A. SCHNEIDER.

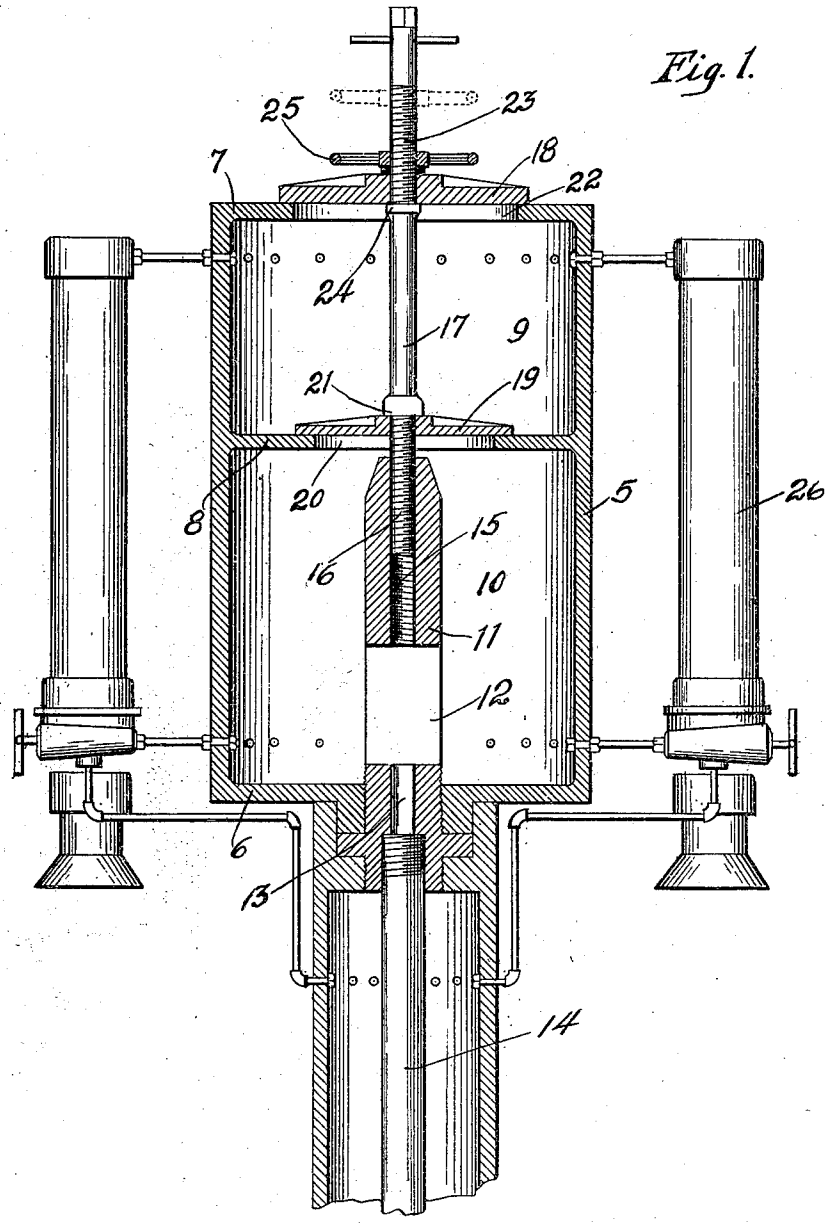
BOTTLE FILLING MACHINE.

APPLICATION FILED MAY 9, 1910.

991,093. **Patented May 2, 1911.**

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

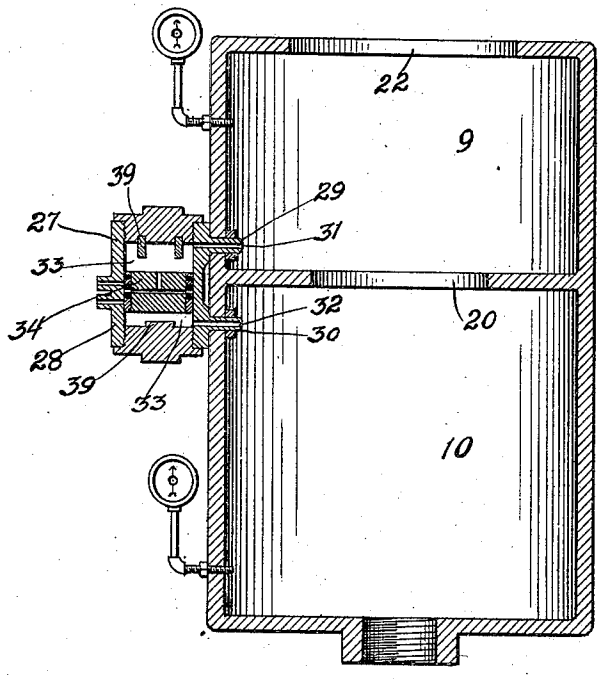


Fig. 2.

Fig. 3.

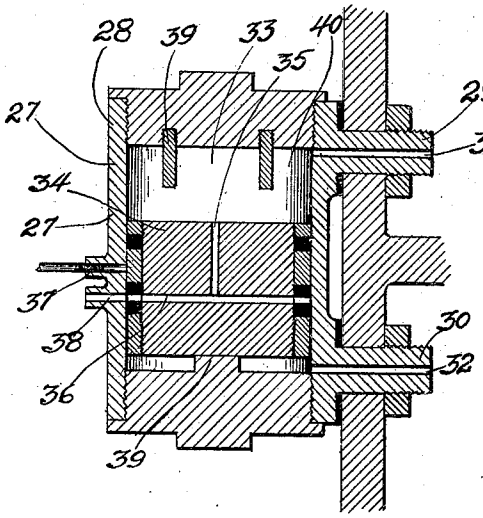
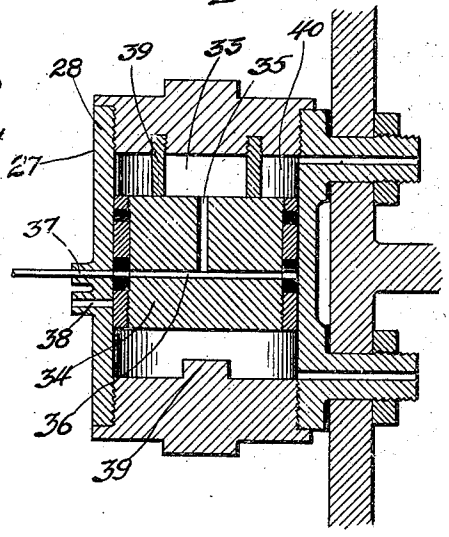


Fig. 4.



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UNITED STATES PATENT OFFICE.

ADOLPH SCHNEIDER, OF CHICAGO, ILLINOIS.

BOTTLE-FILLING MACHINE.

991,093. Specification of Letters Patent. Patented May 2, 1911.

Application filed May 9, 1910. Serial No. 560,111.

To all whom it may concern:

Be it known that I, ADOLPH SCHNEIDER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Bottle-Filling Machines, of which the following is a specification.

The present invention relates more particularly to a construction of tank which will contain separate air and liquid chambers, and to means for maintaining a constant relative pressure within the air and liquid chambers.

The objects of the present invention are, to construct a tank which will have its interior divided by a partition to form an air chamber and a liquid chamber therein, each of which chambers will be sealed, and the air chamber will have communication with the outside air and with a source of pressure supply, which latter communication will be controlled by the movement of a valve member, and the movements of the valve member will be governed by the relative degree of pressure within the chambers, this mechanism serving to maintain a constant relative pressure between the two chambers, the pressure in the air chamber being always less than the pressure in the liquid chamber.

A further object is to maintain a pressure in the air tank during the filling operation, which will be sufficient to exert a certain amount of back pressure onto the air escaping from the package, thus serving to check a violent outflow of the air from the package when it is displaced by the liquor entering the package. And a further object is to construct and locate the covers which seal the various chambers, so that they may be removed simultaneously with one another or independent of one another.

Further objects will appear from the detailed description hereinafter set forth.

In bottle-filling machines as heretofore constructed it has been the general practice to utilize the air forced out from the bottle during the filling operation, as a pressure medium, to force the liquid from the liquid chamber into the package. This operation is technically termed the gravity process. In this process the liquid chamber has communication with the interior of the bottle when the filling mechanism is actuated to a proper position, and when such communication is established, the first action will be an equalization of the pressure between the interior of the bottle and the tank. During this process of equalization, there will be a certain amount of excess pressure accumulated in the tank, and this excess pressure will act upon the liquid to force it into the bottle during the filling operation, so that when communication is established between the liquid chamber and the bottle, the liquor will be forced into the bottle by the excess pressure in the tank over that in the bottle, and the air in the bottle will be displaced by the entrance of the liquor; but while this displacement is going on a constant decrease in pressure will be taking place within the liquid chamber, due to the passing of liquor out of the liquid chamber into the bottle, so that the air displaced from the bottle by the passing of liquid thereinto will rush into the liquid tank to take the place of the pressure which is passing out with the liquid. As stated, the air from the bottle will pass out therefrom into the liquid chamber with a violent rush to take the place of the pressure passing out from the liquid chamber, and in being expelled from the bottle or package in this violent manner will carry with it a greater or less degree of the gas contained in the liquid, permitting an expansion of the gas in the liquid and a consequent foaming. This is especially true where the liquid is in a more or less heated condition and the gas expanded to a greater degree than normal when the liquor enters the bottle.

With a tank of the nature disclosed in the present invention, the liquid chamber and the air chamber will be independent of one another, and an initial pressure is created within each of the chambers, the pressure in the liquid chamber exceeding the pressure in the air chamber by a slight degree, as will be more fully hereinafter set forth. The pressure in the bottle is first equalized to that in the air chamber, and when excess pressure is produced in the air chamber over that in the liquid chamber, it is expelled therefrom by action of an automatic valve mechanism, which will be hereinafter more fully described. The pressure in the air chamber and the bottle being thus equalized, the pressure in the bottle will be slightly less than the pressure in the liquid chamber, and hence when communication is established by the action of the filling mechanism between the liquid chamber and

the bottle, the liquid will enter the bottle by reason of the excess pressure thereon and the air will be displaced from the bottle. However, when this displacement of air is taking place, it will not rush out therefrom violently, as is the case in the structures heretofore described, but will flow into the air chamber with a smooth, easy movement, because of the fact that no decrease in pressure is produced in the air chamber, which the air will rush in to fill after leaving the bottle, and the pressure in the air chamber being but slightly less than the pressure forcing the air from the bottle, the constant pressure in the air chamber will exert a certain amount of back pressure upon the air leaving the bottle, checking the violent outflow of the air from the bottle and reducing to a minimum the escape of gas with the air; and the pressure in the liquid chamber will be regenerated from time to time by the air and gas escaping with the liquid, but should an excess pressure occur in the air chamber, it will be vented by the actions of a valve hereinafter described.

In the drawings, Figure 1 is a sectional elevation of the tank of the present invention; Fig. 2, a sectional elevation showing the valve mechanism for maintaining relative pressure between the tanks in neutral position, and showing the covers for the chambers, and the stem upon which they are mounted removed; Fig. 3, an enlarged detail of the valve mechanism showing it in position to exhaust pressure from the air chamber; and Fig. 4, a detail of the valve mechanism showing it in position to supply pressure to the air chamber.

The tank consists of a body portion 5 of suitable size and configuration, said body portion comprising a lower transverse wall 6, an upper transverse wall 7, and an intermediate transverse wall 8, the intermediate wall dividing the interior of the tank into two compartments, an upper compartment 9 and a lower compartment 10, the upper compartment serving as an air chamber and the lower compartment serving as a liquid chamber.

Entering into the lower or liquid compartment 10 is an elongated stem or boss 11, having a transverse slot 12 in the lower end thereof and a passageway 13 leading from said slot and communicating with a liquid supply pipe 14. Formed in the upper end of the boss 11 is a screw-threaded recess 15, into which is entered the screw-threaded lower end 16 of a rod or stem 17; and screw-threaded onto the rod or stem 17 is an upper cap 18 and a lower cap 19. The lower cap 19 forms a closure for an opening 20 in the transverse wall 8, and is held in position by an abutment 21 formed upon the stem 17 and bearing against the upper face of the cap. The cover 18 forms a closure for an opening 22 in the upper wall 7, and is mounted upon a screw-threaded surface 23 on the upper end of the rod 17 and rests against an abutment 24 on the rod 17, which bears against the lower face of the cap, and the cap is secured in position by means of a hand-wheel 25, which operates upon the screw-threaded surface 23.

Communicating with the air and liquid chambers are bottle-filling mechanisms 26, which may be of any well known and usual type of construction. Located adjacent to the tank is a valve casing 27, comprising a body portion 28, having thereon nipples 29 and 30 extending through the walls of the tank into the air and liquid chambers, respectively, and the nipples are provided with passageways 31 and 32, which communicate with the interior of the air and liquid chambers respectively and with the chamber 33 formed in the interior of the casing 27. Operating within the casing 27 is a pressure-actuated valve 34, which in the form shown is in the nature of a piston, provided with a vertical pasageway 35 and a transverse or horizontal passageway 36 communicating therewith, and when the piston is in the position shown in Fig. 4, pressure is being admitted to the air chamber through the passage 31, passage 35, passage 36, and a passage 37 leading from a source of pressure, with which the passageway 36 is adapted to register. When the piston is moved to the position shown in Fig. 3, the passage 36 will communicate with an exhaust passage 38 formed in the casing, and pressure will be exhausted through the passage 31 and the passages 35, 36 and 38. Thus, as the piston is actuated up and down within the chamber of the casing by an excess pressure in either of the chambers, air will be exhausted from the air chamber or admitted to the air chamber accordingly as pressure is received or lowered in the liquid chamber.

The valve in the position shown in Fig. 2 is in normal position, and, as shown, is raised slightly to clear the floor of the casing 27. Thus, in order to hold the valve in this position, the pressure in the liquid chamber at this time must be sufficient to overcome the pressure exerted upon the upper face of the piston by the pressure in the air chamber, and also overcome the force of gravity which is being exerted upon the piston to lower it within the casing. Thus a slightly increased pressure will be necessary in the liquid chamber over that of the air chamber in order to hold the valve in normal position. This excess of pressure will, of course, be varied according to the weight of the valve. For an example, we will say that an initial pressure of ten pounds is placed in the liquid chamber, and the weight of the valve is one-half pound.

Pressure will be admitted to the air chamber until sufficient pressure is contained therein to combine with the pressure produced by the action of gravity upon the valve member and equal the pressure in the liquid chamber. It is contemplated that the valve will be so positioned that the excess pressure necessary to maintain it in normal position will be approximately the weight of the valve. Hence, in the situation set forth by the above noted set of figures, pressure will be admitted to the air chamber until nine and one-half pounds of pressure are produced therein, which, together with the valve, will equalize the force exerted by the ten pounds of pressure in the liquid chamber, to maintain the valve in position where communication will be cut off between the air chamber and the outside air and between the air chamber and source of pressure supply.

If desired, stop members 39 may be positioned in the interior of the chamber of the casing 27, to limit the movement of the valve in either direction. These stop members check the movement of the valve so that a space 40 is always left between the floor of the casing and the face of the valve, so that pressure may enter therein and act upon the face of the piston to move it.

The operation briefly is as follows: Initial pressure is produced in the liquid chamber, and pressure is admitted to the air chamber by the actions of the valve member 34 until the desired relative pressure is produced in each of the chambers. The device is then in condition to perform the filling operation, which is accomplished with the foregoing stated result. When it is desired to remove the caps or covers from their normal positions, both covers may be removed simultaneously by the rotating of the rod 17 to bring its screw-threaded end 16 out from engagement with the boss 15. The rotating of the rod to withdraw it from the boss will result in the lifting of the cover from engagement with the wall 8 when the rod is withdrawn from the boss 15 and lifted from the tank, the covers will be lifted simultaneously therewith. If, however, it is desired to remove the upper cap or cover without disturbing the position of the rod 17, this can be done by turning the hand-wheel 25 into the position shown in dotted lines in Fig. 1, when the cover can be easily withdrawn from its position and admisison to the air chamber be possible.

I claim:

1. In a bottle filling machine, the combination of a tank having therein a liquid chamber and an air chamber independent of one another, each of the chambers being sealed to prevent the commingling of the air and liquid, package filling mechanism connected to the tank, means for regulating the pressure in the chambers, whereby a constant relative pressure is maintained between the chambers, the pressure in the air chamber being a predetermined amount less than the pressure in the liquid chamber, the pressure in the air chamber remaining constant at all times with respect to the pressure in the liquid chamber and exerting a back pressure to prevent the sudden escapement of air from the package when it is replaced by the liquid during the filling operation, substantially as described.

2. In a bottle-filling machine, the combination of a tank, having therein a liquid chamber and an air chamber independent of one another, each of the chambers being sealed to prevent the commingling of air and liquid, package-filling mechanism connected to the tank, means for constantly maintaining a predetermined increased pressure in the liquid chamber over that in the air chamber, means for automatically exhausting the excess pressure in the air chamber, said means being operated by excess pressure in the liquid chamber whereby pressure is maintained between the air chamber and the package during the filling operation, the pressure in the air chamber being slightly less than the pressure in the liquid chamber and remaining constant at all times with respect to the pressure in the liquid chamber, the pressure in the air chamber exerting a back pressure to prevent the quick escapement of air displaced from the package by the liquid during the filling operation, substantially as described.

3. In a bottle-filling machine, the combination of a tank, divided in its interior by a partition wall into a liquid chamber and an air chamber, means for sealing said chambers to prevent the commingling of air and liquor, means for breaking said seal, package-filling mechanism connected to the tank, means for regulating the pressure in the chambers, whereby a constant relative pressure is maintained between the chambers, the pressure in the air chamber being a predetermined amount less than the pressure in the liquid chamber, the pressure in the air chamber remaining constant at all times with respect to the pressure in the liquid chamber and exerting a back pressure to prevent the sudden escapement of air from the package when it is displaced by the liquid during the filling operation, substantially as described.

4. In a bottle-filling machine, the combination of a tank, divided in its interior by a partition wall into a liquid chamber and an air chamber, means for sealing said chambers to prevent the commingling of air and liquor, means for breaking said seal, package-filling mechanism connected to the tank, means for constantly maintaining a slightly increased pressure in the liquid chamber over that in the air chamber, means for au-

tomatically exhausting the excess pressure in the air chamber, said means being operated by an excess of pressure in the liquid chamber whereby a constant lower pressure is maintained in the air chamber and the package during the filling operation, over that in the liquid chamber, the pressure in the air chamber exerting a back pressure to prevent the quick escapement of air displaced from the package by the liquid during the filling operation, substantially as described.

5. In a bottle filling machine, the combination of a tank having therein a liquid chamber and an air chamber independent of one another, package filling mechanism connected to the tank, a casing located adjacent to the tank, a valve within the casing in the form of a piston, connections between the casing and the tank extending upon the outside thereof and serving as a means of communication between the chambers of the tank and the interior of the casing, said casing having a passage communicating with the outside air, said piston being actuated to automatically vent and admit pressure from the air chamber by the falling and rising respectively of the pressure in the liquid chamber, whereby a constant relative pressure is maintained between the chambers, the pressure in the liquid chamber always exceeding the pressure in the air chamber by a predetermined amount, the pressure in the air chamber exerting a back pressure to prevent quick escapement of air displaced from the package by the liquid during the filling operation, substantially as described.

6. In a bottle filling machine, the combination of a tank having therein a liquid chamber and an air chamber independent of one another, package filling mechanism connected to the tank, a casing located adjacent to the tank, a valve within the casing in the form of a piston, connections between the casing and the tank extending upon the outside thereof and serving as a means of communication between the chambers of the tank and the interior of the casing, said casing having a passage communicating with the outside air and a passage communicating with a source of pressure supply, said piston being actuated to automatically vent excess pressure from the air chamber and admit pressure to the air chamber by the falling and rising respectively of the pressure in the liquid chamber, whereby a constant relative pressure is maintained between the chambers, the pressure in the air chamber exerting a back pressure to prevent quick escapement of air displaced from the package by the liquid during the filling operation, said valve being held in neutral position when an excess pressure is produced in the liquid chamber over that in the air chamber, said excess pressure being equal to the weight of the valve member, substantially as described.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents Washington, D. C."