June 3, 1952 L. C. BARLING 2,599,426

AUTOMATIC VALVE

Filed Oct. 21, 1949

Fig. 1.

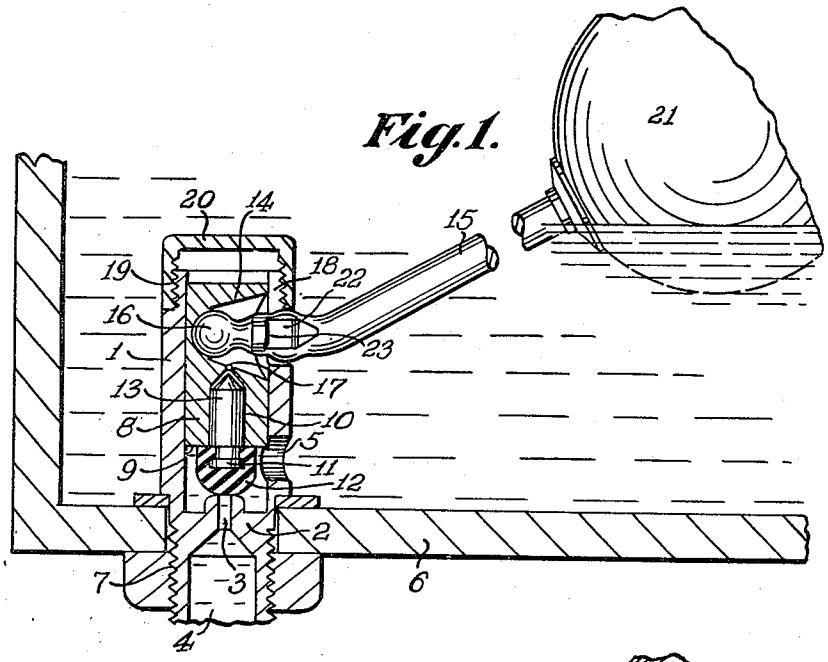


Fig. 2.

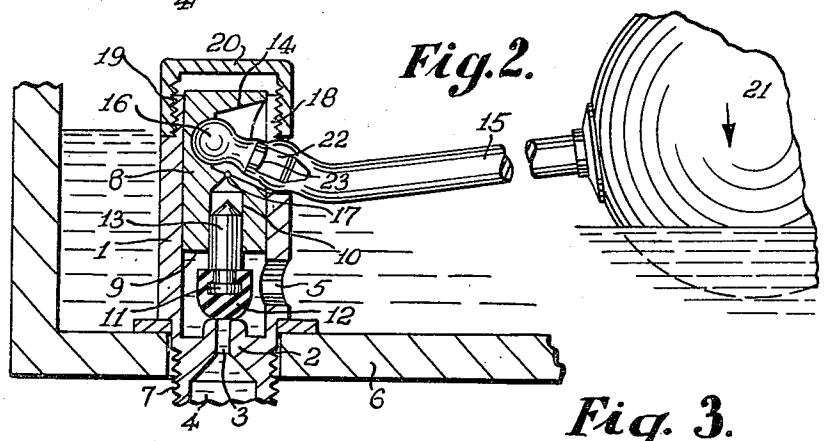
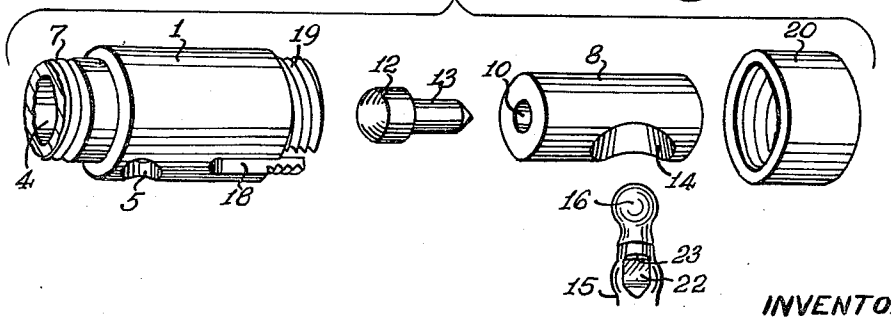


Fig. 3.



INVENTOR

LESLIE CLEMENT BARLING

L. S. Saulsbury

ATTORNEY

Patented June 3, 1952 2,599,426

UNITED STATES PATENT OFFICE

2,599,426

AUTOMATIC VALVE

Leslie Clement Barling, Rosebank, Johannesburg, Transvaal, Union of South Africa

Application October 21, 1949, Serial No. 122,805
In Union of South Africa May 20, 1949

2 Claims. (Cl. 137—104)

1

This invention relates to automatic valves of the type used for admitting a predetermined quantity of liquid to a container. Such valves are employed, for example, in domestic water closet cisterns where they are actuated by means of a lever arm having a floating ball at the free extremity thereof. When the level of the water in the cistern falls the ball falls also, thus causing the valve to open and admit a fresh supply of water. When the volume of water so admitted has raised the level in the cistern to a predetermined extent, the position of the floating ball is such that it causes the valve to close automatically.

Valves as described above usually comprise a body part having a closure member adapted for reciprocating movement therein. The actuating lever on the free end of which the floating ball is mounted is arranged to co-operate with the closure member for the purpose of imparting reciprocating movement thereto.

Valves as described in the preceding paragraph are usually mounted with the body part in a horizontal position and when the cistern has been filled to the predetermined level, the valve is still above the surface of the liquid. If the valve is mounted in a submerged position and the liquid supply to the inlet side of the valve fails, the floating ball will remain in a position in which the closure member is off its seat. The valve will therefore remain open and liquid on the outlet side of the valve may be drawn into the supply system due to negative pressure in the system. Contamination of the supply in this manner is, of course, highly undesirable and for this reason the fitting of submerged valves of this type in domestic water closet cisterns is subject to an almost universal prohibition.

It is an object of the present invention to provide a valve which shall be capable of being fitted submerged without the least risk of reverse flow taking place through the valve in the event that the supply to the inlet side fails. Valves according to the invention can thus be mounted vertically in the bottom of a cistern.

In accordance with the invention, therefore, a valve of the type described comprises a materially vertical body part having an inlet thereto and an outlet therefrom for liquid; a plunger pivotally mounted on one end of an actuating lever and arranged for reciprocating movement within said body part; a closure member movable axially relative to the plunger and comprising a closure head and a spigot extending upwardly therefrom; an axial socket in the plunger for receiving the spigot; venting means through which pressure on the outlet side of the valve may be communicated to the socket behind the spigot; and a floating member associated with the end of the actuating lever remote from the body part; the

2

arrangement being such that movement of the plunger to close the valve imparts a corresponding movement to the closure member by positive action whilst the closure member tends to remain on its seat under the action of gravity when the plunger moves in the opposite direction.

The depth of the socket is preferably exactly the same as the length of the spigot and the closure head provided with a rubber sealing cap. If the overall cross-sectional area of the closure head is greater than that of the spigot, it is immaterial whether the depth of the socket is greater or less than the length of the spigot but, even in this case, I prefer to make the depth the same.

If the socket is not vented and the spigot is a close fit therein, the closure member will not tend to fall away from the plunger under gravity when the latter is moved to open the valve. The venting means conveniently comprises an axial port extending from the end of the socket into the customary radial socket which receives the end of the actuating lever. The latter socket is in communication with the pressure on the outlet side of the valve.

Since the actuating lever is connected to the plunger and not to the closure which can move axially relative to the plunger, it will be appreciated that failure of the supply to a vertically mounted valve according to this invention is of no consequence. The closure member remains on its seat under the influence of gravity and it cannot be lifted off it until the inlet pressure is restored to an amount greater than the pressure on the outlet side. Reverse flow through the valve is therefore impossible.

A preferred embodiment of the invention will now be described by way of example with reference to the accompanying drawings in which:

Fig. 1 is a sectional elevation of an automatic valve in accordance with the invention mounted in a cistern. The valve is shown in the closed position.

Fig. 2 is a sectional elevation similar to Fig. 1 but showing the position of the valve when the inlet pressure fails.

Fig. 3 illustrates in perspective the body part, the plunger, the closure member and the extremity of the actuating lever which cooperates with the plunger.

Referring to the drawings, the valve comprises a cylindrical body part 1 provided internally with a transverse partition 2 having an axial aperture 3 for the passage of liquid from the inlet 4 to the radial outlet 5. The body part 1 is shown mounted vertically in the bottom of a cistern 6 and it is threaded externally at 7 for connection to a supply pipe. A plunger 8 is received and is a close fit within that portion of the body part 1 remote from the inlet 4 and its internal face 9

is provided with an axial socket 10 having parallel walls.

A closure structure or unit assembly comprises a closure head 11 with a resilient cap 12 mounted on it and a spigot 13 or guide pin projection which is slidably receivable in the axial socket or guide opening in the plunger 8. The closure structure as a whole is movable axially relative to the plunger 8 and it seals off the axial aperture 3 when the valve is closed. A radial socket 14 is drilled from the periphery of the plunger 8 inwards towards and beyond the center thereof at a point above the axial socket 10.

One end of the actuating lever 15 is rounded off at 16 and adapted to be received in the radial socket 14 with sufficient play to allow of an easy reciprocating movement of the plunger 8. An axial hole 17 is drilled in the plunger extending from the end of the axial socket 10 into the radial socket 14 to provide venting means through which pressure on the outlet side may be communicated to the socket 10 behind the spigot 13.

A longitudinal slot 18 is provided in the wall of the body part 1 and such slot extends from the extremity remote from the inlet towards the radial outlet 5. Said slot 18 is to enable the actuating lever with the plunger 8 mounted thereon to be assembled to the body part 1. The end of the body part remote from the inlet is threaded externally at 19 for reception of an internally threaded cap 20 which, when secured in position, retains the actuating lever 15 in its slot and prevents withdrawal of the plunger 8.

At a short distance from the point at which it projects outwards through the longitudinal slot 18, the actuating lever 15 is bent at an obtuse angle and on the free extremity a floating ball 21 is mounted.

At the point where the actuating lever 15 is embraced by the longitudinal slot 18, it is narrowed to a section corresponding to that of the slot 18, and provided with flattened faces 22.

Rounded shoulders 23 prevent the lever 15 from dropping out and they conform to its arcuate movement.

In operation, a reduction in the liquid level in the cistern 6 causes the ball 21 to drop and the actuating lever 15 moves the plunger 8 upwards towards the end of the body part 1 remote from the inlet 4. The closure structure does not move with the plunger 8 but tends to remain on its seat under the action of gravity. This tendency is overcome by the pressure on the inlet side of the valve which lifts the closure structure bodily from its seat and so enables the cistern 6 to be refilled to the correct level. When this level has been reached, the actuating lever 15 moves the plunger 8 downwards and the closure structure is carried with it to close the valve. If there is no inlet pressure, or if the inlet pressure is less than the pressure on the outlet side, the closure member will remain firmly on its seat and no reverse flow can take place.

I claim:

1. An automatic valve for admitting a predetermined quantity of liquid to a container comprising a vertically extending hollow cylindrical body, adapted to be attached to the container and to have a liquid supply means connected thereto, said hollow cylindrical body having a transverse partition with an axial inlet aperture therein, and a radial outlet opening above the partition, a plunger slidable in the cylindrical body above the partition, said plunger having an axial guide opening extending upwardly from the lower end thereof, a closure structure having a head and engageable with the transverse partition to close off the inlet aperture thereof and a guide pin projection extending into said axial guide opening of the plunger whereby the closure structure will be guided in its movement relative to the plunger and maintained in alignment with the aperture of the transverse partition, float lever means connected to said plunger to elevate the plunger upon the liquid supply being lowered in the container and vent means in the plunger communicating between the axial guide opening and the exterior of the plunger whereby the closure structure may be left on the transverse partition and over the aperture in the absence of the liquid pressure supply to prevent the flow of liquid from the container to the liquid supply source.

2. An automatic valve for admitting a predetermined quantity of liquid to a container comprising a vertically extending hollow cylindrical body adapted to be attached to the container and to have a liquid pressure source connected thereto, said hollow cylindrical body having a transverse partition with an axial inlet aperture therein and a radial outlet opening above the partition, a plunger slidable in the cylindrical body above the partition, said plunger having an axial guide opening extending upwardly from the bottom thereof, a closure structure having a head engageable with the transverse partition to close off the inlet aperture thereof and a guide pin projection extending into said axial guide opening of the plunger whereby the closure structure will be guided in its vertical movement relative to said plunger and relative to the aperture of said transverse partition, said plunger having in its upper end a radially extending socket opening, vent means communicating between said axial guide opening and said radially extending socket opening, whereby the closure member will be permitted to remain on the transverse partition and over the aperture therein to prevent the flow of liquid from the container to the liquid supply source, said hollow cylindrical body having a vertically extending slot in its upper end, a lever having flattened sides fitted into said vertically extending slots of the cylindrical body with the flattened sides thereof respectively engaging with the sides of the vertically extending slot, said slot side walls being straight whereby said lever will be held against rotation about its axes within said slot, said lever having a ball on the end thereof connecting with the socket opening of said plunger, said lever serving to raise and lower said plunger, a float ball connected to said lever and adapted to engage with the liquid within the container to work the lever as the liquid supply is raised or lowered, and means on the cylindrical body for retaining the lever within the slot thereof and against vertical displacement therefrom.

LESLIE CLEMENT BARLING.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
240,240	Farley	Apr. 19, 1881
297,426	McGinley	Apr. 22, 1884
1,223,170	Hodgson	Apr. 17, 1917
2,164,934	McGrath	July 4, 1939