July 3, 1928.

1,676,034

J. W. LANGDON

VALVE

Filed Oct. 5, 1925

2 Sheets-Sheet 1

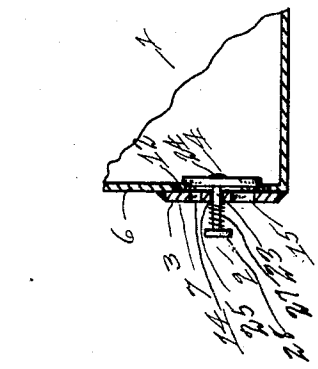

Fig. 3

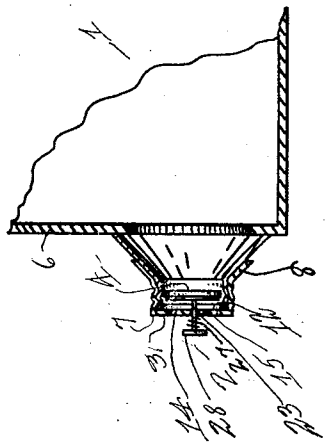

Fig. 2

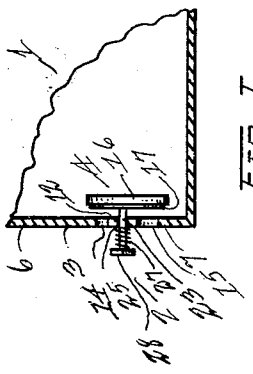

Fig. 1

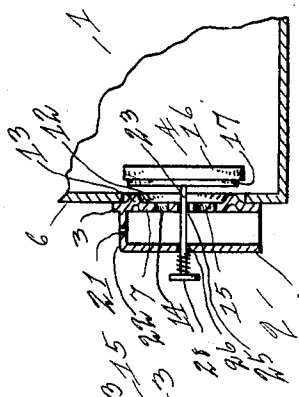

Fig. 6

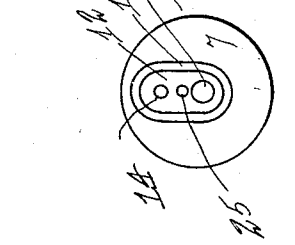

Fig. 5

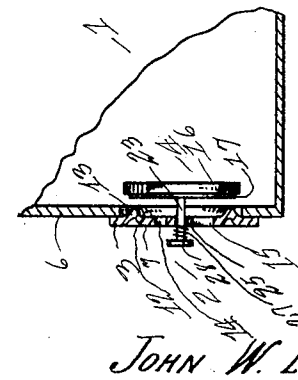

Fig. 4

Inventor

JOHN W. LANGDON

By E. E. Sauge

Attorney

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J. W. LANGDON

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2 Sheets-Sheet 2

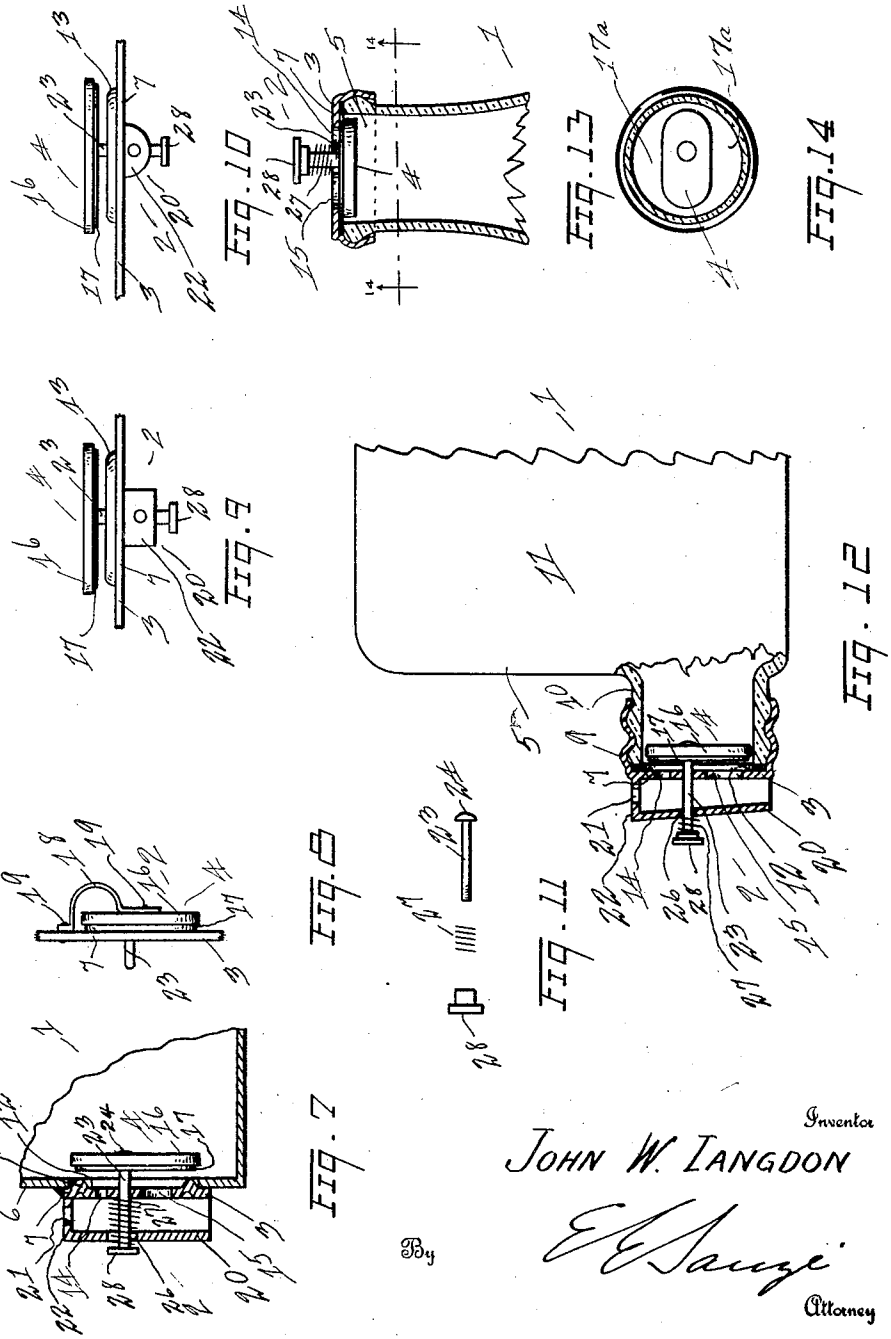

Fig. 7

Fig. 8

Fig. 9

Fig. 10

Fig. 11

Fig. 12

Fig. 13

Fig. 14

Inventor

JOHN W. LANGDON

By E. E. Sauzé

Attorney

Patented July 3, 1928. 1,676,034

UNITED STATES PATENT OFFICE.

JOHN W. LANGDON, OF WALLA WALLA, WASHINGTON.

VALVE.

Application filed October 5, 1925. Serial No. 60,387.

This invention relates to valves, the term valve in this case being used to denote a means for discharging from a closed container, said means including a relief means and a discharging means operating under a single control, and has as one of its objects to provide a valve that is exceptionally cheap to manufacture, that is easy to apply, that is highly efficient, and that is peculiarly adaptable to the work for which it is intended.

Another object of the invention is to provide a valve for containers that will retain liquid contents under pressure, as in mineral waters, carbonated or other gas contained liquids.

A further object of the invention is to provide a valve that will permit a discharge of liquid from a closed container and at the same time prevent the escape of gas therefrom.

A further object of the invention is to provide a valve that will provide for a steady flow of liquid contents from a closed container.

With these and other objects in view reference is now had to the accompanying drawings in which:

Fig. 1 is a sectional elevation of the valve showing its application directly to a container;

Fig. 2 is a sectional elevation of a valve showing its application to a container by means of a screw cap;

Fig. 3 is a sectional elevation of the valve having a disc body;

Fig. 4 is a similar view showing a raised valve seat;

Fig. 5 is a plan view of the raised valve seat;

Fig. 6 is a sectional elevation of the valve showing the addition of a spout and one form and position of closing means;

Fig. 7 is a similar view showing a modified position of closing means;

Fig. 8 is a side elevation of the closure showing a modification of the spring;

Fig. 9 is a plan view of the spout;

Fig. 10 is a similar view showing a modified form of spout;

Fig. 11 is a side elevation of the operating means;

Fig. 12 is a side elevation of the device as applied to a bottle container having an eccentrically positioned outlet;

Fig. 13 shows the device as adapted to a bottle cap; and

Fig. 14 is a plan view from below of the closure, taken on the line 14—14 of Fig. 13.

Having reference to the drawings like numerals refer to like parts throughout the several views and the numeral 1 refers to a bottle, can, or other container designed to contain liquids.

Formed integral with, or attached to the container, is a valve 2 comprising in general a body portion 3 and a closure 4.

The valve is located on the container at a point where it will assume the lowermost position during discharge, i. e. the valve may be positioned on the top 5 of the container if the container is to be tipped during discharge; on the side 6 when the container is to remain upright; or it may be on the bottom (not shown) if discharge is desired from this part. In either case the valve will be placed to assume the lowermost position to be submerged by the contents, submergence being for a purpose to be explained.

The body portion 3 consists of a thin flattened part 7 and may form an integral part of the container 1, or it may be of disc form that may be attached to a can by soldering or other means, or may comprise the flattened portion of a screw cap 8, as shown in Fig. 2, or may be provided with a threaded skirting as in a screw cap 9 to threadedly engage the neck 10 of a bottle 11, as shown in Fig. 12, and the valve may be further provided with a spout, to be explained, as shown in this Fig. 12.

The body portion 3 is provided with a valve seat 12; and this seat may consist of a perfectly flat surface, as shown in Figs. 1, 2, 3, 10, and 12, or it may have a rib or ring 13 raised thereon to form a raised valve seat, as shown in Figs. 4, 6 and 7, the rib forming a stiffener for the body 3 to retain the disc in its original flattened state and to form a desirable seat for the valve.

The ring is preferably oval in form and surrounds or contains a plurality of orifices forming an influx orifice 14 and an efflux orifice 15 for the container, and these orifices are arranged in juxtaposition and in a man-

ner to be contained within the ring and to be or become submerged by the liquid contents when the container is in a position to be discharged and while the discharging operation proceeds.

By placing the orifices in juxtaposition the valve seat 12 and thus the valve itself, may be of very small size, and as such is rendered adaptable to such articles as a bottle cap, as shown in Fig. 13.

The orifices are further arranged to assume a position of one above the other when the valve 2 is in the said discharging position as by thus positioning the orifices they attain a different elevation and hence are provided with a different head over the respective orifices, with the result that the orifice having the greater head will be determined as the efflux orifice 15 as a natural consequence, and the orifice having the lesser head will as naturally form the influx orifice 14.

By placing the air inlet and the discharge outlet in close proximity, and one above the other, the influx orifice will be in a position to be covered by the contents during the discharging operation, which covering will avoid the escape of the entrapped gas.

Should the gas content cause an internal pressure, then during the initial discharge the flow will occur through both orifices, the gas pressure being assumed to be greater than the outside air pressure.

Under these conditions the flow will continue through the two orifices until the internal pressure is reduced to a state of equilibrium with the atmospheric pressure when, by continuing, a partial vacuum will be formed in the container and the air will pass through the upper orifice to supply the vaccum and the flow will continue through the lower orifice.

By this arrangement the flow will be steady at all times.

The orifices are of different sizes, the influx orifice having a smaller diameter than the efflux orifice.

Were the orifices reversed the influx would be intermittent, the air entering in sufficiently large amounts that when passing through the contents would form bubbles of relatively large size that would break intermittently at the surface of the contents, and thereby permit a partial vacuum to form that would restrain the discharge until the vacuum is relieved by the next succeeding bubble thus causing an intermittent flow that would be objectionable.

Therefore with a relatively small influx orifice 14 positioned above a large efflux orifice 15 the above mentioned bubbles will be of a relatively small size and these will develop a high frequency that will relieve the vacuum with sufficient rapidity to provide a flow that will be regular and continuous, with the intermittent feature removed or reduced to an imperceptible stage.

By constructing the body 3 of thin material friction in the orifices is reduced to a minimum thus providing for a free movement therethrough, which, added to the difference in sizes of the orifices, will provide a valve that may be perfectly regulated to fit conditions under which the valve is designed to operate.

The size of the orifices will be obviously determined by the density of the liquid contents, their relative sizes however will remain the same whether the contents are of a light or heavy nature.

Now, with the orifices close together the influx orifice 14 will be closed by the contents when the container is in a position for discharge, as above mentioned, and being therefore in a submerged position, and closed by the liquid, a seal is formed that, in case of gas-filled liquids, will prevent the escape of any gas that has risen to the top of the contents, and hence the contents will continue in a comparatively fresh state by the retention of the gases until the contents are completely discharged.

This is of great importance where mineral or carbonated waters are involved as with this device the gas contents cannot escape owing to the water seal, and the air passing into the container must pass through the liquid, and in doing so becomes impregnated with the gas to form a mixture with it, in the space above the surface of the contents.

By placing the orifices close together they may be controlled jointly and simultaneously by a closure 4, the closure comprising preferably a cap 16 in which is contained a cork 17 or other gasket that will seat closely against the valve seat 12.

The closure is preferably oval in form to provide a perimeter inconsistent with the perimeter of the valve to afford ample passageways 17^a on either side thereof for the air and liquid contents respectively between it and the container. By this construction the device may be made small and thus be adaptable to bottles, or other containers having small and standard necks, providing a valve that is practically universal in its application.

The closure may be yieldingly mounted on the body portion by a flat spring 18, as shown in Fig. 8, the spring being attached at one end to the body, with its other end attached to the closure, attachment being by any suitable means or by the rivets 19 shown, or by a coil spring positioned as shown in Fig. 6 or Fig. 7.

A spout 20, of a generally rectangular or curved section, may be attached to the outer face of the body 3 to direct the discharge, and when used is provided with an

inlet orifice 21 in the upper closed end 22 of the spout, through which orifice air is supplied to the influx orifice 14 without having to pass through the discharging contents.

A spout is desirable being of particular advantage when the liquid is placed in the container 1 under pressure, for under these conditions the initial flow will start with a force that would expel the contents to a distance from the valve were it not controlled by the spout.

In either of the designs of valves shown in the drawings a means for operating the closure is provided which consists of a stem 23 having a head 24 that may be soldered or otherwise secured to the cap 16, the stem 23 being extended perpendicularly to the cap and in a manner to project through the body portion 3, or through the body portion and the spout, if the latter member is used, a hole 25 being provided in the body for the purpose, preferably between the influx and the efflux orifices, and when the spout 20 is added the stem 23 will project through the spout through a suitable hole 26 therein. To automatically seat the gasket 17 against the valve, either the flat spring 18 or a coil spring 27 may be used. In the latter case the coil spring will encircle the stem 23 with one end bearing against the body 3, as shown in Figs. 1, 3, 4 and 7, with the other end bearing against the button 28 in threaded engagement with the stem as shown, or, the spring 27 may bear against the spout 20, as shown in Figs. 6 and 12, and against the button as before.

In use the container is filled by submerging with the valve 2 open, (or in the case of a screw cap with the cap removed) or any other method, and when filled is finally sealed by releasing the pressure on the button (or by screwing the cap onto the filled container).

Now, for discharging, the container is positioned so that the valve is at the lowermost part of the container, then by pressure manually exerted on the button 28 the valve 2 is opened and the contents will immediately start flowing.

The flow will continue as long as air enters the container and the air will enter until the valve is released when both the influx and the efflux orifice will be closed simultaneously by the closure 4.

By simultaneously closing the orifices the air influx will be limited to that amount actually necessary to the discharge, and hence without an excess of air the gases will be maintained at their maximum strength in the container.

While this valve is specifically designed for use with carbonated or other gaseous liquids, it is also adaptable for use with other liquids, and hence I do not wish to be restricted to its use for such liquids alone.

Having thus described my invention, I claim:

1. In a valve, the combination of a body portion, a ring raised in said body portion to form a valve seat and to provide a stiffener for said body portion, said body portion being provided with an influx and an efflux orifice contained within said ring, a closure positioned to register with said valve seat, and means to operate said closure.

2. In a valve, a relatively thin body portion, a ring raised in and integral with said body portion to form a valve seat on the inside of the valve and to provide a stiffener for said body portion, said body portion being provided with an influx and an efflux orifice contained within said ring, a closure positioned to register with said valve seat, said closure and said ring having a perimeter inconsistent in form to the perimeter of the body portion, and means to operate said closure.

In testimony whereof I affix my signature.

JOHN W. LANGDON.