R. W. WEBSTER & L. CHEW.

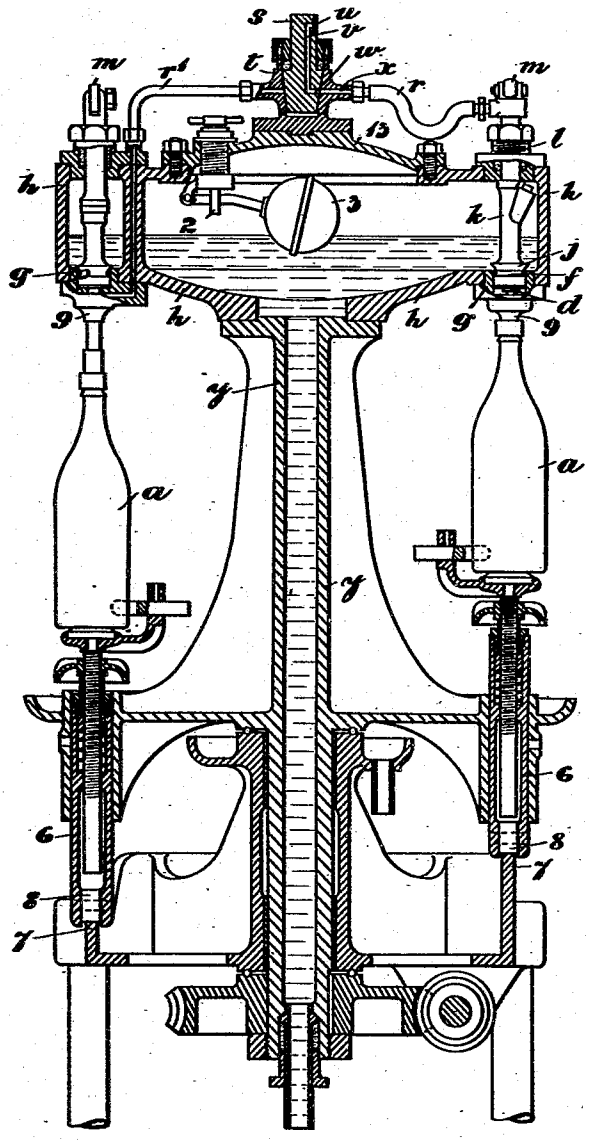
COUNTER PRESSURE BOTTLING MACHINE FOR BEER, MINERAL WATERS, AND THE LIKE.

APPLICATION FILED AUG. 10, 1907.

921,032. **Patented May 11, 1909.**

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses.

Stephen Edward Gunyon

William Anderson Smith

Inventors.

Ralph Webster

Lewis Chew

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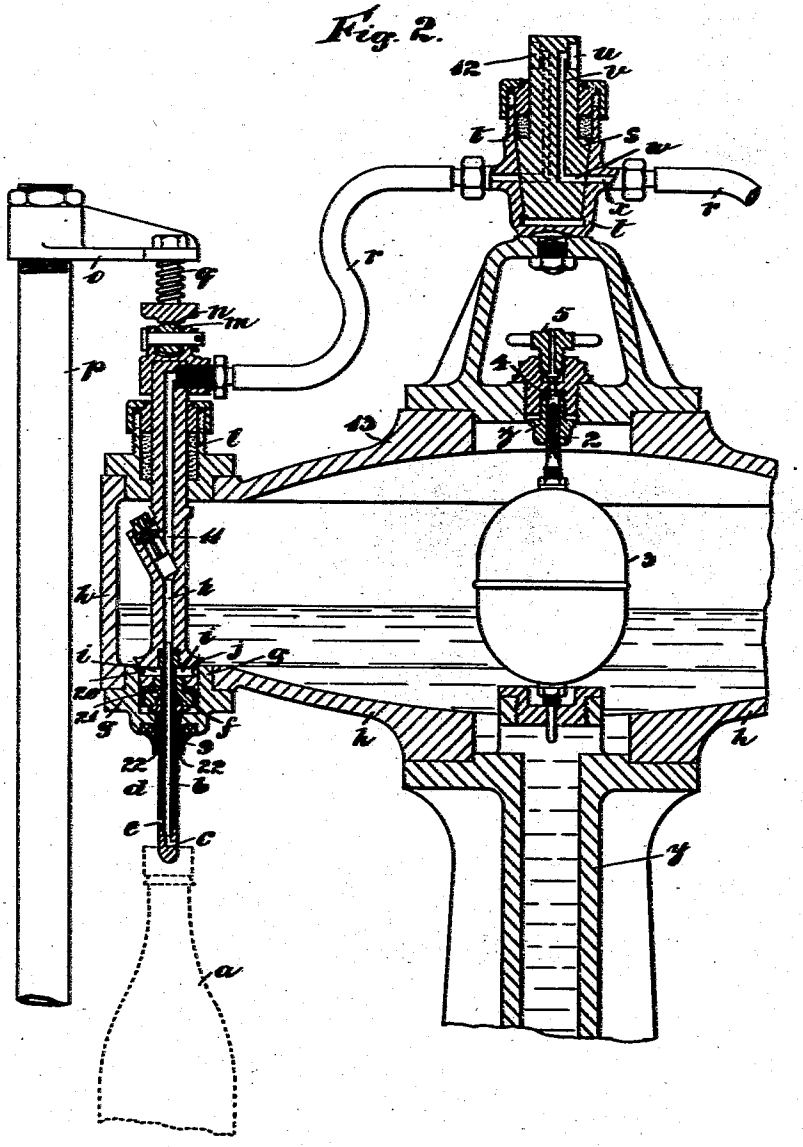
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4 SHEETS—SHEET 2.

Fig. 2.



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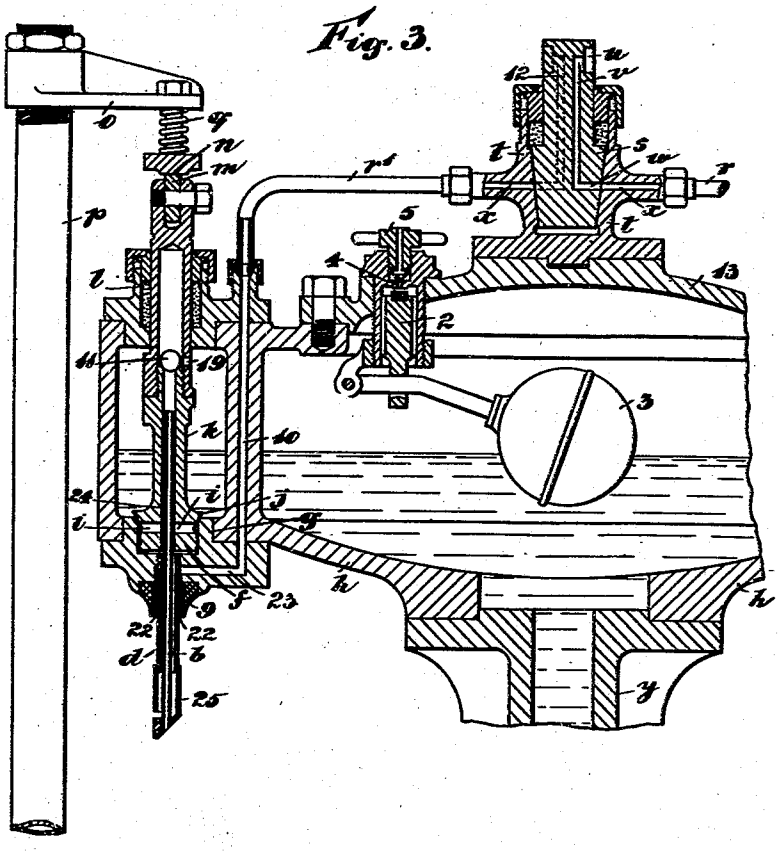
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4 SHEETS—SHEET 3.

Fig. 3.



Witnesses.

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4 SHEETS—SHEET 4.

Fig. 7.

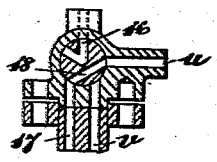


Fig. 8.

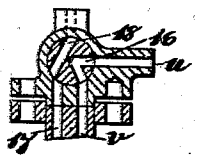


Fig. 4.

Fig. 6.

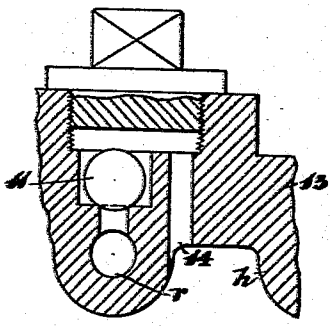
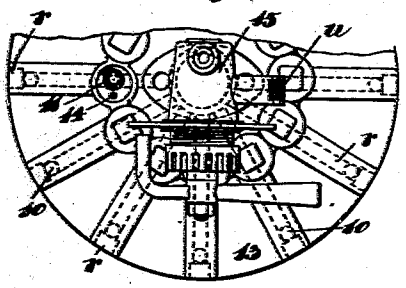


Fig. 5.



Witnesses.

Stephen Edward Finnigan

William Anderson Smith

Inventors.

Ralph Waldo Webster

Lewis Chew.

UNITED STATES PATENT OFFICE.

RALPH WALDO WEBSTER, OF LONDON, AND LEUIG CHEW, OF SAXILBY, ENGLAND, ASSIGNORS TO H. J. WEST AND COMPANY, "LIMITED," OF SAXILBY, ENGLAND.

COUNTER-PRESSURE BOTTLING-MACHINE FOR BEER, MINERAL WATERS, AND THE LIKE.

No. 921,032. Specification of Letters Patent. Patented May 11, 1909.

Application filed August 10, 1907. Serial No. 388,070.

To all whom it may concern:

Be it known that we, RALPH WALDO WEBSTER and LEUIG CHEW, both subjects of the King of Great Britain, residing at London and Saxilby, England, have invented new and useful Improvements in Counter-Pressure Bottling-Machines for Beer, Mineral Waters, and the Like, of which the following is a specification.

This invention relates to improvements in machines for filling bottles, jars, and other like vessels, in which a counter-pressure is created to enable beers, mineral waters, and the like, having a natural or artificial condition or pressure, to be bottled without undue foaming or loss of condition.

Our invention is specially applicable to that description of bottle-filling machine in which the bottles are placed one by one in the machine, are charged and removed for corking or stoppering, during the rotation of the machine, thereby enabling the placing of empty bottles in position, the charging of same, and the removal of charged bottles, to be carried on continuously.

In the accompanying four sheets of drawings Figure 1 is a vertical section of so much of a bottling machine as is necessary to illustrate our invention, the arrangement of bottling device on the left hand side of the figure differing in certain details from that shown on the right hand of the figure; Fig. 2 is an enlarged section of the bottling device shown on the right hand side of Fig. 1, with other modifications of the apparatus; Fig. 3 is a similar view to Fig. 2 of the bottling device shown on the left hand side of Fig. 1; Fig. 4 is a similar view to Figs. 2 and 3 with further modifications of the apparatus; Fig. 5 is a partial plan view of Fig. 4; Fig. 6 is a detail view of a non-return valve shown also in Figs. 4 and 5; and Figs. 7 and 8 are further detail views in connection with Fig. 4.

Similar characters denote like parts in all the figures of the drawings.

Referring to the device illustrated on the right hand side of Fig. 1, and to a larger scale in Fig. 2, *a* is the bottle into which the pressure is admitted by a tube *b* extending downward into the interior of the bottle to a convenient distance, and terminating at its lower end in a nozzle *c* opening into the bottle *a*.

d is a tube for the supply of beer, mineral waters or the like (hereinafter referred to as a beer tube) surrounding the air pressure tube *b*, and provided at its lower end with a passage *e* into the bottle *a*.

f is a piston or plunger above the upper end of the beer tube *d* and adapted to rise and fall liquid-tight in a cylindrical chamber *g* fitted to (or formed in) the bottom of the beer, mineral water, or the like reservoir (hereinafter referred to as a beer reservoir *h*). This piston or plunger *f* may be attached to the beer tube *d* as shown in Fig. 2, or it may be entirely separate therefrom as shown in Figs. 3 and 4. At the upper end of the piston or plunger *f* is formed a differentially acting valve *j* the stem *k* of which is suitably guided in a stuffing-box *l* in the upper part of the beer reservoir *h* as shown. It will be understood that the effective area of the upper side of the valve *j* is less than that of the lower side of the piston *f* owing to part of the upper side being covered by the stem *k*. The upper end of the cylindrical chamber *g* above the piston or plunger *f* is capable of being opened to the beer reservoir *h* as hereinafter described, and annular, radial, and vertical passages 20, *i*, and 21 then communicate between the beer reservoir *h* and the annular space between the interior of the beer tube *d* and the exterior of the pressure tube *b*. The differentially acting valve *j* is arranged to close the upper end of the cylindrical chamber *g* during a certain part of the rotation of the machine and thereby prevent beer flowing into the bottle *a*. This may be effected by any suitable fixed device which does not rotate with the machine, and which acts at definite predetermined periods upon a roller *m* carried by the upper end of the valve stem *k*. Such a device is illustrated in Figs. 2 and 3 in which *n* is a cam surface carried by a bracket *o* attached to the fixed column *p*, which may form part of the framework of the machine. Springs *q* interposed between the fixed bracket *o*, and the cam surface *n* allow the latter to yield to a certain extent as the roller *m* engages therewith and thereby prevent undue jar.

It will be understood that as the effective area of the underside of the piston or plunger *f* exceeds that of the upper side of the valve *j*, in the event of the underside of the piston or plunger *f* being subjected to the same or nearly the same pressure as that of the upper

side of the valve *j* the piston or plunger *f* will be caused to rise and the valve *j* be opened. Consequently so long as there is no bottle in position, or if a leaky bottle is in position, or if the bottle breaks when subjected to the pressure of the incoming air or gas, the valve *j* will be kept in the closed position by the superior pressure in the beer reservoir *h* acting upon the upper surface of such valve, and no beer will be allowed to escape. But as soon as the pressure in the bottle reaches approximately the pressure in the beer reservoir, the said pressure will act upon the underside of the piston or plunger, which being as already stated of greater effective area than the upper side of the valve *j*, will raise the said valve and allow beer to flow into the bottle.

The valve stem *k* may be hollow and form a passage from the pressure tube *b* through the flexible connection *r* to a special plug cock or valve mounted centrally at the top of the machine as shown, and rotating with the same. The plug *s* of this central cock is held stationary by a fixed arm (not shown in the drawings) from the frame f the machine, or otherwise, and the gas or other pressure is introduced into such plug at *u* from a gas bottle or any other desired source of supply, and passes along the passages *v w* into the port *x* in the shell or casing *t* of the said cock.

11 is a non-return valve in the pressure passage in the valve stem *k* for preventing loss of pressure in the beer reservoir *h* when the nozzle *c* of the pressure tube *b* is open to the atmosphere, as for example when there is no bottle in position, or when a bottle breaks, or is faulty.

The reservoir *h* is kept charged with beer through the hollow central revolving stem *y* of the machine, and the desired level of beer may be maintained in the said reservoir by any suitable means, such as, for example, either of the forms of pressure-relief valve 2 illustrated clearly in Figs. 2 and 3. These valves are caused to open communication between the upper part of the reservoir *h* and the atmosphere by the falling of the floats 3 when the level of the beer is reduced, thereby momentarily relieving the top pressure in the reservoir *h*, destroying the balance, and allowing the beer to rise, the valves 2 then closing against their seatings 4 as soon as the normal level of beer is reached, thus stopping the reduction of pressure and consequently the inflow of beer. The orifices which are acted upon by the valves 2 may also be opened or closed by hand by operating the screw-down plugs 5 when required, as for example, on starting the machine when it is advisable to first create a pressure in the beer reservoir *h* before admitting the liquid.

Means for rotating the machines, for regulating the position of the bottle-holders 6 according to the size of the bottles to be used and for raising the bottle into the filling position, and lowering them when filled, are shown in Fig. 1, but they may be of any other suitable arrangement without departing from our invention.

The action of the above described apparatus is as follows:—When the empty bottle *a* (for example) is placed in position to be filled, as shown on the left hand of Fig. 1, the differentially acting beer valve *j* and the port *x* in the casing or shell *t* of the central plug cock are in the closed position, and as the bottle *a* is carried around by the rotation of the machine, it is raised, by means of the cam surface 7 acting upon the roller 8, into the position shown on the right hand side of Fig. 1 so that the top of its neck bears against an india rubber or other pad or plug 9 thus making a more or less gas-tight joint between the bottle neck and the delivery part of the machine *g*. The continued rotation of the machine brings the port *x* in the casing or shell *t* of the central plug or cock opposite the passage *w* in the stationary plug *s*, and pressure is thereby admitted by the flexible connection *r*, hollow valve stem *k*, pressure tube *b*, and nozzle *c*, into the bottle *a*. As soon as the pressure in the bottle *a* reaches approximately that of the beer-reservoir *h*, it acts upon the lower side of the piston or plunger *f* through the annular space 22 between the exterior of the beer tube *d* and the wall of the central hole in the bottom of the cylindrical chamber *g* and the said piston or plunger together with the pressure tube *b* and beer tube *d* are thereby raised, lifting the valve *j* from its seat, and allowing beer to flow into the bottle during the continued rotation of the machine, while the gas or air under pressure which has been admitted to the bottle can flow through the pressure tube *b*, valve stem *k* and non-return valve 11 into the beer reservoir *h*. The continued rotation of the machine meanwhile also effects the closing of communication between the port *x* in the casing, and the passage *w* in the plug *s* of the central cock. The beer continues to flow into the bottle *a* until its level reaches a point in the neck of the bottle at the level of the passage *e*. The bottle then passes under the stationary cam surface *n* which acts upon the roller *m* and forces the valve stem *k* and valve *j* together with the pressure and beer tubes downward, closing communication between the beer-reservoir *h* and the bottle *a*. Before the bottle *a* reaches the point at which it is to be removed from the machine, the port *x* in the casing or shell *t* is brought opposite the passage 12 (Fig. 2) in the plug *s* of the central cock, opening communication for an instant between the bottle *a* and the atmosphere, whereby the pressure in the neck of the bottle *a* is momentarily relieved, and the beer remaining in the passages below the valve *j*

flows into the bottle and at the same time the non-return valve 11 is closed thus preventing the gas under pressure in the beer reservoir from having access to the pressure tube *b*. The continued rotation of the machine brings the roller 8 of the bottle holder 6 on the lowermost portion of the stationary cam surface 7, whereby the joint between the neck of the bottle and the pad or plug 9 is broken, and the bottle may then be removed from the machine, and corked or stoppered in the usual manner.

In the modification illustrated on the left hand side of Fig. 1 and to an enlarged scale in Fig. 3, it will be seen that a rigid connection r^1 is substituted for the flexible connection *r*, and pressure is admitted from the central cock to the bottle *a* through a passage 10 in the body of the beer reservoir and passage 23 in the casing of the cylindrical chamber *g*. The passages 10 and 23, the connection r^1 and the port *x* and passage 12 also serve as a communication with the atmosphere when the said port *x* and passage 12 are in communication.

In Fig. 3 it will be seen that the beer tube *d* does not rise and fall with the piston or plunger *f* as in Fig. 2, but is secured into the bottom of the cylindrical chamber *g* and that the pressure tube *b* extends into the hollow valve stem *k* and is adjustably secured thereto in a liquid-tight manner at 24, while the nozzle 25 sliding on the fixed beer tube *d*, is secured to its lower end. Pressure is admitted into the bottle from the passage *x* in the shell *t* of the central cock into the fixed connection r^1, through the passages 10, 23, and the annular space 22 between the exterior of the beer tube *d* and the wall of the central hole in the bottom of the cylindrical chamber *g*. It will be understood that the pressure tube *b* in this case acts only as a means of communication between the bottle and the hollow valve spindle *k* which contains the non-return valve 11 which is normally kept closed by the pressure in the upper part of the beer reservoir *h* acting upon the upper side of the said valve 11 through the hole 19 and thereby preventing loss of pressure in the reservoir *h* when there is no bottle in position or when a bottle breaks, or is faulty. When beer or the like is admitted to the bottle the gas or air under pressure flows from the bottle through the annular space between the beer and pressure tubes thus causing the piston to rise which carries with it the differentially acting valve *j* and the pressure tube *b*, and as the bottle fills with beer or the like the gas or air under pressure in the bottle is able to flow through the pressure tube *b*, valve stem *k* and non-return valve 11 into the beer reservoir. If desired the non-return valve shown in Fig. 2 or other non-return valve may be used.

In Fig. 4 the beer tube *d* is situated within the pressure tube *b*, the beer entering the bottle from the reservoir *h* by the passages 24, 20, *i* and a central hole 25 in the lower part of the piston or plunger, and the gas or air under pressure entering by the passage 23 and the tube *d* either from the upper part of the beer reservoir *h* or from a separate gas or air supply according to the position of the supplementary plug of the cock 15.

In Figs. 4, 5 and 6 the radial passages *r* are formed in the cover 13 of the beer reservoir *h;* and the non-return valve 11 is seated in a recess in the top of such cover as shown clearly in Fig. 6. This valve 11 while allowing any excessive pressure in the bottle to escape by the passage 14 (see Fig. 6) into the upper part of the beer reservoir *h*, will also be held on to its seat by the pressure in such beer reservoir *h* and prevent the escape of pressure therefrom when no bottle is in position, or when a bottle breaks, or is faulty. In Fig. 4 the casing or shell *t* of the central cock is also formed in the cover 13 of the beer reservoir *h*, and this figure also illustrates how the pressure in the said reservoir may if desired be utilized for charging the bottle and ultimately opening the differentially acting beer valve *j*. For this purpose the fixed plug *s* of the central cock is provided with a supplementary cock 15 the plug of which when turned into the position shown in Fig. 4 establishes communication (by means of the Λ shaped passage 16) between the passages *v* and 17 in the plug *s* of the main central cock. It will also be seen that when the plug of the supplementary cock 15 is turned into the position shown in Fig. 7 the beer reservoir *h* is brought into communication with the compressed air or gas supply *u* by means of the straight passage 18, and when turned into the position shown in Fig. 8 the passages *v w r* et cetera are brought into communication with the compressed air or gas supply *u* by means of the Λ shaped passage 16 and the machine will then work as described with reference to Figs. 1, 2 and 3. The momentary communication between the bottle and the atmosphere is accomplished at the desired moment in the manner described with reference to Figs. 1, 2 and 3.

We would have it understood that we do not limit ourselves to the precise details as hereinbefore described as they may be varied without departing from our invention. It will be obvious that if it is desired to create a vacuum in the bottle or other vessel before charging the same, further passages may be formed in the plug *s* of the central cock and the said passages connected with any convenient form of vacuum apparatus. It will also be obvious that with suitable modifications this invention may be employed for filling other vessels than bottles, and with other liquids than beer, such for example, as mineral waters and the like.

Claims.

1. In a bottling machine, the combination with a liquid reservoir, and means for creating a counter-pressure in the bottle before the liquid is admitted thereto, of a differential valve for admitting the liquid to the bottle, the upper smaller area of the valve being in communication with the lower part of the reservoir, and the lower larger area of the valve in communication with a passage leading from the bottle thereto, substantially as described.

2. In a bottling machine, the combination with a liquid reservoir, and means for creating a counter-pressure in the bottle before the liquid is admitted thereto, a liquid reservoir *h*, a cylindrical chamber *g*, a differential valve *j*, in said chamber, a pressure tube *b* and a liquid tube *d*, substantially as described.

3. In a bottling machine in which a counter-pressure is created in the bottle before the liquid is admitted thereto, the combination with a differential valve *j*, for admitting the liquid to the bottle, of means for closing the said valve, which consist of a fixed bracket *o*, a cam surface *n*, a spring *q* and a roller *m* on the upper end of the spindle *k* of the valve, substantially as described.

4. In a bottling machine in which a counter-pressure is created in the bottle before the liquid is admitted thereto, a central cock *t* fixed upon the liquid reservoir *h*, a plug *s* in the said cock held against rotation, passages *u*, *v*, *w*, in the said plug, passages *x* in the said cock and passages leading therefrom to the bottle, substantially as described, and for the purpose set forth.

5. In a bottling machine in which a counter-pressure is created in the bottle before the liquid is admitted thereto, in combination a central cock *t* fixed upon the liquid reservoir *h*, a plug *s* in the said cock, held against rotation, passages *u*, *v*, *w*, in the said plug, passages *x* in the said cock, a flexible tube *r*, a passage through the stem *k* and valve *j*, and a pressure tube *b* leading to the interior of the bottle, substantially as described and for the purpose set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

RALPH WALDO WEBSTER.
LEUIG CHEW.

Witnesses:
STEPHEN EDWARD GUNYON,
WILLIAM ANDERSON SMITH.