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Giroud

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[54] SIPHON-VALVE STOPPER COMPRISING A BODY ENCLOSING CARBON DIOXIDE CAPSULE

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[58] **Field of Search** 222/396, 399, 400.7, 394, 61, 222/256, 263, 373; 137/495, 505.42

[56] **References Cited**

UNITED STATES PATENTS

3,325,053	6/1967	De Boer et al.	222/396 X
3,027,905	4/1962	Dobrikin	137/495 X

FOREIGN PATENTS OR APPLICATIONS

1,559,777	1/1968	France	222/396

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Assistant Examiner—James M. Slattery
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[57] **ABSTRACT**

A siphon-valve stopper adapted for use on containers formed with a neck and utilizing a small CO_2 cartridge of conventional type, said stopper being provided with a pressure reducing device and a gas stop valve, wherein said gas stop valve comprises a valve comprises a valve member and a valve seat incorporated in said pressure reducing device, with control members co-acting with an expansion piston so as to move said piston away from a rod rigid with said valve member when the control knob of the device is rotated in a given direction, whereby said valve member engages its seat, thus preventing the gas from said cartridge from flowing beyond the high-pressure chamber of the pressure reducing device. The siphon-valve stopper may also be utilized without any risk with ordinary glass bottles containing indifferently a gaseous, or a non-carbonated liquid or beverage, for example beer.

2 Claims, 2 Drawing Figures

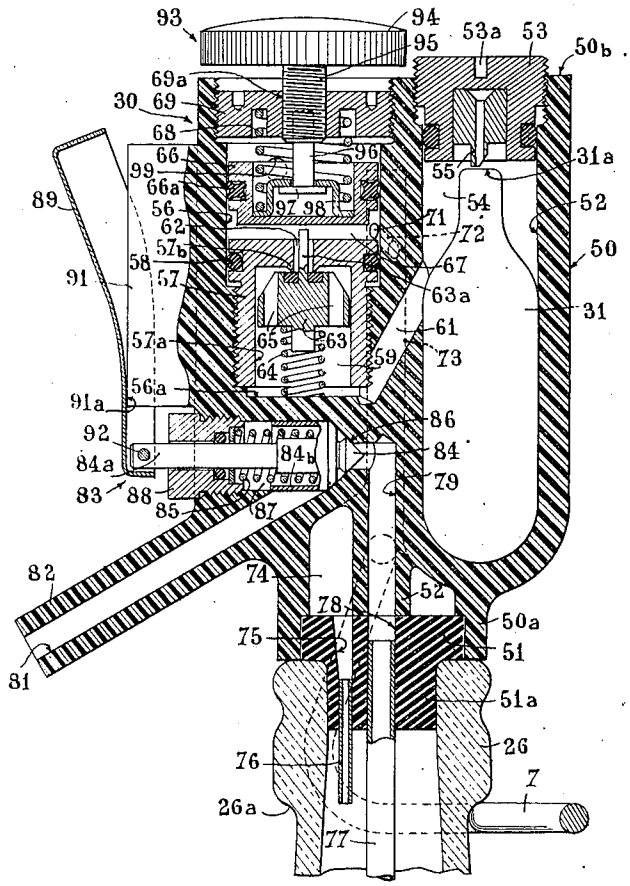


Fig. 1.

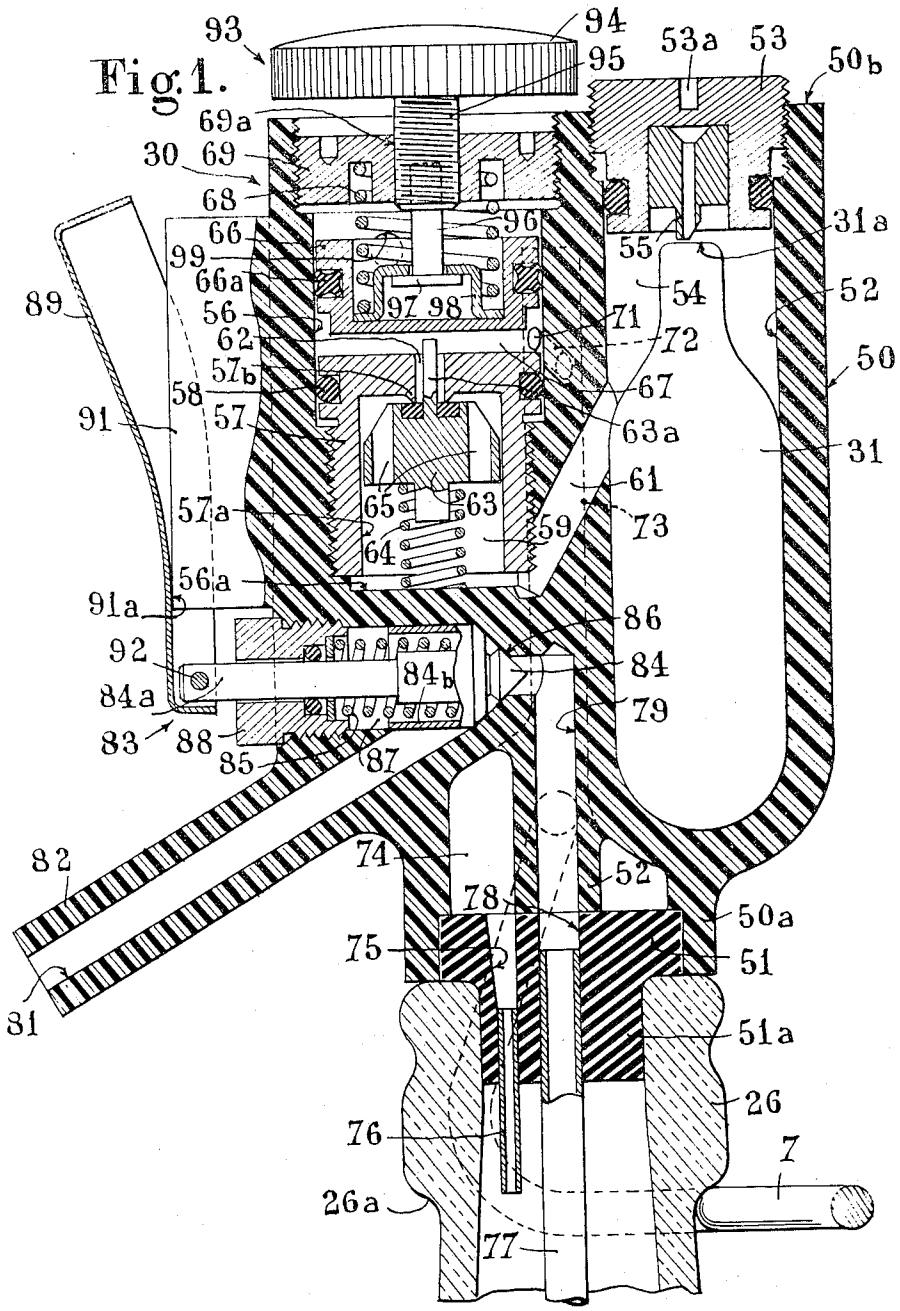
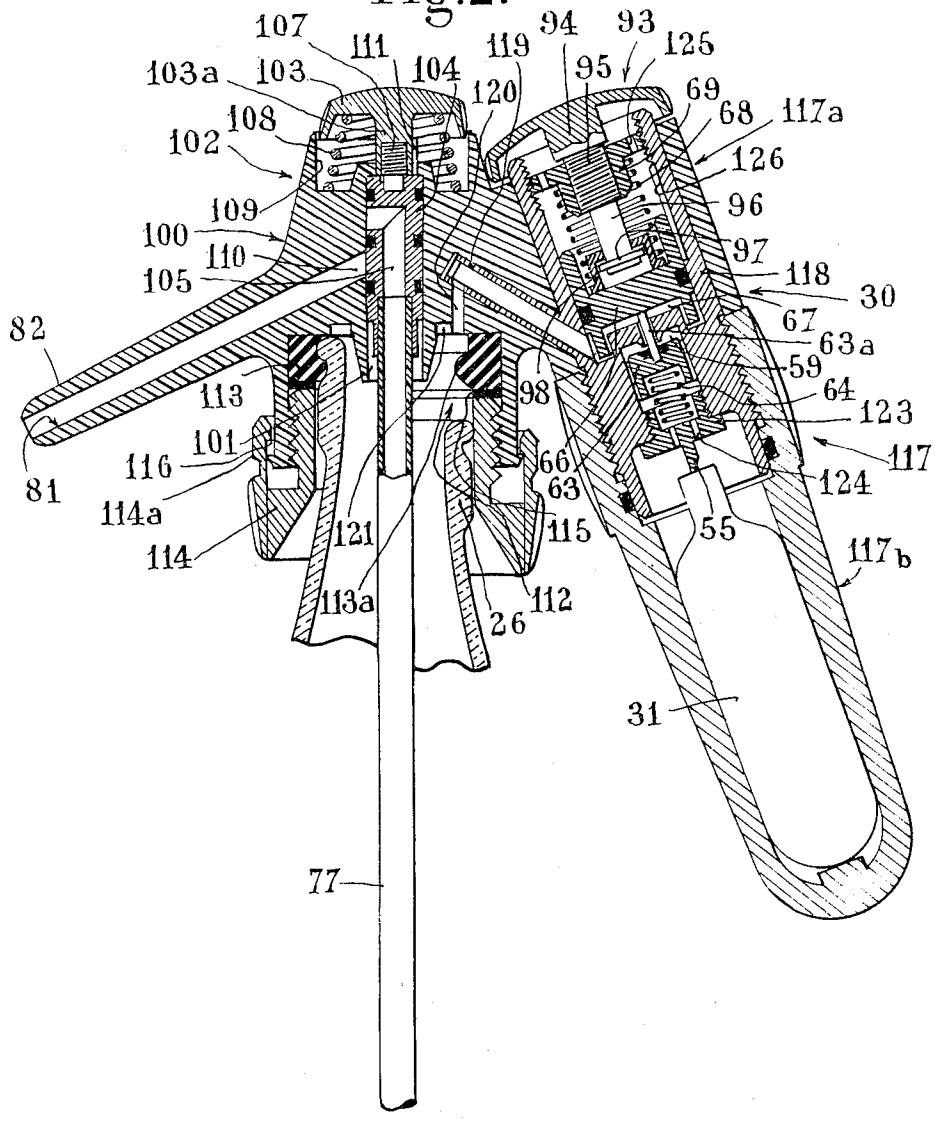

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95
53a
53
50b
69a
30
69
68
66
99
66a
89
56
62
57b
58
91
57
57a
56a
91a
92
84a
83
88
85
87
82
81
74
78
75
76
26a
77
96
97
98
71
72
67
63a
61
65
63
64
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73
86
84
84b
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50a
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51a
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31a
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Fig.2.


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103a
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117a
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118
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82
67
63a
59
113
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64
123
101
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117
116
63
124
81
114a
121
115
55
117b
114
113a
112
26
31
77

SIPHON-VALVE STOPPER COMPRISING A BODY ENCLOSING CARBON DIOXIDE CAPSULE

BACKGROUND OF THE INVENTION

The present invention relates to a siphon-valve stopper adapted to be fitted an ordinary glass bottle containing a gaseous or non-gaseous liquid, notably beer, and equipped according to the first addition No PV 165,506 of Sept. 9, 1968 to the French Pat. No. 1,559,777 of Jan. 15, 1968 with means capable of generating a constant pressure above said liquid in the bottle, irrespective of its level in the bottle.

As already described in said first addition said means may comprise a small gas-filled cartridge or capsule, for example a CO_2 capsule, a pressure-reducing device and a stop valve for closing the duct and thus deliver the gas into the bottle.

It is also known through the French Pat. No. 1,380,581 to provide a siphon-valve stopper of which the body comprises at its lower portion a cavity adapted to receive the neck of a bottle and having fitted therein a ring of elastomer material which can undergo a radial distorsion for clamping the neck introduced into said cavity, by exerting an axial compression with the assistance of a clamping ring actuatable from the exterior of the body of the siphon-valve stopper and adapted to be screwed into said cavity for compressing said ring of elastomer material for the dual purpose of securing and sealing said siphon-valve stopper on the bottle neck. Moreover, there is provided within the siphon-valve stopper described in the above mentioned French Pat. No. 1,380,581 an axial duct adapted to communicate with a lateral liquid dispensing duct via a control valve comprising a movable valve member adapted to be moved axially away from a valve seat provided at the bottom of said axial duct in said siphon-valve stopper by means of a control rod extending axially within said axial duct and connected to a push-button arranged at the upper portion of the body of said siphon-valve stopper, a spring being provided for seating said movable valve member when no pressure is exerted on said push-button. With this liquid output control valve the movable valve the movable valve member, when in its open position, creates substantial interferences in the flow of liquid, thus producing a considerable amount of foam, notably if the liquid to be dispensed is beer.

As a result, when the movable valve member is closed or seated, some foam remains in the outlet duct of the siphon-valve stopper, so that after some time this foam build up droplets that eventually fall from the spout of the device, thus soiling the surface on which the bottle provided with said stopper is laid.

Moreover, since CO_2 capsules available on the market deliver carbon dioxide gas under a pressure of about 870 psi, it appeared that great cares had to be exerted in the manufacture of the pressure reducing device, and that various safety measures had to be taken to permit the trouble-free fitting of the siphon-valve stopper on an ordinary glass bottle. In fact, conventional pressure reducing devices and so-called safety valves are objectionable in that they tend to become misadjusted after a certain time of operation so that they cannot be relied upon for meeting the operating and safety requirements for which they had been contemplated initially. Moreover, many tightness problems arise due to the natural tendency of carbon dioxide gas to siep very easily through joints, even if its pressure is relatively low.

SUMMARY OF THE INVENTION

It is the essential object of the present invention to provide an improved siphon-valve stopper adapted to be fitted to an ordinary glass bottle filled with liquid and equipped with a CO_2 capsule or cartridge having a capacity sufficient for discharging several bottles filled with liquid, with a pressure reducing device and a stop valve for the gas, so as to discontinue the delivery of gas into the bottle when the latter is empty and permit the fitting of the siphon-valve stopper to another full bottle for dispensing its content.

This invention is also concerned with the provision of a siphon-valve stopper of the type broadly set forth hereinabove, which is of compact design.

To this end, the siphon-valve stopper according to this invention, adapted to be fitted to an ordinary glass bottle filled with a liquid and comprising a body enclosing a CO_2 capsule of capacity sufficient for emptying a plurality of bottles filled with liquid, a pressure reducing device and a gas stop valve for discontinuing the delivery of gas into the bottle when the latter, equipped with said siphon-valve stopper, is empty and permit the fitting of the same siphon-valve stopper on another filled bottle to be emptied, said pressure reducing device comprising a high-pressure chamber and a low-pressure chamber communicating with each other, said low-pressure chamber also communicating during the operation of the siphon-valve stopper with the inner space of said bottle, a valve-member for adjusting the gas output through the communication provided between between said two chambers, said valve-member being arranged in said high-pressure chamber and provided with a rod extending co-axially through said communication into said low-pressure chamber, a first resilient member urging said valve member against a valve seat provided in the high-pressure side of said communication so as to close said communication, an expansion piston slidably mounted in said low-pressure chamber and registering with said communication, and a second resilient member constantly urging said expansion piston for engagement with the free end of said rod with a predetermined force opposed to, and greater than, that of said first resilient member, in order to keep said valve member spaced from its companion seat, said force being such that said piston be in a state of equilibrium under the action of said force and of a desired low gas pressure in said low-pressure chamber, characterized in that said stop valve is associated with said pressure reducing device and consists of said valve member and said seat so as to constitute a valve unit, and of control members co-acting with said expansion piston in such a manner that when said control members are actuated in a first direction they move said expansion piston away from the end of said rod of said valve member, against the action of said second resilient member, in order to seat said valve member under the force of said first resilient member and close said valve unit, and thus prevent the subsequent delivery of gas into said low-pressure chamber and therefore into said bottle, and that when said control members are actuated in the other direction, they release said expansion piston so that said piston, by engaging the end of said rod under the action of said second resilient member, moves said rod backwards and unseats said valve so as to open said valve unit.

BRIEF DESCRIPTION OF THE DRAWING

Other objects, features and advantages of this invention will appear as the following description proceeds with reference to the attached drawing given by way of example , in the drawing :

FIG. 1 is a vertical axial section showing a first from of embodiment of the siphon-valve stopper according to this invention ;

FIG. 2 is a vertical axial section section showing another form of embodiment of the siphon-valve stopper according to this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The siphon-valve stopper illustrated in FIG. 1 is adapted to be fitted to the neck 26 of an ordinary glass bottle containing a liquid, whether gaseous or non-gaseous or non-carbonated, for instance beer. This siphon-valve stopper is also adapted to be used in conjunction with a CO_2 cartridge or capsule 31 of a type currently used in the trade, for example a cartridge of the type having a perforable end and delivering, when perforated, carbon dioxide gas under a pressure of, say, 870 psi. Since, it would be rather dangerous to allow CO_2 to penetrate under this pressure into an ordinary glass bottle, there is provided in

a manner known per se a pressure reducing device designated in general by the reference numeral **30**. Moreover, since a single CO_2 cartridge of this type is sufficient for dispensing the contents of at least three bottles, a gas stop valve is provided so that the siphon valve stopper can safely and advantageously be withdrawn from a first, empty bottle, and fitted to other bottles in succession, until the cartridge content is axhausted, whereafter a fresh cartridge is substituted for the exhausted one.

According to this invention, this stop valve is operatively connected to the pressure reducing device, as will be described presently, the pressure reducing device being otherwise and in general of a type known per se, and comprising a valve member and an expansion piston.

The siphon valve stopper comprises a body **50**, advantageously of suitable plastic material, having fitted in its base portion **50***a*, a stopper proper **51** of suitable elastomer, such as rubber, for adapting the siphon-valve stopper to the neck **26** of a bottle to which it can be locked in position by means of a spring **7** reacting against a shoulder **26***a* of the bottle neck. This stopper **51** comprises a lower portion **51***a* of smaller diameter adapted to be inserted into the neck **26** of the bottle. Of course, several interchangeable stoppers **51** having different diameters may be provided to permit the fitting of the siphon-valve stopper of this invention to bottles having different neck inner diameters. However, it would also be possible to provide a single stopper permitting of fitting the siphon-valve stopper of this invention to substantially any type of ordinary glass bottle available in the trade for beverages of all kinds.

Formed in the body **50** is a first blind cavity **52** open at the top and adapted to receive a cartridge or capsule **31** filled with CO_2 under pressure so that its perforable end **31***a* is directed upwards. The upper open end of said cavity **52** is adapted to receive a screw-threaded sealing or fluid tight plug **53** forming with said cavity **52** a chamber **54**. Axially mounted within said plug **53** is a perforator **55** adapted to perforate the upper perforable end of cartridge or capsule **31** when the plug **53** is screwed in by means of a screw-driver or a coin engaging the slot **53***a* formed in the upper or outer face of said plug.

Adjacent to, but separate from, said cavity **52** is another cavity **56** also opening upwards in relation to the body of the siphon-valve stopper and adapted to receive the assembly comprising the pressure reducing device and the gas stop valve. This cavity **56** has an internally screw-threaded lower portion adapted to receive a hollow cylindrical member **57** having an externally screw-threaded lower portion engageable in the lower threaded portion of cavity **56**, the upper portion of the outer peripheral surface of this member **57** being formed with a circular groove in which a sealing O-ring **58** is fitted and adapted to co-act with the plain wall of cavity **56**. The inner cavity **57***a* of this hollow member **57** is cylindrical and constitutes with the bottom **56***a* of cavity **56** a high-pressure chamber **59**. This high-pressure chamber **59** communicates with chamber **54** via a passage **61** opening into chamber **59** in the vicinity of the bottom **56***a* of cavity **56**. The upper portion of member **57** constitutes a fluid-tight transverse partition in said cavity **56** and is formed in its central portion with an orifice **62** having its end adjacent the high-pressure chamber **59** surrounded by a valve seat **57***b* formed integrally with said member **57**. Slidably mounted in the high-pressure chamber **59** is a check valve **63** engaging the walls **57***a* of cavity **56**, somewhat like a piston. This check valve **63** is urged against the seat **57***b* by a coil compression spring **64** reacting against the bottom **56***a* of cavity **56**, and is formed with axial passages **65** whereby the gas under pressure from capsule **31** and circulating through chamber **54**, via passage **61**, can flow up to the orifice **62** when said check valve **63** is unseated. The check valve **63** further comprises an upstanding axial rod **63***a* extending coaxially through said orifice **62** beyond the upper face of member **57**. Overlying this upper face is an expansion piston **66** adapted to slide along the intermediate, plain-walled portion of cavity **56**. Formed in the outer peripheral surface of piston **66** is a circular groove receiving a sealing ring **66***a* co-acting with the lateral wall of capacity **56**. This ring **66***a* is preferably of the "quad-ring" type. The lower face of piston **66** and the upper face of member **57** form therebetween in conjunction with a corresponding portion of cavity **56**, a low-pressure chamber **67** in which the gas under pressure flowing from the high-pressure chamber **59** through orifice **62** is expanded while pushing the piston **66** against the resistance of a gauged coil compression spring **68**. The force of this spring **68** may advantageously be adjusted by means of an adjustment screw **69** normally urged in the downward direction by the gauged spring **68**. This screw **69** closing the top of cavity **56** permits of setting at the factory the force of the gauged spring **68** so that the gas has constantly the desired low-pressure value for delivering same to the bottle when the piston **66** is in a state of balance between the opposed forces exerted by the gas and said gauged spring **68**, respectively. The low-pressure chamber **67** communicates with the interior of the bottle through the following path : a port **71** disposed just above the upper face of member **57**, and a small duct **72** connect said chamber **67** to another duct **73** (shown in dash lines) extending vertically through the body **50** but shifted to the rear with respect to the plane of the Figure which is also the plane of the section made through the body **50**, and also in relation to the common vertical axis of the siphon-valve stopper and bottle. This duct **73** opens into an annular chamber **74** formed in the base **50***a* of body **50**, above the stopper proper **51** ; this chamber **74** communicates in turn with the interior of the bottle via an orifice **75** formed in an eccentric position through the stopper **51**, and also through a short pipe section **76** force fitted in said orifice **75** and extending somewhat into the bottle neck. This pipe **76** is not necessarily long, since its only function is to prevent the orifice **75** from being choked when the stopper section **51***a* is inserted into the neck and more or less compressed according to the inner diameter of said neck.

The liquid contained in the bottle may be withdrawn therefrom in a manner known per se by utilizing the force of the gas under pressure directed into the bottle through a dip-tube **77** extending to a distance short of the bottle bottom, this dip-tube **77** being fitted coaxially through an axial orifice **78** formed in the stopper **51**, said orifice having a vertical coaxial extension in the form of a duct **79** formed in the body **50** and extending through the annular chamber **74**. This duct **79** may be caused to communicate with the outlet duct **81** of the dispensing spout **82** via a control valve designated in general by the reference numeral **83**. This control valve **83** comprises a valve member **84** urged by a coil compression spring against a corresponding seat **86** formed in a transverse chamber **87** adjacent the upper end of said duct **79**. The valve member **84** has a cylindrical skirt portion **84***b* at its rear end which surrounds one portion of spring **85** and is adapted to slide in said chamber **87**. The function of this skirt **84***b* is to close in a fluid-tight manner that portion of chamber **87** which extends behind the valve member **84** and encloses the spring **85**, thus preventing, during a liquid dispensing operation, any ingress and accumulation of liquid or foam derived from this liquid in this portion of chamber **87**, since such accumulation, if this skirt **84***b* were not provided, would cause an objectionable dripping of liquid after completing said liquid dispensing operation and the closing of valve member **84**. Moreover, this valve member **84** is provided with a control rod **84***a* extending coaxially through a screw **88** closing the outer end of chamber **87** and engaged by the spring **85**. The end of the rod **84***a* which projects externally from the body of the siphon-valve stopper has pivotally mounted thereon, through the medium of a fulcrum or pivot pin **92**, a control handle or lever **89** bearing at **91***a*, slightly above said fulcrum pin **92**, against a projection **91** formed integrally with the body **50**, on one side thereof.

According to this invention, the gas stop valve is operatively connected to the pressure reducing device **30**. In fact, this valve unit utilizes the valve member **63** and its seat **57***b* as clos-

ing means, and suitable control means, designated in general by the reference numeral **93**, are provided for acting through the medium of expansion piston **66** and controlling the opening and closing movement of the valve unit comprising said valve member **63** and saet **57***b*.

Said control means **93** comprise a control knob **94** rigid with a screw **95** having a left-hand screw pitch. The screw **95** extending coaxially through the adjustment screw **69** is formed to this end with a tapped hole **69***a* of which the threads and pitch correspond to those of said screw **95**. This screw **95** has a lower or depending extension formed with a concentric flange **97**. The expansion piston **66** is formed with a cavity surrounding coaxially the rod **96** and has force fitted in said cavity a return cup **98**. This cup is disposed upside down in the cavity of piston **66** and its bottom has an aperture formed therein through which extends the rod **96** so that the flange **97** is trapped between the bottom of cup **98** and the bottom of cup **98** and the bottom of the cavity of piston **66**. In the drawing (FIG. **1**) the assembly comprising the pressure reducing device and the stop valve is in the closed position. In fact, the knob **94** has previously been rotated in the clockwise direction, thus causing the upward movement of rod **96** and flange **97**, due to the left-hand pitch of screw **95**. During the upward movement of rod **96** and flange **97**, the latter engages the bottom of cup **98** so as to raise the piston **66** against the antagonistic force of spring **68**. Piston **66** is raised to an extent sufficient to disengage it from any contact with the free end of rod **63***a* of valve **63** urged to its position of engagement of the relevant seat **57***b* by spring **64**, thus closing the valve unit.

The above-described siphon-valve stopper operates as follows : Assuming that a fresh cartridge of capsule **31** filled with carbon dioxide gas under pressure has been placed into the cavity **52** of body **50** which is subsequently reclosed by means of the plug **53**, the latter being screwed home to cause its perforator **55** to pierce the perforable wall **31***a* of capsule **31**. Thus, the gas contained in this capsule **31** under a pressure of, say, 870 psi, escapes therefrom into cavity **54** and flows via duct **61** into chamber **59** where it co-acts with spring **64** for urging the valve member **63** against its seat **57***b* (the control members **93** of the stop valve being in the position shown in FIG. **1**). The gas under relatively high pressure can thus flow through the orifice **62**. Then, the siphon-valve stopper can be adapted (and locked in position by means of its spring **7**) on the neck **26** of a bottle filled with a beverage, such as beer. If the knob **54** is rotated in the clockwise direction until it engages the upper face **50**b of the body of the siphon-valve stopper, the rod **96** and its flange **97** will be lowered, so that the piston **66** urged by spring **68** will contact the free end of rod **63**a of valve member **63** and push this valve member **63** away from its seat **57***b*. The gas under high pressure in chamber **59**, which flows through the orifices **65** of said valve member, can thus flow through the orifice **62**. Then, the siphon-valve stopper can be adapted (and locked in position by means of its spring **7**) on the neck **26** of a bottle filled with a beverage, such as beer. If the knob **54** is rotated in the clockwise direction until it engages the upper face **50***b* of the body of the siphon-valve stopper, the rod **96** and its flange **97** will be lowered, so that the piston **66** urged by spring **68** will contact the free end of rod **63***a* of valve member **63** and push this valve member **63** away from its seat **57***b*. The gas under high pressure in chamber **59**, which flows through the orifices **65** of said valve member, can thus flow through the orifice **62** into the low-pressure chamber **67** in which it is expanded while moving the piston **66** against the resistance of the gauged spring **68**. As already explained hereinabove the force exerted by the gauged spring **68** on piston **66** is such that when this piston is in a state of balance between the opposed forces of spring **68** and of the gas pressure in the low-pressure chamber, this pressure in the low-pressure chamber has the desired value adjustable on the other hand by means of screw **69**, and low enough to be safely applied to the interior of an ordinary glass bottle. The spring **68** and screw **69** may be selected and adjusted respectively in such a manner tat the value of this low-pressure approximates 11 or 12 psi. Although this has not been shown in the Figure, when the piston **66** is in a state of balance, the flange **97** of rod **96** is somewhat spaced from the bottoms of cup **98** and piston **66**, so that this piston **66** can oscillate freely about said position of equilibrium. The piston **66** and spring **68** (of which the force is greater than that of spring **64**, also act as a pressure regulating device. In fact, if an excess amount of gas flows into chamber **67**, this gas will accumulate therein and tend to move the piston **66** so that the valve member **63**, by moving towards its seat **57***b*, will reduce the cross-sectional passage area available for the gas towards the orifice **62**. Conversely, if the amount of gas flowing through this orifice is not sufficient, this piston **66** will move downwards and thus unseat the valve member **64** to a greater extent, to increase the cross-sectional passage available towards the orifice **62**. The gas present under a regulated low-pressure in chamber **67** escapes through the port **71** and ducts **72**, **73** towards the annular chamber **74** from which it flows through the orifice **75** and the short pipe **76** into the bottle. The gas pressure within the bottle is substantially equal to that prevailing in the low-pressure chamber **67**. To draw liquid from the bottle the user has simply to depress the upper end of the handle or lever **89** which, by bearing against the portion **91***a* of projection **91**, moves the valve member **84** away from its seat **86**, against the resistance of spring **85**, thus enabling the liquid under pressure to rise up the dip-tube **77** and duct **79** and escape through the outlet passage **81**. When all the liquid contained in the bottle has thus been dispensed, the gas stop valve is closed by rotating the knob **94** in the clockwise direction, as described hereinabove. Then, the siphon-valve stopper can be removed from the bottle to which it has been fitted, without causing the gas contained in capsule **31** and chambers **54** and **59** from escaping to the surrounding atmosphere, the same siphon-valve stopper being subsequently fitted to another bottle filled with liquid to be dispensed. Experience teaches that by using this procedure it was possible, by using a single CO_2 cartridge, to dispense the contents of three bottles representing a total capacity of about three liters, with a gas residue still sufficient for discharging the content of a half-filled bottle in order to rinse the inner ducts and passages of the siphon-valve stopper. Other tests proved that by closing the gas stop valve each time when the bottle is half-empty and utilizing the pressure of the residual gas left in the bottle, above the liquid level, it was possible to dispense the contents of at least four one-liter bottles by using a single carbon dioxide gas capsule.

It may be noted on the other hand that the above-described siphon-valve stopper is characterized by several safety features. In fact, if for any reason the pressure increased dangerously in the bottle and therefore in the low-pressure chamber **67**, the piston would be moved upwards in such a manner that the sealing ring **66***a* would move past an orifice **99** formed through the side wall of cavity **56** and causes the low-pressure chamber **67** to communicate with the atmosphere. Moreover, if with the run of time the spring **68** lost its gauged force or became abnormally weak, the position of equilibrium of piston **66** would be obtained at a higher level in cavity **56**, so that valve member **63** would be nearer to its seat and allow a lesser quantity of gas to flow towards the low-pressure chamber **67**. Therefore, after a relatively long service, as the spring **68** is weakened, the gas pressure in said low-pressure chamber **67** decreases gradually. Moreover, the spring **7** provided for locking the siphon-valve stopper on the neck **26** of the bottle may advantageously be so proportioned as to be released when the pressure in the bottle exceeds a predetermined limit, for example 60 psi, in case the valve unit comprising the piston **66** and orifice **99** failed to operate. However, the above-described siphon-valve stopper is objectionable in that its vertical dimension is relatively great, with the inconvenience that in certain types of refrigerators it is not possible or hardy possible to place in a vertical position a bottle equipped with this siphon-valve stopper at the place normally provided for bottles in a refrigerator. Moreover, it was also

found that the check valve **84** interferes somewhat with the liquid flow when it is open, thus causing foam to develop and the fall of a few drops of liquid after each use of the siphon-valve stopper.

These inconveniences are avoided by using the siphon-valve stopper constituting the second form of embodiment of this invention which will now be described in detail with reference to FIG. **2** wherein the same reference numerals as used in FIG. **1** designated identical or similar elements or parts.

In FIG. **2** the siphon-valve stopper illustrated is adapted to be fitted to an ordinary glass bottle filled with a liquid, for example a beverage such as beer, and comprising a body **100** enclosing a CO_2 capsule **31** as currently available on the market, of a capacity permitting of dispensing the contents of several bottled filled with liquid, a pressure reducing device designated by the reference numeral **30**, and a gas stop valve for discontinuing the delivery of gas into the bottle when the latter is empty and permit the fitting of the siphon-valve stopper to another bottle to be emptied.

The body **100** of the siphon-valve stopper comprises a vertical axial bore **101** and a side spout **82** formed with a liquid outlet duct **81** connected to said axial bore **101**. In a manner already known per se through the French Pat. No 1,380,581 a liquid outlet control valve designated in general by the reference numeral **102** and normally closed in the inoperative condition of the device is arranged in the axial bore **101** and adapted to be actuated by means of a push button **103** disposed in the upper portion of body **100**. According to this invention, the valve **102** consists of a piston **104** slidably and tightly mounted in the axial bore **101** and formed at its lower portion with a blind axial bore **105** and with a radial bore **106** opening into said axial bore **105** near or at the bottom thereof. The upper end of piston **104** is connected to the lower portion of the central rod **103***a* of the control push-button **103**, for example by means of an axial stud **107**. A coil compression spring **108** surrounding the central rod **103***a* of push-button **103** reacts with one end against the underface of the upper cap-shaped or dome-shaped portion of push-button **103** and with the other end against the bottom of a cavity **109** formed in the body **100** of the siphon-valve stopper and in which the upper cap-shaped portion of push-button **103** is adapted to penetrate, with a moderate radial clearance.

The axial bore **101** comprises at its upper portion a portion having a smaller diameter than the remaining portion thereof, in which the piston **104** is slidably engaged. The central rod **103***a* of push-button **103** has a smaller diameter than the piston **104** and can slide in the portion of reduced diameter of said axial bore **101**. The annular shoulder formed between the two portions of minor diameter and major diameter of axial bore **101** acts as a top for limiting the permissible upward stroke of piston **104** and push-button **103** under the force of return spring **108**. In the position shown in FIG. **2** the piston **104** engages said shoulder and this position corresponds to the inoperative position in which the valve **102** is closed since the radial passage **106** of the piston registers with the wall of axial bore **101**.

A dip-tube **77** which, during the operation of the device, extends within the bottle down to a distance short of the bottom thereof, is force fitted into the axial duct **105** of piston **104**. During the operation and to permit the delivery of liquid under the action of the gas pressure prevailing in the bottle, through the dip-tube **77**, the axial duct **105**, the radial duct **106** and the outlet duct **81** of spout **82**, it is only necessary to depress the push-button **103** so as to bring the radial hole **106** of piston **104** in alignment with the orifice **110** through which the spout duct **81** opens into the axial bore **101**. A stop (not shown) may advantageously be provided for example within the cavity **109** of body **100** in order to limit the permissible stroke of push-button **103** when the latter is depressed by the user, and therefore the axial downward stroke of piston **104**, so that when valve **102** is open the radial hole **106** of piston **104** will register exactly with the orifice **110** of duct **81**. Moreover, in order to keep the piston **104** in an annular position such that its radial hole **106**, in the open position of valve **102**, registers exactly with the orifice **110**, the rod **103***a* of pushbutton **103** is formed with a longitudinal rib **111** engaging a corresponding guilding groove formed in a portion of smaller diameter of axial bore **101** to prevent any relative rotary movement of said push-button **103** and of the piston **104** rigid therewith, while permitting an axial movement of these push-button and piston. Moreover, in order to avoid any interference in the flow of liquid when valve **102** is opened, as this might cause excessive foam to build up, the radial hole **106** and orifice **110** of duct **81** have preferably the same dimensions.

In order to permit the adaptation, fitting and fastening of the siphon-valve stopper on the neck **26** of a bottle, the body of the device is formed in the manner known per se, notably through the French Pat. No 1,380,581 with a lower capacity **112** adapted to receive the neck **26** of the bottle. As also described in said French Patent a sealing ring **113** of suitable elastomer is fitted in said cavity **112** and adapted to be compressed radially by means of a clamping collar **114** screwed in a suitably tapped portion of cavity **112**. In the example illustrated in FIG. **2** the sealing ring **113** reacts against the bottom of said cavity **112**. In the right hand portion of FIG. **2** there is shown the clamping collar **114** in a low position wherein it does not compress the sealing ring **113** to permit the introduction of the bottle neck **26** into the cavity **112**, down to the bottom of this cavity, by slightly increasing the necessary effort as the neck **26** engages the central hole of ring **113**. In the left-hand portion of FIG. **2** the neck **26** is shown in the final position obtaining when it is engaged home or to the bottom of cavity **112**, and after collar **114** has been screwed home for axially compressing the sealing ring **113** which, due to the clamping action, exerts a radial pressure against the neck **26** of the bottle for the dual purpose of sealing the joint and safely securing the device to the bottom neck **26**, by engaging the circular groove or grooves usually provided on the outer walls of neck **26**. The sealing ring **113**, consisting preferably of a suitable elastomer of cellular type having for example a Shore hardness of about **20**, comprises an inner bead **113***a* which, in the example illustrated, is adapted to co-act with the single annular groove formed in the outer wall of neck **26** and which, in other cases, permits the fitting of the siphon-valve stopper to a bottle of which the neck has a smaller outer diameter. Of course, the number of inner beads of said sealing ring **113**, such as bead **113***a*, and also the shape or contour of these beads, should not be construed as being strictly limited to those shown in the Figure. Moreover, although to bottle neck **26** illustrated comprises a single annular groove formed in its outer wall, the siphon-valve stopper may also be adapted to bottles having another type of neck, for example an externally screw-threaded neck. Besides, a washer **115** having good anti-friction properties is interposed between the sealing ring **113** and the clamping collar **114** in order to facilitate the rotation of said collar **114** during the tightening or release movements. This arrangement is particularly advantageous in that is permits of fitting and securing the siphon-valve stopper to bottles having necks differing by their shapes and/or diameters, while preserving the possibility for the stopper to pop out so as to release the gas in case of accidental overpressure within the bottle, thus providing an additional safety feature. Howaver, this arrangement, as described hereinabove, is already known per se is attended by a major inconvenience. In fact, when the clamping collar is released, it can separate from the base of the body of the siphon-valve stopper, so that there is a constant risk of loosing this collar **114** during the handling of the device. In order to avoid this inconvenience, the clamping collar **114** is formed in a manner known per se an external annular bead **114***a* surrounding the lower portion of the body of the siphon-valve stopper ; this bead **114***a* is formed at its upper end with one or a plurality of radial or annular projections **116** extending towards the peripheral wall of the lower portion of the body of the siphon-valve stopper and adapted, when the clamping collar **114** is released, to coact with a circular retain-

ing flange formed at the base of said body, as illustrated in the right-hand portion of FIG. 2, to prevent the collar 114 from being released from the body of the siphon-valve stopper.

According to another feature characterizing the present invention, the body 100 of the siphon-valve stopper comprises an elongated handle designated generally by the reference numeral 117 which extends obliquely downwards and outwards from one side of said body 100 and comprises two separable sections 117*a* and 117*b*. More particularly, the upper portion 117*a* is rigid with the body 100 of the siphon-valve stopper and the lower portion 117*b* is adapted to be secured by screwing to the lower end of said upper portion 117*a*. This upper portion 117*a* of handle 117 encloses a pressure reducing device 30, the gas stop valve and the means 93 for operating this valve, the lower portion 117*b* of handle 117 constituting a housing for enclosing the CO_2 capsule 31.

The pressure reducing device 30, the gas stop valve and its operating means 93 are in the whole similar to those of the first form of embodiment described hereinabove with reference to FIG. 1 ; therefore, a detailed description thereof is not deemed necessary. In FIG. 2, as already mentioned hereinabove, all parts or elements similar to or identical with those of FIG. 1 are designated by the same reference numerals. In the modified form of embodiment illustrated in FIG. 2 the following difference are clearly visible :

Thus, the pressure reducing device 30, the gas stop valve and the control means 93 thereof, except the control knob 94, are enclosed completely in a metal case 118, for example of the known alloy named "Zamac," which is partly embedded in the body 100 of the siphon-valve stopper, for example during the moulding of this body 100 made preferably of plastic material. The purpose of this metal case 118 is mainly to avoid any risk of explosion in the body of the siphon-valve stopper as a consequences of the high pressure prevailing in the high-pressure chamber 59 of the pressure reducing device. To the same end the lower portion 117*b* likewise consists preferably of metal, such as "Zamac." Extending from one side of case 118 is a pipe 119 communicating at one end with the low-pressure chamber 67 of the pressure reducing device and at the other end with the vertical duct 120 formed through the body 100 and opening into an annular groove 121 formed in the bottom of cavity 112. Thus, during the operation of the device, the low-pressure chamber 67 of the pressure reducing device communicates with the inner space of the bottle.

On the other hand, the spring 64 constantly urging the valve member 63 to its seated position reacts against one face of a plug 123 having its opposite face provided with a perforator 55. The function of this perforator 55 consists of course in perforating the perforable and wall of the capsule 31 enclosed in the lower portion 117*b* of handle 117 when this lower portion 117*b* is screwed home to the upper portion 117*a*. The plug 123 is screwed in the lower end of said case 118 and formed with orifices 124 permitting the passage of gas from the capsule 31 towards the high-pressure chamber 59 of the pressure reducing device, through said holes 124 and also through longitudinal grooves formed in the outer periphery of valve 63.

Another difference with respect to the first form of embodiment shown in FIG. 1 is that the hole 99 forming in conjunction with the piston 66 of the pressure reducing device a safety valve is replaced in the case of FIG. 2 by holes 125 formed through the screw 69 provided for adjusting the compressive force of expansion spring 68 and by a longitudinal groove 126 formed in the inner wall of metal case 118 so that, when the piston 66 is moved upwards by an accidental overpressure, the gas can be vented to the atmosphere through said holes 125. Otherwise, the mode of operation of pressure reducing device and of the gas stop valve is exactly the same as in the case of the first form of embodiment shown in FIG. 1.

The siphon-valve stopper according to the present invention can be used to advantage not only by any private consumer of beer or other gaseous or non-gaseous beverages, but also in all small inns and cafes not equipped with a special installation for dispensing beer under pressure.

Of course, the preferred forms of embodiment of the invention which have been described hereinabove are given by way of illustration, not of limitation, and many modifications and variations may be brought thereto without departing from the basic principles of this invention, as will be readily understood by those skilled in the art. Thus, although the drawing shows a dispensing spout 82 formed integrally with the body 50 or 100 of the siphon-valve stopper, it is clear that this spout could be secured to said body 50 or 100 and/or have any other shape. Moreover, notably as far as the elastome ring 113 is concerned, this ring could be free of any internal bead and have a height adapted to enable it to accomodate the shape and contour of the external surface of the bottle neck when said ring is radially distorted as a consequence of the resultant axial compression exerted by the clamping collar 114.

What I claim is:

1. A siphon-valve stopper, adapted to be fitted to the neck of an ordinary glass bottle filled with a liquid, which comprises a body enclosing a CO_2 capsule of a capacity sufficient for emptying a plurality of bottles filled with liquid, a pressure reducing device and a gas stop valve for discontinuing the delivery of gas into the bottle when the latter, equipped with the siphon-valve stopper, has been emptied, to permit the fitting of the siphon-valve stopper to another full bottle to be emptied, said pressure reducing device comprising a high-pressure chamber and a low-pressure chamber communicating with each other through a passage, said low-pressure chamber also communicating, during the operation of the siphon-valve stopper, with the interior of said bottle, a valve member for adjusting the gas output through said passage between said two chambers, said valve member being arranged in said high-pressure chamber and provided with a rod extending axially through said passage into said low-pressure chamber, a first resilient member constantly urging said valve member towards a valve seat provided on the high-pressure side of said passage for closing same, an expansion piston slidably mounted in said low-pressure chamber and registering with said passage, and a second resilient member constantly urging said expansion piston for engagement with the free end of said rod with a predetermined force opposed to and greater than that of said first resilient member in order to hold said valve member away from its seat, said force being such that said piston is in a state of balance under the action of said force and of a desired gas low-pressure in said low-pressure chamber, the improvement consisting in that said gas stop valve in operatively connected to said pressure reducing device, said gas stop valve consisting of said valve member and said valve seat constituting a valve unit, and of control members co-operating with said expansion piston in such a manner that when said control members are actuated in a first direction they move said expansion piston away from said end of said valve member rod, whereby said valve member engages its seat under the action of said first resilient member so as to close said valve unit and thus prevent the subsequent delivery of gas into said low-pressure chamber and therefore into said bottle, and whereby when said control members are actuated in another direction they release said expansion piston so that said expansion piston engages the and of said rod under the force of said second resilient member and pushes said rod and therefore said valve member away from its seat so as to open said valve unit, further comprising means for adjusting the force exerted by said second resilient member on said expansion piston said second resilient member consisting of a gaged coil spring reacting with one end against said expansion piston and with the other end against the end of adjustment screw constituting said adjustment means which is screwed in the body of said siphon-valve stopper and has its position adjustable in order to preset the compressive force of said coil spring, wherein said adjustment screw is formed with an axial tapped hole, and said gas stop valve control member comprises a control knob disposed externally of said siphon-valve stopper body and provided with a screw-threaded rod engaging said axial tapped hole of said adjustment screw, said screw-threaded rod of said control knob having a control rod

extension provided at its free end with a stop flange, said expansion piston comprising on its side adjacent to said adjustment screw a retaining member surrounding said control screw and so arranged as to engage the stop flange of said control rod when said control knob is actuated in the direction corresponding to the closing of said gas stop valve in order to move said expansion piston away from the rod of said valve member.

2. A siphon-valve stopper, adapted to be fitted to the neck of an ordinary glass bottle filled with a liquid, which comprises a body enclosing a CO_2 capsule of a capacity sufficient for emptying a plurality of bottles filled with liquid, a pressure reducing device and a gas stop valve for discontinuing the delivery of gas into the bottle when the latter, equipped with the siphon-valve stopper, has been emptied, to permit the fitting of the siphon-valve stopper to another full bottle to be emptied, said pressure reducing device comprising a high-pressure chamber and a low-pressure chamber communicating with each other through a passage, said low-pressure chamber also communicating, during the operation of the siphon-valve stopper, with the interior of said bottle, a valve member for adjusting the gas output through said passage between said two chambers, said valve member being arranged in said high-pressure chamber and provided with a rod extending axially through said passage into said low-pressure chamber, a first resilient member constantly urging said valve member towards a valve seat provided on the high-pressure side of said passage for closing same, an expansion piston slidably mounted in said low-pressure chamber and registering with said passage, and a second resilient member constantly urging said expansion piston for engagement with the free end of said rod with a predetermined force opposed to and greater than that of said first resilient member in order to hold said valve member away from its seat, said force being such that said piston is in a state of balance under the action of said force and of a desired gas low-pressure in said low-pressure chamber, the improvement consisting in that said gas stop valve is operatively connected to said pressure reducing device, said gas stop valve consisting of said valve member and said valve seat constituting a valve unit, and of control members co-operating with said expansion piston in such a manner that when said control members are actuated in a first direction they move said expansion piston away from said end of said valve member rod, whereby said valve member engages its seat under the action of said first resilient member so as to close said valve unit and thus prevent the subsequent delivery of gas into said low-pressure chamber and therefore into said bottle, and whereby when said control members are actuated in another direction they release said expansion piston so that said expansion piston engages the end of said rod under the force of said second resilient member and pushes said rod and therefore said valve member away from its seat so as to open said valve unit, wherein said body comprises a vertical axial bore communicating with a dip-tube adapted, during the operation of the stopper, to extend within the bottle for drawing liquid therefrom, and a lateral spout formed with a liquid outlet duct ope-ning into said axial bore, and comprising in a manner known per se a liquid output control valve disposed in said axial bore and closed in the inoperative condition of said siphon-valve stopper, and a push button operatively connected to said valve to permit the operation thereof, said push-button being disposed at the upper portion of said body, and wherein said output control valve consists of a piston adapted to slide in a fluid-tight manner in said axial bore and formed at its lower portion with a blind axial hole communicating with said dip-tube and with a radial hole opening in close proximity of the bottom of said blind axial hole, said radial hole being adapted to be brought to a position in which it registers with the inner orifice of said spout outlet duct when said push-button is depressed, to permit the delivery of liquid through said output orifice, the radial hole of said piston and said orifice of said outlet duct having substan-tially the same dimensions, and wherein said dip-tube is secured to the piston of said control valve so that its internal duct constitutes the extension of the axial duct of said piston.

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