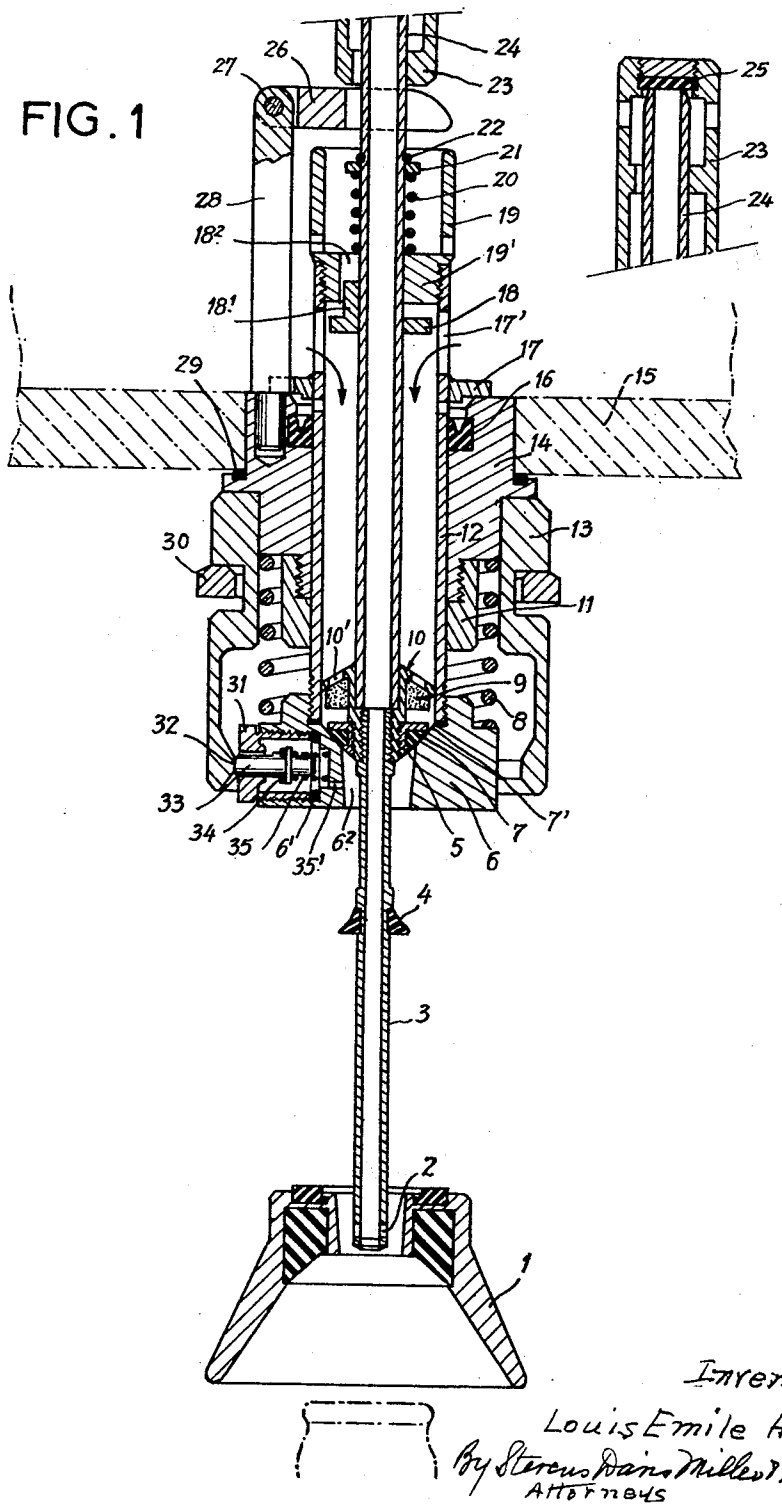
Nov. 3, 1964 L. E. HI 3,155,126

AUTOMATIC COCKS FOR TAKING SATURATED OR UNSATURATED LIQUIDS

Filed Feb. 6, 1961 4 Sheets-Sheet 1

FIG. 1



Inventor
Louis Emile Hi
By Stevens Davis Miller & Mosher
Attorneys

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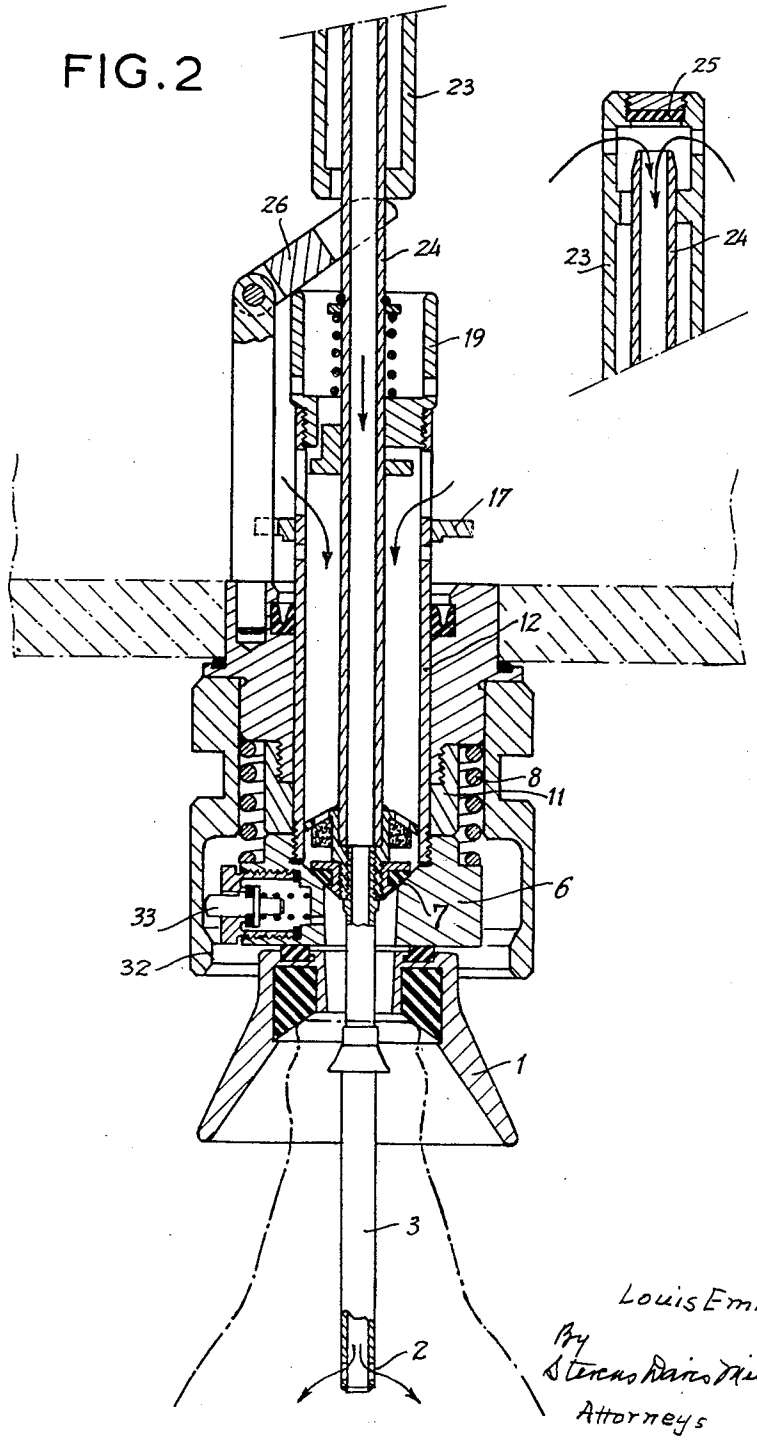
FIG. 2



Inventor
Louis Emile Hi
By Stevens Davis Miller & Mosher
Attorneys

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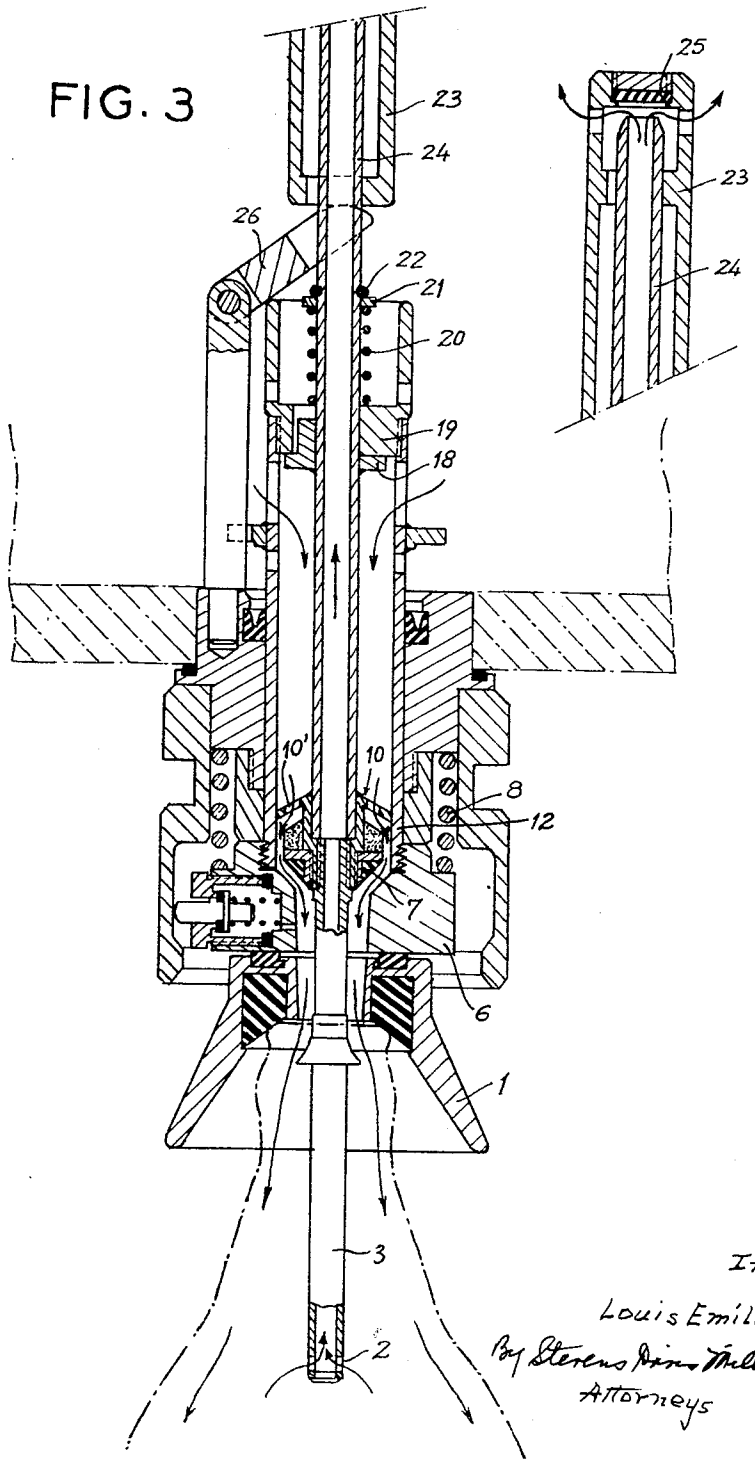
FIG. 3



Inventor
Louis Emile Hi
By Stevens Davis Miller & Mosher
Attorneys

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AUTOMATIC COCKS FOR TAKING SATURATED OR UNSATURATED LIQUIDS

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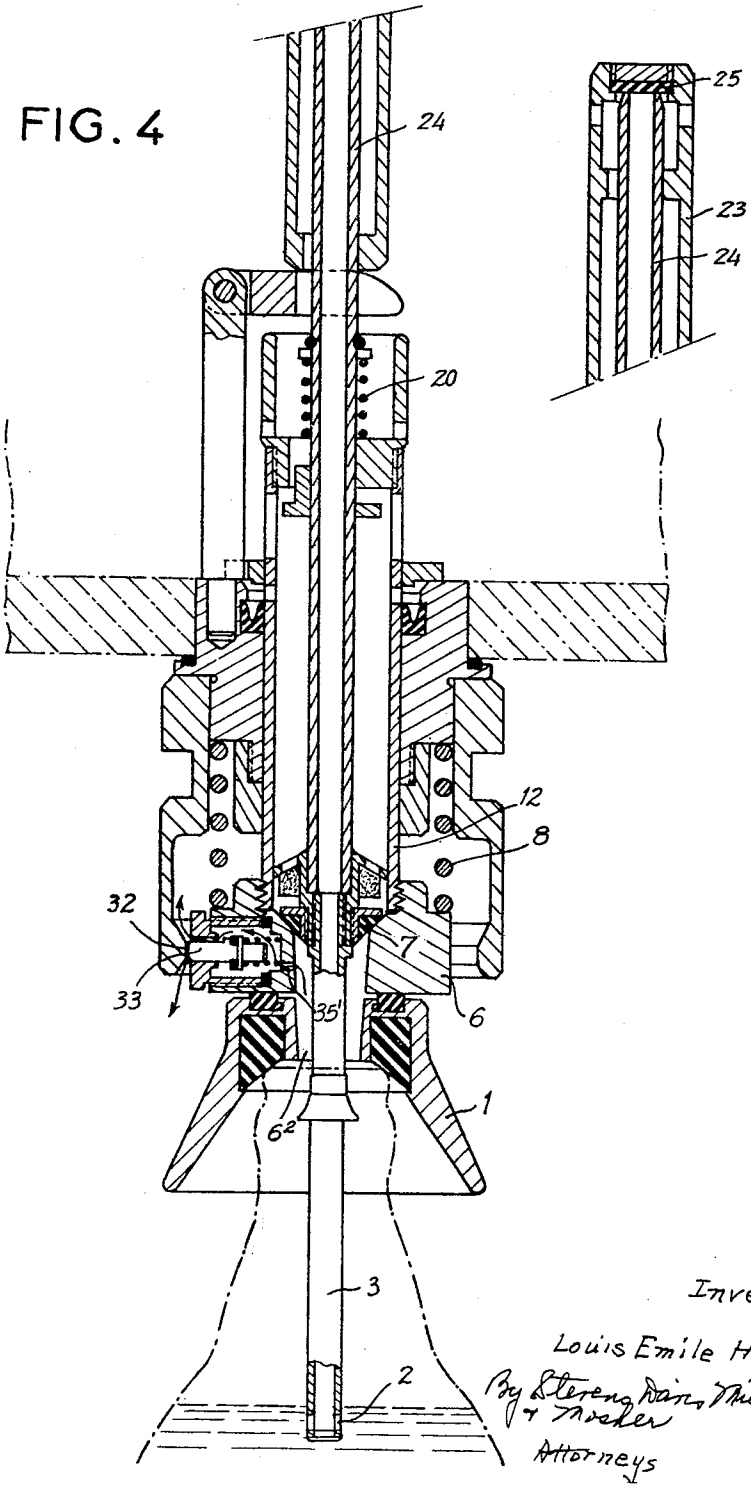
FIG. 4



Inventor
Louis Emile Hi
By Stevens, Davis, Miller & Mosher
Attorneys

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AUTOMATIC COCKS FOR TAKING SATURATED OR UNSATURATED LIQUIDS

Louis Emile Hi, Paris, Seine, France, assignor to Societe Anonyme de Construction de Materiel d'Alimentation, Paris, France, a corporation of France

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Claims priority, application France, Feb. 8, 1960, 817,870, Patent 1,256,564
10 Claims. (Cl. 141—50)

This invention relates to an automatic cock for bottling saturated or unsaturated liquids, notably beverages.

It is the essential feature of this invention to eliminate partially or totally the control of the various operating cycles such as opening, delivery, closing cycles, the cock being controlled by the bottle itself and the latter centered positively by a bell-shaped member.

Other features and advantages of this invention will become apparent as the following description proceeds with reference to the attached drawings illustrating diagrammatically by way of example a typical embodiment of the automatic bottling cock of this invention in its different operative positions. In the drawings:

FIGURE 1 is a vertical axial section showing the cock in its closed position, prior to its engagement by a bottle to be filled;

FIGURE 2 illustrates the same cock positioned for pressurizing the bottle;

FIGURE 3 illustrates the cock during the bottle filling operation, and

FIGURE 4 illustrates the bottle and cock assembly at the end of the cycle.

Referring to the drawings, it will be seen that the automatic cock of this invention comprises essentially:

(1) A body **14** fixed in relation to the bottom of mounting plate **15** of the tank or filling machine, this body **14** engaging with a flanged portion a bore formed in this bottom plate **15**; the joint between the body **14** and plate **15** is sealed by a gasket **29**; under the flanged portion the body is engaged by a tubular socket **13**, and a nut-forming collar **11** is screwed on the lower, threaded end of the body **14**. The assembly comprising the fixed members **11**, **13** and **14** is tightly fastened on the plate **15** of the filling machine by known locking means comprising a fork **30** engaging a circular groove formed on the body **14**, as shown in FIGURE 1.

(2) A first movable assembly comprising a tubular base **6**, a sleeve **12**, a head **19**, a bottom **19'** formed integrally with the head **19**, this assembly being movable as a unit. The sleeve **12** carries an external flange or washer **17** normally bearing, in the inoperative position shown in FIG. 1, on the bottom or mounting plate **15** of the tank or filling machine.

The tubular base **6** lying within the socket **13** is solid with the sleeve **12** sliding in a bore formed in the collar **11** and body **14**, and the flange or washer **17** solid with this sleeve **12** comprises a forked portion engaging the lower portion of a substantially vertical rod **28** supported by and slidably engaging the body **14**. The sleeve **12** is formed with lateral orifices **17'** through which the liquid filling the tank consisting of the space overlying the bottom plate **15** can penetrate into this sleeve **12**.

The tubular base **6** is formed with a lateral, radial chamber 6^1 in which a release or venting valve is mounted; this valve comprises a valve member **34** having a push-rod or shank **33** extending with a certain play through a cap **31** and is constantly urged to its closed position by a spring **35**. An orifice 35^1 connects the outlet aperture 6^2 of the tubular base **6** with the valve chamber 6^1 and permits the gradual restoring of the atmospheric pressure in the bottle neck at the end of the cycle, when the

cam face **32** formed internally of the socket **13** engages the push-rod **33** of valve **34**; under these conditions, the gas accumulated in the bottle escapes through the orifice 35^1, chamber 6^1, open valve **34** and clearance between the push-rod **33** and the orifice formed through the cap **31**.

This first movable assembly is constantly urged downwards by a relatively strong spring **8**, and it will be seen that the action of this spring is assisted by the liquid pressure prevailing in the tank.

A packing **16** seals the sliding joint between the sleeve **12** and the fixed body **14**.

(3) Another movable assembly comprising a pipe **3** screwed in a fitting **10** carrying a grid 10^1 at its top.

This fitting **10** is solid in turn with an upper pipe **24** of which the upper end opens into the gaseous atmosphere of the tank, that is, above the liquid level therein.

The pipe **3** carries a deflector **4** of flexible material, and the fitting **10** has screwed thereon a member **5** carrying a valve **7** for controlling the delivery of the liquid.

The upper pipe **24** is solid with a rotation and lifting preventing member **18** formed with a stud 18^1 engaging an eccentric hole 18^2 formed through the head **19**, and comprises a spring ring **22** for locking a washer **21** against upward axial movement.

Slidably fitted on the tubular shank of fitting **10** is a valve member **9** for stopping the delivery of liquid at the end of the filling operation; this valve member consists of a material having a specific gravity inferior to **1**, or may be urged upwards by a spring bearing on the member **5**, not shown, so that at the end of its permissible upward movement this valve member **9** will engage the grid 10^1 and close its orifices.

The pipes **3** and **24** constitute an assembly moving as a solid unit since the two tubes are interconnected through the fitting **10**. Furthermore, it will be seen that, when the cock is closed, the valve member **7** engages a seat 7^1 formed internally of the tubular base **6**.

A spring **20** of adequate force is mounted on the pipe **24** and bears with one end against the bottom **19'** of head **19** and with the other end against the washer **21** retained on the pipe **24** by the spring ring **22** as already explained.

(4) An air valve comprising a tubular member **23** having a seat-forming bottom **25** engaging in the closed position of the cock the upper end of pipe **24**.

(5) A reduction lever comprising the vertical rod **28** carried by the body **14**, and a lever proper **26** pivoted on the upper end of rod **28** about a pin **27**. This lever **26** has a forked portion surrounding the pipe **24** and adapted to engage the tubular member **23** of the air valve from beneath.

(6) A bottle-centering bell-shaped member **1** properly guided by adequate means (not shown) during its upward movement.

The automatic cock described hereinabove operates as follows:

The stroke figures given hereafter are given by way of example only and should not be construed as limiting the invention. FIGURE 1 shows the automatic cock in its closed position, with the centering bell-shaped member **1** in its lowermost position and the air valve **25** and liquid valve **7** seated.

FIGURE 2 illustrates the bottle in its pressurizing position. During its upward movement, it has lifted through the medium of the bell-shaped centering member **1** the first movable assembly comprising the base **6** solid with the head **19**. Thus, the head **19** has engaged the reduction lever **26** and the latter has lifted in turn the tubular air valve **23** so that, assuming a 9-millimeter upward stroke of the first movable assembly **6**, the air valve has been moved **15** millimeters upwards.

In this position, the air from above the liquid level

in the tank penetrates into the bottle through the pressurizing pipes **24**, **3**, and the orifices **2** at the lower end of this pipe.

In the preceding phase (FIG. 2), the gas under pressure of the tank passes through tube **24–3** and fills the bottle.

The closure member **25** of the pneumatic flap valve being raised, the force which it applies downward on the tube **24** is eliminated, but the pressing force transmitted by the liquid and acting on the closure member **7** remains.

It is clear that this pressing force is substantially proportional with the difference in the gaseous pressures existing respectively in the reservoir and in the bottle.

As long as this difference remains greater than a certain minimum value, the opposing force of the spring **20** cannot raise the tube **24**. When this value is reached by the gas within the bottle, the spring **20** expands raising the tube **24** with respect to the tube **12** and opens the liquid flap valve **7**; the cock closes then in the phase of FIGURE 3.

The movement of the valve member **7** away from its seat 7^1 is limited by the relative engagement of members **19** and **18'**. This lift, for example of 3 millimeter, will still provide a 3-millimeter passage for the air returning from the bottle at the upper end of the air valve **25**.

During the filling operation, the air is exhausted from the bottle in the direction opposite to the pressurizing direction.

When the liquid has filled the bottle up to the level of the orifices **2** of tube **3**, the flow is stopped and the reduction in the velocity of flow of the pets of liquid passing through the grid 10^1 and around the valve **7** enables the float forming valve member **9** to rise and thus close the orifices of this grid 10^1, thus preventing the air from escaping from the bottle neck and stabilizing the filling level.

FIGURE 4 illustrates the automatic cock at the end of the cycle.

During the downward movement of the first movable assembly comprising the tubular base **6** (this movement taking place when the bottle is lowered), the following successive operations take place:

The air valve **25** closes due to the reverse movement of reduction lever **26**, the tubular member **23** is lowered, and pipe **24** is closed by valve **25**.

As it continues its downward movement, the reduction lever **26** enables the tubular member **23**, by gravity, to lower the pipe **24** and the latter will thus close the liquid-flow control valve **7**, the weight of this valve assembly exceeding the upward thrust of spring **20**.

During this downward movement, the bottleneck is gradually restored to the atmospheric pressure due to the operative engagement occurring between the push-rod **33** and cam face **32** so as to open the valve **34**; thus the aperture 6^2 of the base **6** communicates with the external atmosphere through the orifice 35^1.

The last step consists in releasing the bottle from the cock.

During these different movements, the first movable assembly **6**, **12**, **19**, 19^1 cannot revolve about its axis, as the forked member **17** is guided by the support **28**.

By changing the lower pipe **3** different filling levels may be obtained at will. This pipe can be removed, by unscrewing it, the fitting **10** being held against rotation by the member **18**, 18^1 preventing the rotational and lifting movements of the assembly.

In case of accidental bursting or breakage of a bottle during the filling operation, the internal pressure of the liquid in the tank reseats the valve **7**, thus precluding any loss of liquid, except what has already been dispensed to the bottle.

I claim:

1. Bottle filling device for the automatic bottling of liquids under gaseous pressure from a tank supplied simultaneously with liquid at a level maintained between certain limits and with gas under pressure, the device comprising the tank, a cylindrical body fixed vertically under the tank, a first movable tubular element sliding in a sealed manner in an axial bore of the cylindrical body relatively to which it is moved downwards by elastic means, the upper part of which communicates with the liquid in the tank and an annular base at the lower part, a second movable tubular element guided coaxially in the first and relatively to which it is moved upwards by elastic means, the upper end of which is situated in the gaseous atmosphere of the tank and the lower end of which passes underneath the base of the first movable element and is provided with lateral apertures, a main liquid valve controlling the flow of liquid between the two movable tubular elements, the valve having its seat oriented upwards and formed by a recess in the internal wall of the annular base of the first movable element and its closure integrally connected with the second movable element, an auxiliary liquid valve co-operating with the main valve and situated above it, having for its downwardly directed seat an annular perforated member fixed around the second movable element and sliding in the first, and having a ring as a closure, said ring being of light material and being movable upwardly by a weak restoring force, a first gas valve controlling the passage of gas from the tank through the second movable tubular element, the seat of said first gas valve being formed by the upper aperture of the second element and a fitting carrying the closure of the valve and capable of being lifted by the upward movement of the first element, a second gas valve placed radially in the base of the first element, a push rod, a cam integrally connected to the cylindrical body and operating the cam to connect the internal space of the base with the atmosphere, an annular vertically movable socket passing through the lower part of the second movable element having an upper end and a lower end, an annular elastic joint near the upper end and fitted into the socket and pushed under the base of the first movable element during refilling of a bottle, a rubber snout near the lower end against which the edge of the bottle fits, this single fitting having the effect of releasing combined vertical displacements of the movable tubular elements, suitable stops limiting these movements and producing successively the opening of the first gas valve and the opening of the liquid valve, the removal of the bottle having the effect of successively closing these valves and decompressing the gaseous atmosphere of the bottle by the second gas valve.

2. Device according to claim 1, wherein a vertical rod is fixed to the cylindrical body in the tank at the side of the part of the first movable tubular element which passes through the tank and which engages in a cavity of a flange integrally connected with the first movable element and serves to guide the latter in a sliding movement, to prevent it from turning.

3. Device according to claim 2, wherein a lever is articulated to the end of the vertical rod and serves to amplify the vertical displacement transmitted by the first movable tubular element to the fitting carrying the seating of the gas valve.

4. Device according to claim 2, wherein a slidable guide device maintains the second movable tubular element in a fixed angular position relative to the first movable tubular element.

5. Device according to claim 4, wherein the second movable tubular element is in two parts connected together at the level of the closure of the main liquid valve, the lower part being detachable and screwed into the first so that its length can be changed to the requirements of the particular filling operation.

6. Device according to claim 1, wherein the lower part of the second movable tubular element is equipped with a deflector which directs the flow of liquid on to the walls of the bottle during filling.

7. Device according to claim 1, wherein the restoring force pushing the annular closure of the auxiliary liquid valve upwardly is the liquid buoyant force acting on this valve closure immersed in the liquid.

8. Device according to claim 1, wherein the fitting of the movable seat of the first gas valve is returned to its seat by gravity.

9. Device according to claim 1, wherein the base of the cylindrical body is in the form of an inverted bowl, the border of which is re-entrant and forms the cam operating the pushrod of the second gas valve.

10. Device according to claim 1, wherein the cylindrical body is detachably fixed under the tank by sliding of

a cylindrical bearing of the cylindrical body through a corresponding bore in the bottom of the tank, against which a shoulder of the cylindrical body bears with interposition of a sealing joint, a forked member keeping this body in position.

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