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Granier

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[54] **SCREW-DOWN VALVES FOR FILLING BOTTLES WITH DRINKS**

[75] Inventor: **Hector Granier**, Vergeze, France

[73] Assignee: **A-T-O Inc.**, Willoughby, Ohio

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[30] **Foreign Application Priority Data**

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Oct. 8, 1970 France 7036441

[52] **U.S. Cl.** **141/46**, 137/614.2, 251/347
[51] **Int. Cl.** **B65b 31/00**
[58] **Field of Search** 141/1, 2, 3, 4, 5, 141/14, 18, 6, 29, 37, 39, 40, 99, 101, 102, 141/46, 236, 285, 286, 301, 367, 383, 384, 141/369, 372, 128; 137/614.2; 251/347, 353

[56] **References Cited**

UNITED STATES PATENTS

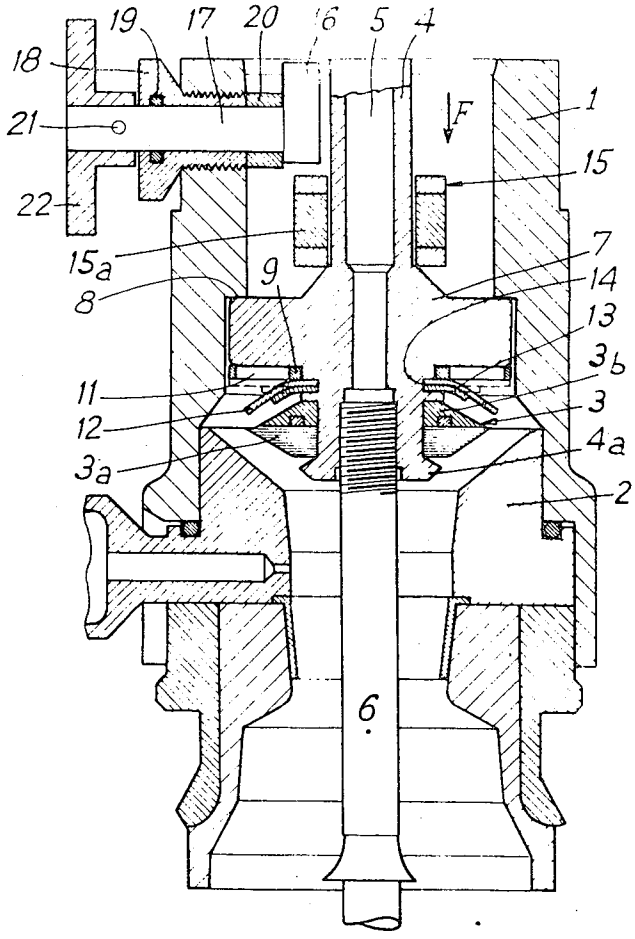
3,046,027 7/1962 Meyer 141/39

Primary Examiner—John Petrakes
Assistant Examiner—Frederick R. Schmidt
Attorney—Richard K. Stevens et al.

[57] **ABSTRACT**

This invention relates to an improved screw-down valve for filling bottles with drinks, and more particularly with gaseous drinks with a high pulp content, containing in particular carbon dioxide under counter-pressure, the filling members of which comprise a gas valve communicating the pressurised gas of the liquid reservoir and the inside of the bottle and a liquid valve then communicating the reservoir and the bottle, wherein said screw-down valve comprises a plate integral with the central rod of the liquid valve and located upstream of said valve, with respect to the direction of flow of the liquid, said plate which is located beneath a guide brace, having orifices for the passage of the liquid which may be obturated by at least one diaphragm held applied on the lower face of the plate by its elasticity and subjected to the weight of the liquid located above.

15 Claims, 6 Drawing Figures



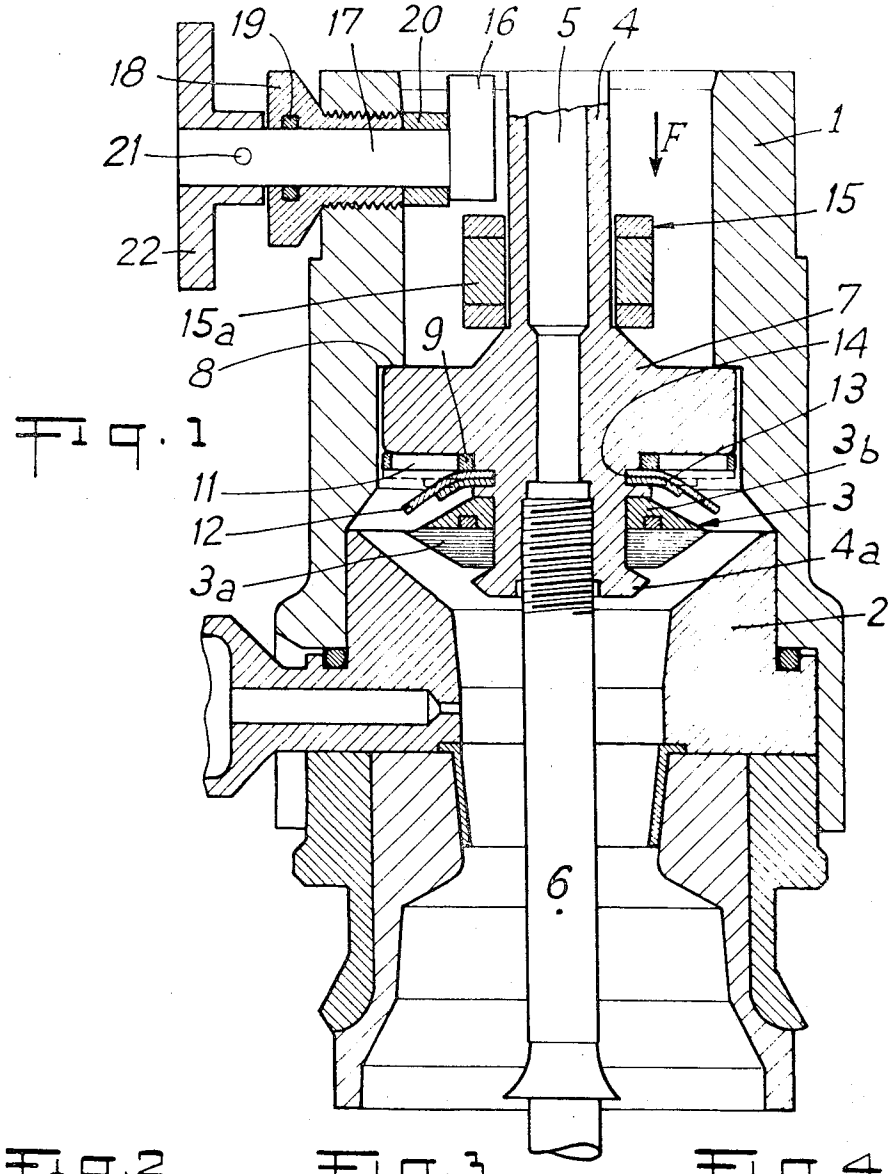


Fig. 1

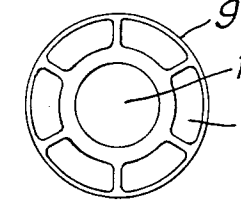


Fig. 2

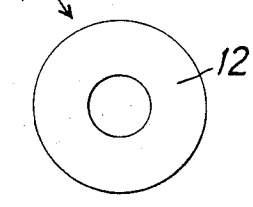


Fig. 3

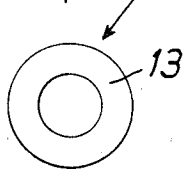


Fig. 4

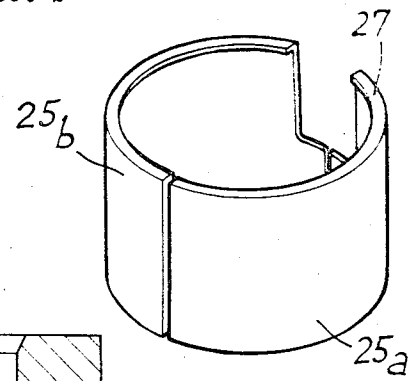
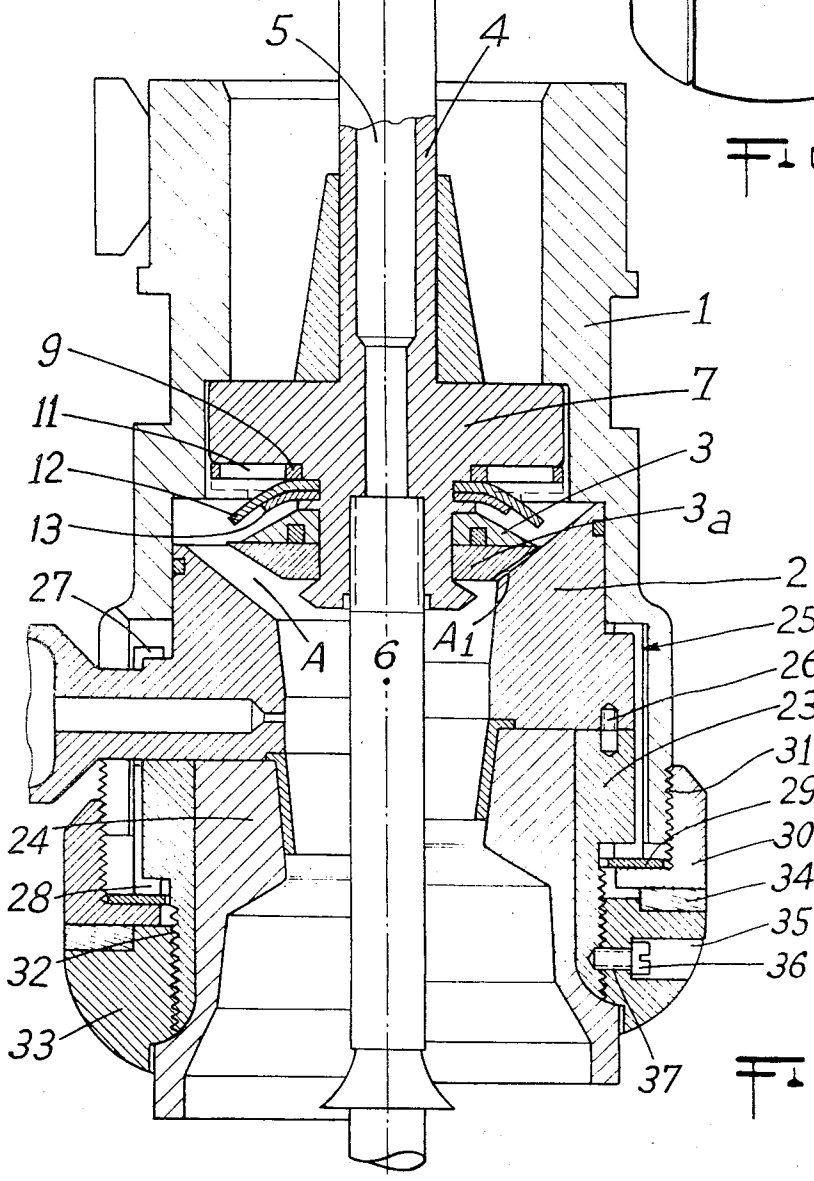

27
25b
25a

Fig. 6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3a
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Fig. 5

SCREW-DOWN VALVES FOR FILLING BOTTLES WITH DRINKS

The present invention relates to an improved screw-down valve for filling bottles with drinks and more particularly gaseous drinks with a high pulp content.

In installations for bottling drinks and more particularly gaseous drinks containing pressurized carbon dioxide, it is known to use screw-down valves comprising a valve for communicating the gas chamber of a reservoir with the empty bottle and a liquid valve which opens for filling the bottle with liquid, when the pressure is established between the gas chamber and the inside of the bottle.

However, said liquid valve does not enable the flow of the liquid to be precisely controlled at the end of filling and this results in differences in level in the full bottles.

The screw-down valve comprises a plate integral with the central rod of the liquid valve and located upstream of said valve with respect to the direction of flow of the liquid, said plate which is located beneath a guide brace, having orifices for the passage of the liquid, which may be obturated by at least one diaphragm held applied on the lower face of the plate by its elasticity and subjected to the weight of the liquid located upstream.

This arrangement makes it possible to check the end of filling of the bottle so that the pressure of the gas in the bottle cooperating with the elasticity of the diaphragm enables said latter to take its horizontal position again and to apply itself beneath the plate. The flow orifices for the liquid are then obturated and the level in the bottle is maintained until the valve is mechanically shut.

According to another characteristic, means are used for regulating the output of the valve for filling the bottles, according to their format.

To this end, a stop is used upstream of the brace, which cooperates with a cam pivotally mounted in the body along an axis perpendicular to the axis of the central rod of the valve, said cam being integral with a regulating knob disposed outside the body.

This arrangement enables the height of the joint of the liquid valve to be modified with respect to its seat and consequently the output of the screw-down valve to be varied. This means for regulating the output solves to a wide extent the problems that are met with when small bottles are filled with valves with high speed of flow.

According to another embodiment, the seat of the liquid valve is mounted to slide in the body so as to vary the section of passage between the seat and the liquid valve in open position.

This arrangement enables a very fine adjustment of the output to be obtained, particularly by using a thread procuring a slight axial displacement of the seat for a sufficiently large rotation of an output regulating ring.

Furthermore, this improvement enables the upper conduit of the valve body to be completely released and reduces the risks of lamination of the product, provoked by various parts located in this zone.

The invention will be more readily understood upon reading the following description of several embodiments thereof with reference to the accompanying drawings, in which:

FIG. 1 is a longitudinal section through the lower part of an improved valve according to the invention.

FIG. 2 is a plan view of a perforated plate.

FIG. 3 is a plan view of a main diaphragm.

FIG. 4 is a plan view of a secondary diaphragm.

FIG. 5 is a longitudinal section of an improved screw-down valve showing on the left-hand side the position for a maximum output and on the right-hand side the position for a minimum output.

FIG. 6 is a perspective view of the locking member constituted of two half-shells.

Referring now to the drawings, FIG. 1 shows the lower part of a screw-down valve for filling bottles with gaseous drinks, which comprises a body 1 in which is fitted a seat 2 of the liquid valve 3, coming in contact with the seat 2 by elastic joint 3*a*.

This liquid valve 3 which also comprises a bolt 3*b* on which the joint 3*a* abuts, is mounted on the central rod 4 of the valve which presents a shoulder 4*a* against which the joint 3*a* is held.

The central rod 4 which has a central conduit 5 for the passage of the gas of the reservoir into the bottle is elongated by a vent tube 6 screwed on the central rod and intended to be engaged in the bottle.

Upstream of the liquid valve 3 there is disposed a brace 7 shaped from the central rod and abutting against a shoulder 8 of the body 1.

The gas valve which is located below the liquid valve and the brace 7, is not shown in the Figure, as it is constituted in a manner known per se in this type of screw-down valve.

Upstream of the liquid valve 3 with respect to the direction of flow of the liquid shown by the arrow F, there is disposed beneath and against the brace 7 a plate 9 (FIGS. 1 and 2) which is engaged by a bore 10 on the central rod 4. This plate 9 has orifices such as 11 for the passage of the liquid which may be obturated by a main diaphragm 12 (FIG. 3) used in combination with a secondary diaphragm 13, said diaphragms 12 and 13 which are made of an elastic material being engaged in a groove 14 provided in the central rod.

When the liquid valve 3 is opened, as shown in FIG. 1, for filling the bottle, the joint 3*a* is no longer in contact with its seat 2 and the diaphragms 12 and 13 which are subjected to the weight of the column of liquid located above, become deformed, as shown in solid lines in FIG. 1, thus uncovering the orifices 11 of the plate 9 in order to allow passage of the liquid.

At the end of the filling operation, the pressure of the gas in the bottle cooperating with the elasticity of the diaphragms 12 and 13 enables them to take a horizontal position again, as shown in dashed lines in FIG. 1, so that the diaphragm 12 obturates the orifices 11 of the plate 9.

The orifices 11 for the flow of the liquid therefore remain obturated and the level of the liquid in the bottle is maintained until the screw-down valve is mechanically shut, for which closure the joint 3*a* of of the liquid valve 3 comes into contact with the seat 2.

There abuts on the brace 7 a stop 15 which has in its central part an elastic part 15*a*, made particularly of neoprene, said stop 15 cooperating with a cam 16 whose shaft 17 is mounted to pivot in a bearing 18 screwed in the body 1 and provided with a seal ring-joint 19. A distance-piece 20 made of rigid or elastic material is disposed between the bearing 18 and the

cam 16. A control knob 22 outside the body 1 is attached to shaft 17 by a pin 21.

This arrangement enables the position of the cam 16 to be regulated with respect to the stop 15, by means of the control knob 22 and the height of the joint 3*a* of the liquid valve to be modified with respect to the seat 2.

According to this opening, the output of the screw-down valve is more or less great.

FIG. 5 shows the lower part of a screw-down valve as described hereinabove comprising a body 1 in which a seat 2 of the liquid valve 3 is mounted for axial sliding. The seat 2 is rendered integral with a member 23 for supporting the joint 24 for centering the neck of a bottle, by means of a locking member 25 and a pin 26.

The locking member 25, shown in FIG. 6, is constituted of two half-shells 25*a*, 25*b* which have a shoulder or flange 27 against which the seat 2 abuts and a shoulder 28 against which the support member 23 abuts. At their lower part and by their shoulder 28, the two half-shells of the locking member 25 rest by means of a stop ring 29 against an adjusting ring 30 which is screwed on a threaded part 31 of the body 1.

The member 23 for supporting the centering joint presents a threaded part 32 on which is screwed a check-nut 33 against which abuts the adjusting ring 30, with the interposition of a stop ring 34.

The stop rings 29 and 34 are preferably made of tetrafluoroethylene.

There is provided on the check-nut 33 a bore 35 in which is mounted a stop screw 36 engaged in a tapped hole 37 in the ring, said screw 36 preventing the rotation of the check-nut and ensuring the locking of the adjusting ring 33.

With the screw-down valve in the open position, i.e. when the liquid valve 3 is raised from its seat 2, the left-hand side of FIG. 5 shows said seat 2 in the maximum opened position which corresponds to the largest space A between the joint 3*a* and the seat 2, and therefore to the maximum output of liquid.

In order to reduce the output, it is sufficient to screw the adjusting ring 30 so that it approaches the joint 3*a* of the valve 3 which is in open position and to bring it into the position shown on the right hand side of FIG. 5 which corresponds to the smallest space A_1 and to the minimum output.

As soon as the ring 30 is in a position corresponding to the required output, the check-nut 33 is screwed on threaded part 32 and brought into abutment against the ring 30 and the whole is locked by means of the stop screw 36.

According to a non-limiting embodiment of the invention, one revolution of the ring 30 corresponds to an axial displacement of 1 mm of the seat 2 with respect to the joint 3*a* of the valve.

This device enables a very fine adjustment of the output to be obtained, for which a quarter of a revolution of the ring permits an axial displacement of 0.25 mm of the seat.

I claim:

1. A screw-down valve adapted for use in filling a bottle with a liquid, said valve having a body with a longitudinal bore therethrough, a valve seat disposed in the bore, a rod centrally disposed in the bore, said rod having a longitudinal bore therethrough adapted for the passage of gas, a valve closure member carried by the rod adapted to form a fluid type seal when disposed against the said seat, a guide brace carried by the rod disposed upstream of said closure member, a plate having openings therethrough disposed about said rod and against the downstream side of the brace, and a flexible diaphragm disposed about the rod and adjacent to said plate, said diaphragm being adapted to flex away from said openings in response to weight of liquid upstream thereof.

2. The screw-down valve of claim 1 wherein said rod has an annular groove therein just downstream of said plate and said diaphragm and a second diaphragm of smaller diameter are secured in the groove with the first said diaphragm adjacent to the plate.

3. Screw-down valve as defined in claims 2, wherein the two diaphragms are made of an elastic material.

4. The screw-down valve of claim 1 wherein said seat is slidably mounted in the said body to vary the size of the opening between the seat and the valve closure member when said seat is in the open position.

5. Screw-down valve as defined in claim 1, wherein upstream of the brace there is mounted on the central rod a stop which cooperates with a cam mounted to pivot in the body along an axis perpendicular to the axis of the central rod, said cam being integral with a shaft connected to a regulating knob disposed outside the body.

6. Screw-down valve as defined in claim 5, wherein the stop comprises in its median part a buffer made of neoprene.

7. Screw-down valve as defined in claim 5, wherein the shaft of the cam on which the regulating knob is fixed is mounted to pivot in a bearing screwed in the body, a distance-piece being disposed between the bearing and the cam.

8. Screw-down valve as defined in claim 7, wherein the distance-piece is made of rigid material.

9. Screw-down valve as defined in claim 7, wherein the distance-piece is made of elastic material.

10. Screw-down valve as defined in claim 1, wherein said valve seat and a support member of a centering joint for centering the neck of the bottle are rendered integral by a pin and a locking member which rests on an output regulating ring screwed on the body of the screw-down valve.

11. Screw-down valve as defined in claim 10, wherein the locking member comprises two half-shells having two shoulders against which the seat and the support of the centering joint abut respectively.

12. Screw-down valve as defined in claim 10, wherein the support of the centering joint has a threaded part on which is screwed a check-nut ensuring the locking of the output regulating ring, said check-nut being fixed by a stop screw engaged in the support of the centering joint.

13. Screw-down valve as defined in claim 12, wherein the locking member is mounted on the output regulating ring with the interposition of a stop ring.

14. Screw-down valve as defined in claim 13 wherein the stop rings are made of tetrafluoroethylene.

15. Screw-down valve as defined in claim 12, wherein the output regulating ring is mounted on the check-nut with the interposition of a stop ring.

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