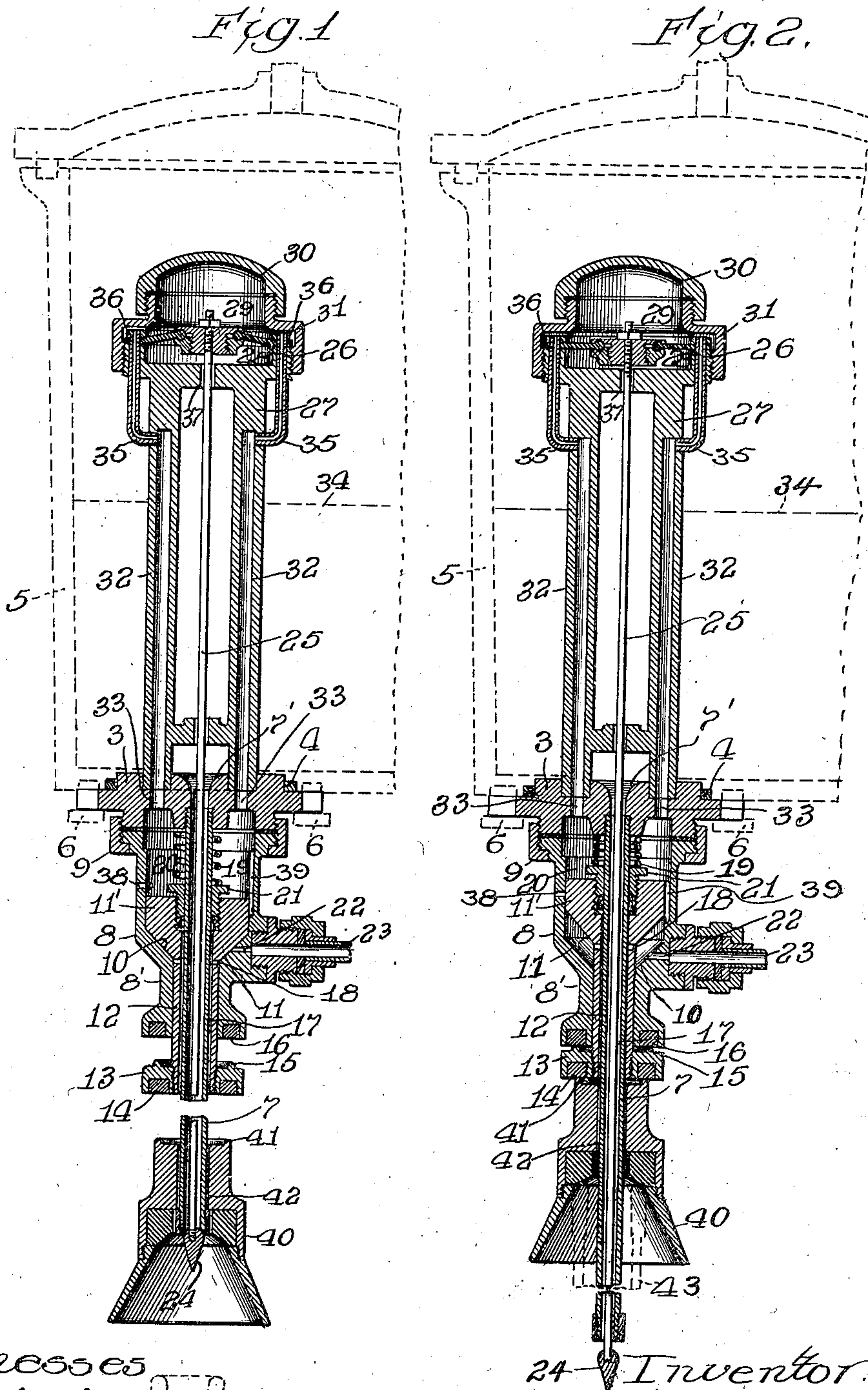


F. C. H. STRASBURGER.  
FILLING MACHINE.  
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948,463.

Patented Feb. 8, 1910.



Witnesses  
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# UNITED STATES PATENT OFFICE.

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## FILLING-MACHINE.

948,463.

Specification of Letters Patent.

Patented Feb. 8, 1910.

Application filed December 26, 1908. Serial No. 469,434.

*To all whom it may concern:*

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

This invention relates to machines for filling bottles with beer or other charged liquids and its object is to accomplish the filling operation without the loss of gas in suspension in the liquid and without the production of foam in the bottles. In the attainment of this primary object the invention also has for its object to utilize the pressure in the liquid tank for closing the liquid valve; to establish a counter-pressure in the bottle before the liquid valve is opened; to operate the liquid valve by a diaphragm and cause the valve to open by equalizing the pressure on both sides of the diaphragm; and to close the liquid valve by exhausting the pressure on one side of the diaphragm.

Another important object of the invention is to close the liquid valve before releasing the pressure on the bottle so that there will be no liability of liquid being discharged into the bottle after the pressure is released. And still another object of the invention is to provide a filling mechanism of simple and novel construction which requires no stuffing boxes in the liquid tank and which embodies a liquid valve located at the lower end of the filling tube and operated by pressure in the tank to prevent dripping.

In the accompanying drawings illustrating one embodiment of the invention Figure 1 is a sectional elevation showing the valves in closed position and Fig. 2 is a similar view showing the parts in filling position.

Referring to the drawings, 3 designates the body of the filling mechanism which is secured in an opening 4 in the bottom of the liquid tank 5 by bolts 6, as shown, or by any other suitable means. A depending filling tube 7 is secured to the body and communicates with the fluid passage 7' therein. A valve casing 8 is secured beneath the body 3 by a threaded ring 9 and in the construction illustrated in the drawings this valve casing is reduced in diameter at 8' and it is provided above said reduced part with a conical seat 10 for the air valve 11 which is adapted to move vertically in the casing on the filling tube. The valve 11 is conical in shape where

it engages the seat 10 and cylindrical in shape at 11' to fit snugly in the casing above the valve seat. The valve also has a sleeve 12 which extends downward through the reduced part of the valve casing and carries a head 13 at its lower end below the casing 8. This head 13 is provided on its underside with a gasket 14 and on its upper side with a circular rib 15 to engage the gasket 16 at the lower end of the valve casing. An air passage 17 is provided between the filling tube and the sleeve 12 to communicate with the radial passages 18. A spring 19 is arranged on the filling tube within the air chamber 20 and between the body 3 and a stuffing box 21 at the upper end of the air valve 11 and this spring normally holds said valve seated to close the air inlet passage 22.

If it is desired merely to equalize the pressure in the bottle and the tank before the filling operation begins the air pressure may be supplied through a tube 23 extending up in the liquid tank above the level of the liquid therein in a familiar manner, but if it is desired to obtain a greater pressure in the bottle than in the liquid tank this air tube may be connected with a suitable source of air supply. The latter arrangement is employed to compensate for the hydrostatic head of the liquid in the filling tube which is of more or less importance as the case may be under the varying conditions which exist in bottling houses.

The liquid valve 24 is arranged to seal the lower end of the filling tube and is carried by a rod 25 which is connected at its upper end to a diaphragm 26. This diaphragm is secured in a casing designated generally 27 and provided with a pressure chamber 28 below the diaphragm and a counter-pressure chamber 29 above the diaphragm. The casing also comprises a removable cap 30 and collar 31 and two tubular members 32 which register with openings 33 in the bed 3. The tubular members are of sufficient length to support the upper part of the casing above the usual level 34 of the liquid in the tank. Air tubes 35 lead off from the tubular members 32 and communicate with passages 36 which open into the counter-pressure chamber 29. The opening 37 in the casing 27 through which the rod 25 passes is sufficiently large to permit constant communication between the



pressure chamber 28 and the tank so that the pressure in said chamber will always be equal to the pressure in the tank.

One or more openings 38 is provided in the casing 8 to permit the escape of air from the counter-pressure chamber 29 as the air valve is closing so that the liquid valve may be closed before the air valve is seated. A by-pass 39 is located in the casing 8 so that it will not be opened until the exhaust opening 38 is closed on the upward movement of the air valve and so that it will be closed before the exhaust opening is opened on the downward movement of the air valve.

A centering bell 40 is slidably arranged on the filling tube 7 to properly position the bottles thereon, and it has a circular rib 41 at its upper end to engage the gasket 14 on the head 13 of the air valve. The bell has an air passage 42 to register with the passage 17.

In practice the air valve is held normally closed by the spring 19 and the liquid valve is held normally closed by the pressure in the chamber 28 under the diaphragm, the chamber 29 above the diaphragm being open to the atmosphere through the passages 36, tubes 35, tubular members 32, openings 33, chamber 20 and exhaust opening 38. When a bottle 43 is moved up to filling position the centering bell first engages the head 13 and unseats the air valve 11 to admit pressure to the bottle, which pressure, as before stated, may be equal to or greater than the pressure in the liquid tank and taken therefrom or elsewhere. As the air valve is unseated and pushed upward against the spring 19 the pressure is first admitted to the bottle, as just stated, then the exhaust opening 38 is closed, and then the by-pass 39 is opened to admit pressure to the counter-pressure chamber 29 above the diaphragm. Thus the pressure above the diaphragm is equalized with or made greater than the pressure below the diaphragm and this permits the liquid valve to open. If the pressure on both sides of the diaphragm is equalized the liquid valve will open by gravity and the weight of the column of liquid sustained thereby; if there is a greater pressure above than below the diaphragm this will assist in opening the liquid valve. The head 13 is permitted a sufficient travel to open the by-pass 39 and there should be sufficient time between the opening of communication between the air inlet 22 and the bottle and the opening of the by-pass to enable the desired pressure to be established in the bottle and the exhaust opening 39 to be closed. Thus the liquid valve is opened by the same pressure that is admitted to the bottle but not until the counter-pressure has been fully established in the bottle so that when the liquid valve is opened the liquid will flow "dead" into the bottle and without

the loss of gas or the production of foam. When the bottle is filled and lowered on the filling tube the spring 19 presses the valve 11 to its seat thereby first closing the by-pass, then opening the exhaust opening and finally closing the air inlet 22. When the exhaust opening is opened on the downward movement of the air valve the pressure above the diaphragm escapes and the pressure below the diaphragm then operates the diaphragm to close the liquid valve. This takes place before the air inlet 22 is closed and hence the air pressure remains on the bottle during and after the closing of the liquid valve which prevents any liability of liquid being discharged into the bottle while the bottle is being removed from the filling tube or after the pressure on the bottle has been withdrawn.

What I claim and desire to secure by Letters Patent is:

1. In a counter-pressure filling machine, the combination of a liquid tank, a filling tube depending from the tank, a liquid valve, means operated by the pressure in the tank for holding said valve normally closed, a counter-pressure supply, means for establishing communication between the counter-pressure supply and the bottle before the filling valve is opened, means operated by pressure from the counter-pressure supply for counter-balancing the pressure which holds the filling valve normally closed to permit said valve to open after the counter-pressure has been established in the bottle, and means for maintaining said pressure on the bottle after the filling valve is closed.

2. In a counter-pressure filling machine, the combination of a liquid tank, a liquid valve, and means operated by the pressure on the liquid in the tank for closing said valve.

3. In a counter-pressure filling machine, the combination of a liquid tank, a liquid valve, and means operated by the pressure on the liquid in the tank for closing and holding said valve normally closed.

4. In a counter-pressure filling machine, the combination of a liquid tank, a liquid valve, means operated by the pressure on the liquid in the tank for holding said valve normally closed, and means independent of the pressure in the tank for overcoming said pressure operating to hold the valve closed to permit the valve to open.

5. In a counter-pressure filling machine, the combination of a liquid tank, a liquid valve, means operated by the pressure on the liquid in the tank for holding said valve normally closed, and independent means for counter-balancing said pressure to permit the valve to open.

6. In a counter-pressure filling machine, the combination of a liquid tank, a liquid valve, a diaphragm connected to said valve



and operated by the pressure in the tank to hold the valve normally closed, and means for overcoming said pressure to open the valve.

5 7. In a counter-pressure filling machine, the combination of a liquid tank, a liquid valve, a diaphragm connected to said valve, said diaphragm being subjected on one side thereof to the pressure in the tank, and  
10 means for supplying sufficient pressure on the other side of the diaphragm to counter-balance the said pressure in the tank and permit the valve to open.

8. In a counter-pressure filling machine,  
15 the combination of a liquid tank, a liquid valve, a diaphragm connected to said valve, said diaphragm being normally subjected on one side thereof to the pressure in the tank and intermittently subjected on the other  
20 side thereof to a pressure less than the pressure in the tank and to a pressure as great as the pressure in the tank.

9. In a counter-pressure filling machine, the combination of a liquid tank, a filling  
25 tube depending from the tank, a liquid valve at the lower end of said tube, and means operated by the pressure in the tank for closing said valve.

10. In a counter-pressure filling machine,

the combination of a liquid tank, a filling 30 tube depending from the tank, a liquid valve at the lower end of said filling tube, means operated by the pressure in the tank for holding said valve normally closed, and means for counter-balancing said pressure 35 to permit the valve to open.

11. In a counter-pressure filling machine, the combination of a liquid tank, a filling tube depending from the tank, a liquid valve, a diaphragm connected to said valve and 40 operated by the pressure in the tank to hold the valve normally closed, and means for overcoming said pressure to open the valve.

12. In a counter-pressure filling machine, the combination of a liquid tank, a filling 45 tube depending from the tank, a liquid valve at the lower end of said tube, a diaphragm within the tank, a rod connecting said diaphragm and valve, said diaphragm being normally subjected to the pressure in the 50 tank to hold the valve closed, and means for counter-balancing said pressure to permit the valve to open.

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