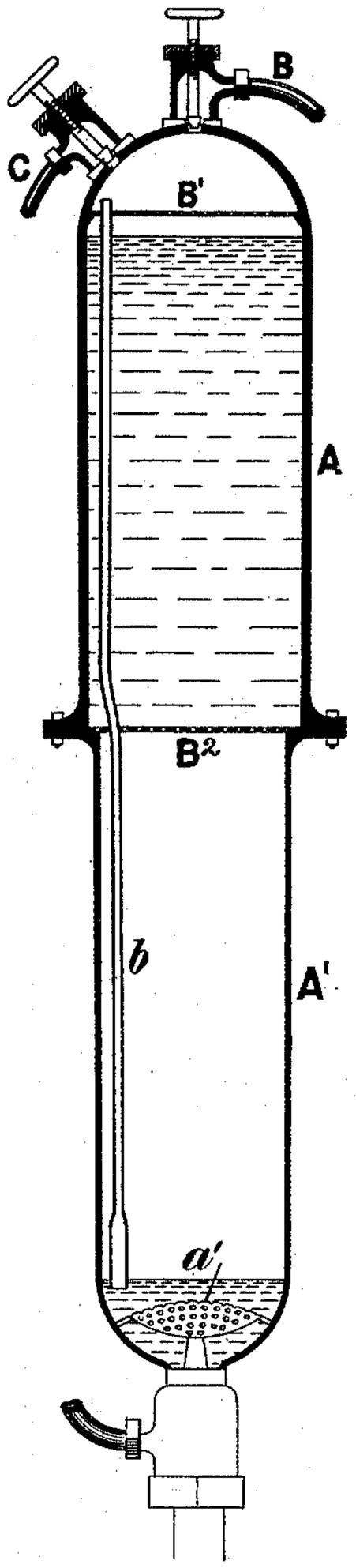


FIG. 5.

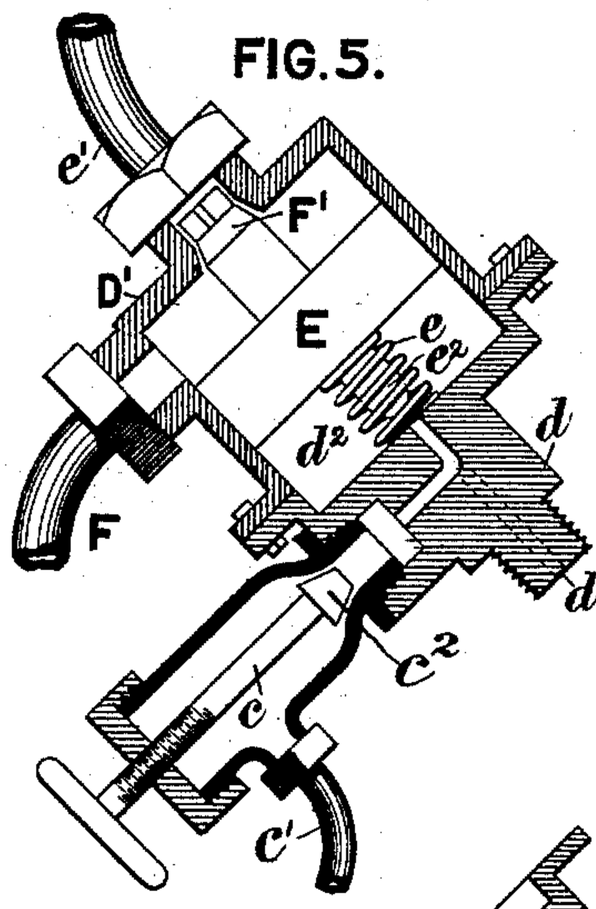


FIG. 6.

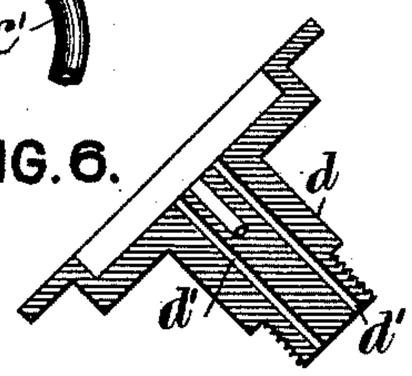


FIG. 2.

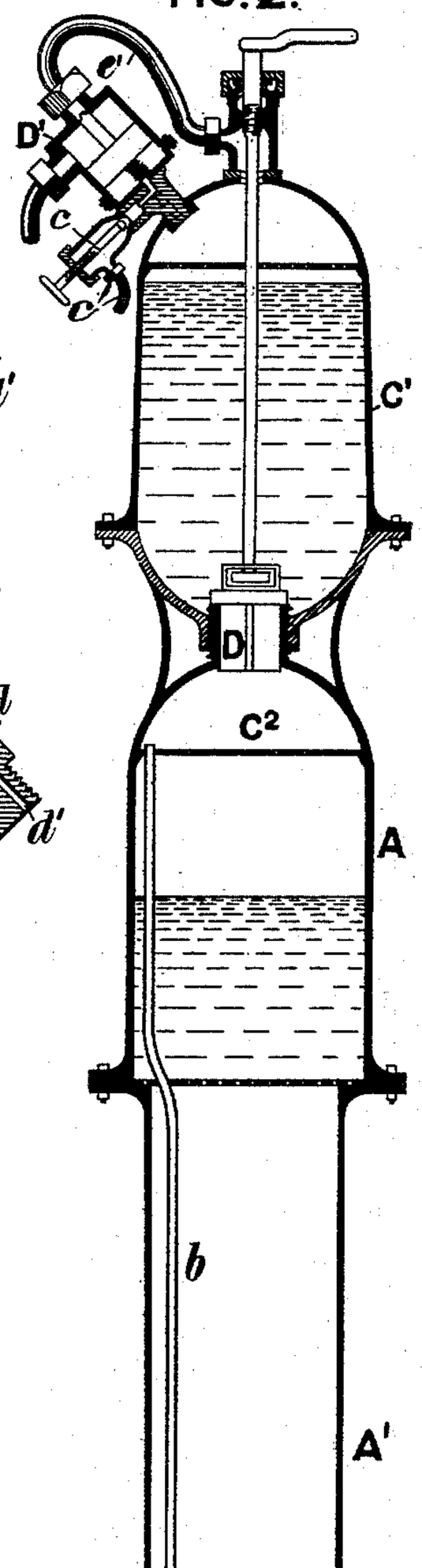


FIG. 4.

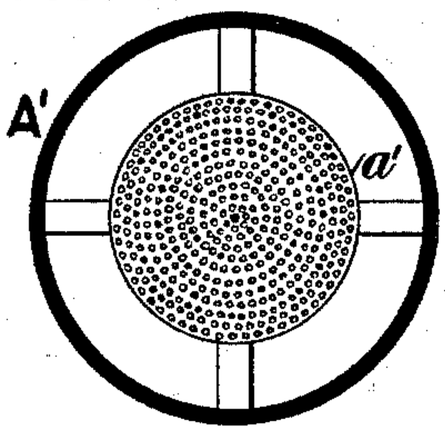
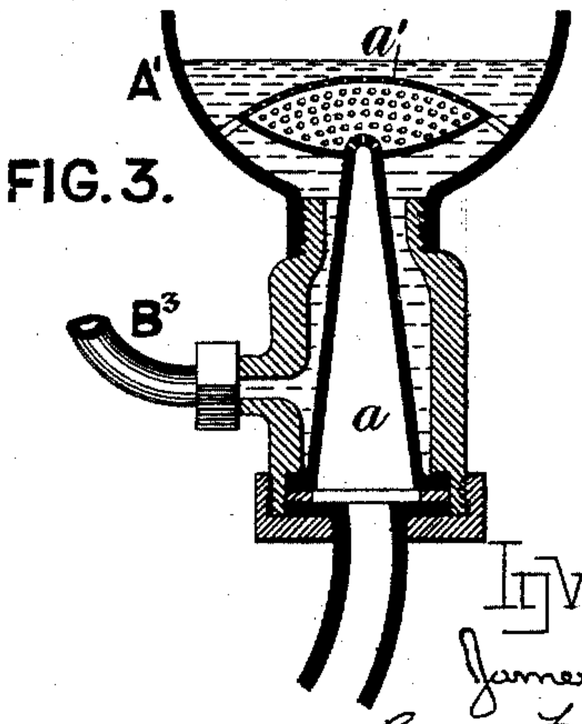


FIG. 3.



Witnesses

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METHOD OF AND APPARATUS FOR AERATING LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 483,259, dated September 27, 1892.

Application filed March 11, 1892. Serial No. 424,538. (No model.)

To all whom it may concern:

Be it known that I, JAMES HUGHES MINTO, a subject of the Queen of Great Britain, and a resident of Liverpool, in the county of Lancaster, England, have invented certain Improvements Methods of Aerating Liquids and Apparatus for Carrying out the Same, of which the following is a specification.

My invention relates to certain improvements in the art of aerating liquids; and the object of my invention is to improve the mode of procedure usually employed in aerating beverages and the like, whereby the process of saturation is rendered substantially continuous and a substantially constant degree of saturation of the aerated liquid is maintained.

My invention also contemplates the provision of new and improved apparatus for carrying my method into effect.

My improved method consists, essentially, in supplying the fresh uncharged liquid to the saturating-chamber in successive portions and in proportion as the saturated or charged liquid therein is withdrawn, whereby the unit of saturation is maintained constant, or substantially so, and the working of the method is rendered substantially continuous.

In lieu of supplying the liquid in an altogether uncharged state to the saturating-chamber, my method also contemplates the utilization of the surplus gas for partially charging the liquid before it is supplied to the saturating-chamber proper, and this is also effected in a substantially continuous manner, all as will be more fully set forth hereinafter.

In the accompanying drawings I have illustrated two forms of the apparatus, differing only in that one is adapted to supply the fresh liquid to the saturating-chamber in a more saturated state than the other, in which drawings—

Figure 1 is a vertical mid-section of a simple form of apparatus constructed according to my invention. Fig. 2 is a similar view of the second form of my improved apparatus. Figs. 3, 4, 5, and 6 are enlarged views illustrating details of construction of the inlet and outlet valves for the gas and liquid.

Referring primarily to Fig. 1, A′ is the saturating-chamber, herein shown as of cylindrical form, and A is the liquid-supply chamber, arranged above chamber A′ and separated therefrom by a diaphragm B^2. The diaphragm B^2 is perforated with minute apertures, which serve to admit the liquid in a fine shower from the upper supply-chamber to the saturating-chamber below.

a is the gas-inlet in the lower part of chamber A′, and this inlet is provided with a rose-nozzle *a*′, by preference, in order to divide the gas issuing therefrom into minute streams of bubbles, which pass through the liquid in the lower end of said chamber, and B^3 is the outlet-pipe for the withdrawal of the saturated liquid, provided, of course, with suitable valves, in order that the liquid may be held in said chamber under pressure normally.

b is a tube, which passes through the diaphragm B^2, the lower end of which is arranged with its mouth normally below the water or liquid level in the saturating-chamber A′, as seen, and the upper end thereof opens into a secondary gas-chamber separated by a second perforated diaphragm B′ from the supply-chamber A.

C is the valve for admitting the liquid-supply to the chamber above the diaphragm B′, and B is the outlet-valve for the gas which has passed through the apparatus and not been taken up.

It will be seen that the gas entering at the gas-inlet *a* bubbles up through the liquid in the saturating-chamber and fills the gas-space above said liquid. After the liquid in the saturating-chamber has been fully saturated it is drawn off, wholly or in part, until the mouth of the tube *b*, hitherto sealed by the liquid, is opened, when the gas from the gas-space will pass up through tube *b* into the chamber above the diaphragm B′, allowing the liquid in the supply-chamber A, which has previously been upheld by the gas in the gas-space, to pass in a shower through the gas in said gas-space. Thus the liquid in the saturating-chamber is maintained at a constant level and at a constant degree of saturation, the supply continuing until the lower mouth of tube *b* has been again sealed by the liquid.

By reason of the minute character of the perforations in the diaphragm B^2 the tension of the gas in the chamber A′ will act against

gravity to prevent the water from falling through said diaphragm until such tension is measurably reduced by the flow of gas from chamber A′ up to the gas-chamber above through the tube *b*, and the gas-tension in chamber A′ will raise a column of water in the sealed tube *b* against the more moderate gaseous tension in the upper chamber; but when the water in chamber A′ falls low enough to unseal the lower end of tube *b* the water in said tube will flow out by gravity and the gaseous tension in chamber A′ will be reduced by the flow of gas up said tube, as before stated, to the secondary gas-chamber above.

In the construction illustrated in Fig. 2 a third chamber C′ is formed above the supply-chamber A, being separated therefrom by a perforated diaphragm C^2 and a valve D. In this case this third chamber only requires to have the gas withdrawn from it when refilling with liquid, which is a great saving. The flow of liquid into the chamber A is regulated by the valve D; but otherwise the mode of action is similar to the preceding construction.

In order to still further reduce the waste of the gas when the machine is worked intermittently or without a pump, I place a valve D′ on the top chamber, which is actuated as follows: The bottom part *d* has two small passages *d′*, Fig. 6, which connect the space under piston or diaphragm E with the gas in the top chamber. The pressure of gas, aided by spring *e*, keeps the valve F′ closed. F is the liquid-supply pipe, *c′* the gas-eduction pipe, and c^2 the gas-eduction valve. If the pressure of gas is, say, fifty-five pounds and the water from the main forty pounds and it is required to fill the chamber C′ with water, the valve D is closed, the stop-valve *c* is opened, and the gas escapes through the gas-eduction pipe *c′* until the pressure of water on the top of piston E overcomes the combined pressure of the remaining gas and the spring *e*, thereby automatically opening the water-valve F′ and closing the gas-valve c^2. The water then flows into the top chamber along the pipe *e′*, and the stop-valve *c* can be closed when the chamber is filled to the required height.

I do not limit myself to using one regulating-tube *b* or to any given number of diaphragms, as under some circumstances it may be necessary to use more.

Having thus described my invention, I claim—

1. The herein-described method of aerating liquids, which consists in automatically regulating the supply of liquid to the saturating-chamber in proportion as the saturated liquid therein is withdrawn, whereby a constant degree of saturation is maintained and the process is made substantially-continuous, as set forth.

2. The herein-described method of aerating liquids in a substantially-continuous manner, which consists in supplying the liquid to the saturating-chamber in a gradual automatically-regulated manner and in proportion as the saturated liquid is withdrawn therefrom, as set forth.

3. In an apparatus for aerating liquids, the combination, with a saturating-chamber provided with a gas-inlet and a liquid-outlet at its lower part and a supply-chamber above the saturating-chamber and connecting with the upper part thereof through the medium of a spraying-inlet, of a pipe connecting the lower portion of the saturating-chamber with the upper portion of the supply-chamber, whereby the lower extremity of said pipe may be unsealed by the withdrawal of liquid from the saturating-chamber, substantially as and for the purposes set forth.

4. In an apparatus for aerating liquids, the combination, with a saturating-chamber provided with a gas-inlet and liquid-outlet at its lower part and a supply-chamber to contain liquid closed against the atmosphere and arranged above the saturating-chamber and separated therefrom by a perforated diaphragm through which the liquid may fall as a spray into the upper portion of the saturating-chamber, of a pipe or like conduit which connects the lower part of the saturating-chamber with the gas-space in the upper part of the closed supply-chamber, whereby when the lower extremity of said pipe is unsealed by the withdrawal of liquid from the saturating-chamber the gaseous pressure in the chambers will be equalized, for the purpose set forth.

5. In an apparatus for aerating liquids, the combination, with the saturating-chamber provided with the inlet for the gas and outlet for the charged liquid, of the supply-chamber A, arranged over the same and provided with the liquid-inlet and gas-outlet, the perforated diaphragm B^2, and the tube *b*, communicating between said chambers, whereby the level of the liquid in the saturating-chamber is maintained, substantially as set forth.

6. In an apparatus for aerating liquids, the combination, with the chambers A and A′, separated by the perforated diaphragm B^2 and provided with outlets and inlets for the liquid and gas, of the tube *b*, communicating between said chambers, whereby the level of the liquid in the saturating-chamber is maintained, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES HUGHES MINTO.

Witnesses:
G. C. DYMOND,
H. P. SHOOBRIDGE.