May 9, 1944. C. E. KERR 2,348,480

FILLING VALVE

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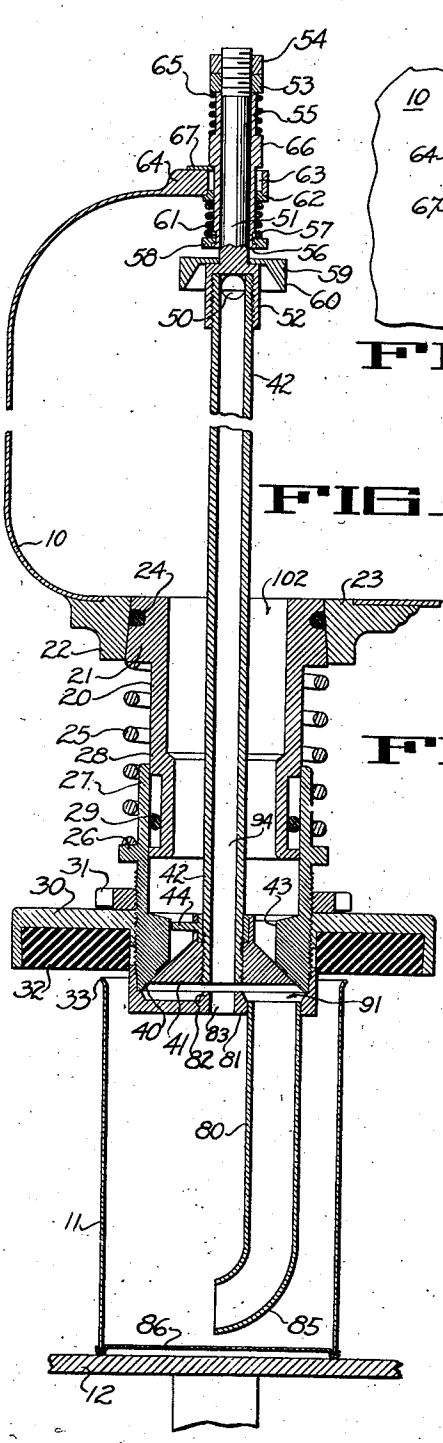

FIG. 1.

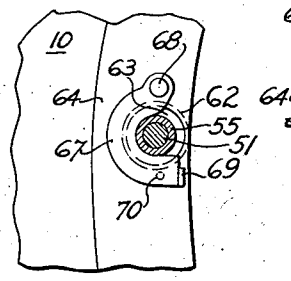

FIG. 3.

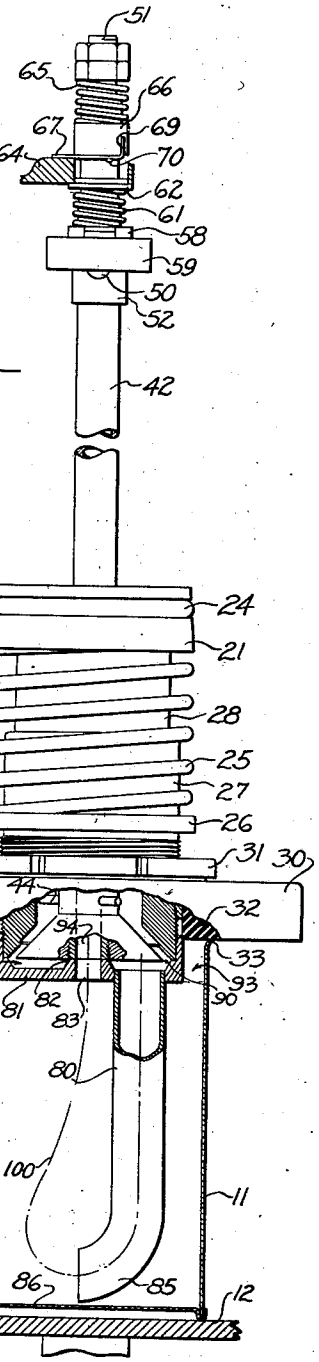

FIG. 2.

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FILLING VALVE

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8 Claims. (Cl. 226—124)

This invention relates to valves which are used in filling containers, such as cans, with fluids.

While a valve constructed in accordance with my invention could be used for filling cans with fluids of any sort, it is particularly efficacious in handling fluids, such as fruit juices, in which case it is of paramount importance that the fluid be introduced into the can without foaming or mixing with air.

Pineapple juice, for example, has a marked tendency to foam whenever it is poured. In canning citrus-fruit juices, such as grapefruit juice, mixture of air with the juice when filling the can is especially to be avoided because air trapped in the can results in a process of oxidation setting in. If the juice is simply poured into the can without regard to splattering or foaming the air becomes trapped in the juice in bubbles and later becomes sealed in when the container is closed. Then when the can is opened the juice is found to have lost its original flavor. Instead of having the palatable taste of the true fruit which it had when put into the can it has a peculiar off taste which is unpleasant. Therefore, exclusion of air from the juice in canning is highly desirable.

The principal object of this invention is to provide a filling valve construction which will enable fluids, such as fruit juices, to be introduced into the cans in such a way that air does not mix with the juice while the can is filling and so that when the can is full there will not be any air trapped in the juice.

Other objects will become manifest from a disclosure of a filling valve in which the invention has been embodied.

In the drawing:

Fig. 1 is a vertical section through the valve.

Fig. 2 is an elevation with parts in section.

Fig. 3 is a detail.

The filling valve herein disclosed is intended for use in a well-known type of machine such as that disclosed in the patent to Thompson No. 1,355,015 dated October 5, 1920, in which the valves are mounted in the bottom of a reservoir containing a supply of the fluid and the cans are automatically lifted into engagement with the valves to receive the fluid released therefrom.

The parts of such a machine immediately associated with the valve are shown in Fig. 1 where 10 indicates the filler bowl or reservoir in which the supply of fluid is maintained at a predetermined level by mechanism not shown but usually employed in machines of this type. The can 11 rests on a platform 12 which has suitable means, not shown, for raising and lowering it at the proper times.

The valve body 20 has a tapered head 21 which fits into a tapered aperture in a boss 22 in the bottom 23 of the bowl 10. A seal 24 insures against leakage. The valve body 20 is held in place as shown by the upward pressure of a spring 25 as will presently appear.

The spring 25 bears against a flange 26 formed on a sleeve 27 which slides telescopically on the barrel 28 of the valve body 20. A seal 29 prevents leakage between the sleeve and barrel. The lower end of the sleve 27 is externally threaded and the lift plate 30 is screwed thereon and locked in adjusted position by a nut 31. The lift plate 30 is provided with an annular rubber pad 32 for sealing engagement with the lip 33 of the can 11 (Fig. 2). When the platform 12 raises the can 11 so that its lip 33 engages the pad 32 it elevates the lift plate 30 against the pressure of the spring 25, causing the sleeve 27 to slide upward on the barrel 28 of the valve body.

The lower end of the sleeve 27 (Fig. 1) is formed internally to provide a conical seat 40 for a valve head 41 which is secured to a hollow valve stem 42. Above the seat 40 the sleeve has a cylindrical bore 43. Pins, such as 44, project from the valve head 41 to center the valve in the bore 43.

The hollow valve stem 42 extends vertically through the interior of the valve body and above the fluid level in the bowl 10 where it has a vent hole 50. The upper end of the valve stem 42 is supported and guided by means of a rod 51 having a portion 52 threaded onto the upper end of the valve stem. The rod 51 passes through a sleeve 55 and is threaded at its upper end to receive an adjusting nut 53 and a lock nut 54.

The lower end of the sleeve 55 has a flange 56 and groove 57 to receive a split washer 58. A splash cap 59, having a depending skirt 60 to deflect fluid from vent hole 50 down into the bowl, is mounted on the rod 51. A spring 61 is interposed between the split washer 58 and a washer 62 which encompasses the sleeve 55 and seats in an aperture 63 in the top flange 64 of the bowl 10 to center the upper end of the valve stem. A spring 65 is interposed between the adjusting nut 53 and a collar 66 formed on the sleeve 55. The lower side of the collar 66 is engaged by a substantially semi-circular latch 67 (Fig. 3) pivoted at 68 to the top flange 64 of the bowl. The latch has an upwardly projecting lug 69 which the

operator grasps to swing the latch into and out of engagement with the sleeve 55, and the latch 67 has a dimple protuberance 70 (Fig. 2) on its under side which snaps into place in a depression provided therefor in the top flange 64 in order to resiliently hold the latch in place.

The advantage of this mounting of the valve is that it permits quick and easy removal of the valve from the bowl. No wrenches are required. The operator merely flips back the latch 67 and the spring 25 ejects the valve body downward from the bowl, the sleeve 55 and the rod 51 and the parts assembled thereon passing down through the aperture 63. Conversely, the entire valve assembly can be introduced into the bowl as a unit and can be securely held in place merely by swinging the latch 67 into engagement with the collar 66 on the sleeve 55.

It will be noted in Fig. 1 that there is clearance between the lower end of the sleeve 55 having the flange 56 thereon and the top of the splash cap 59. This insures that the lip 33 of the can 11 is sealed by the pad 32 before the valve 41 opens. After the lip 33 comes into engagement with the pad 32 the lift 30 rises. During this initial rise of the lift 30 the valve 41 remains seated because the spring 65 is exerting a lifting action on the rod 51 and valve stem 42. As the valve stem 42 rises, the splash cap 59 approaches the end of the sleeve 55. When it contacts the sleeve the upward movement of the valve ceases. During this interval the rubber pad 32 has had time to establish a thorough seal on the lip of the can. Upon further rise of the can the lift 30 in rising draws the seat 40 away from the valve head 41 which is now standing still. Conversely, when the can is lowered, the valve is closed before the seal on the lip of the can is broken. This prevents squirting of the fluid over the lip of the can at the end of the filling operation.

To prevent air from mixing with the fluid a pipe 80 is attached to a cover plate 81 which is threaded onto the sleeve 27 so that the plate and sleeve move together. In the center of the plate 81 there is an upstanding boss 82 provided with a port 83 which registers with the opening in the end of the hollow valve stem when the valve is opened as shown in Fig. 2. After the boss 82 contacts the end of the valve stem 42 the spring 61 presses the valve stem against the boss 82, thus maintaining and insuring a closed air passage through the port 83 into the vent passage 94 in the valve stem. The lower end of the pipe 80 is curved at 85 so as to deliver the fluid tangentially onto the bottom 86 of the can 11.

When the valve is opened the fluid descends from the bowl 10 through the passage 102 (Fig. 1) in the valve body and emerges through the valve opening 90 (Fig. 2) into the annular chamber 91 formed in the plate 81 around the boss 82. Air escapes from the can through the port 83, up through the passage 94 in the hollow valve stem 42, and out the vent hole 50. This is a closed vent passage. No air can pass from the port 83 into contact with the fluid in chamber 91. The escaping air cannot mingle with the incoming fluid in the chamber 91 because the bottom of the valve stem 42 is pressed against the top of the boss 82 by the spring 61. The fluid leaves chamber 91 through the pipe 80 displacing the air out of pipe into the can from which it escapes as just described. The fluid is flowed onto the bottom 86 of the can by the curved spout 85 to avoid splattering of the fluid which would promote foaming and the entrapping of air bubbles.

When the fluid reaches the level 92 (Fig. 2) in the can the air in the annular space 93 above this level is compressed and the fluid rises in the vent passage 94. It will be recalled that the valve 41 closes on its seat 40 before the lip 33 is unsealed. As the valve 41 closes on its seat 40 the valve stem 42 is removed from contact with the boss 82, thus acting as a second valve which places the chamber 91 in communication with the vent passage 94.

As the can lowers away (Fig. 1) the fluid which overflowed into vent passage 94 drains into the can to fill the space above the level 92 (Fig. 2). Also the fluid in pipe 80 and chamber 91 is free to drain into the can because it is under atmospheric pressure by reason of communication with the vent passage 94.

By establishing a closed circuit for the fluid and air in filling the can, intermingling of the two is avoided. As the fluid is introduced it drives the air ahead of it and the air is always provided with an escape passage which leads it away from the oncoming fluid. Thus the fluid enters the chamber 91 and descends the pipe 80 into the can while the air escapes through the enclosed vent passage 83—94 without ever having to pass through the fluid and without being allowed to contact the fluid as it rises from the can. In this connection the curved spout 85 on the pipe 80 is important. This is the turning point in the circuit which is represented by the line 100 (Fig. 2). Experiment showed that a straight pipe without the curved spout promoted foaming. By providing a smooth and easy path of escape for the air, which also serves as a means for depositing the fluid on the bottom of the can with a minimum of agitation, the curved delivery spout 85 achieves the desired result.

By adjusting the lift plate 30 on the sleeve 27 the volume of space 93 (Fig. 2) can be varied. In this way the lift plate 30 can be adjusted so that the drainage from vent passage 94, chamber 91, and pipe 80 will complete the filling of the can.

While I have described a particular embodiment of the present invention, it will be obvious that various changes and modifications may be made in the details thereof without departing from the spirit of the present invention and the scope of the appended claims.

Having thus described my invention and in which manner the same may be used, what I claim as new and desire to protect by Letters Patent is:

1. A valve for filling containers with fluid from a reservoir comprising a conduit for conducting fluid from the reservoir to the container, said conduit having an inlet in said reservoir, the outlet of said conduit being adjacent the bottom of the container, a valve intermediate the inlet and outlet of said conduit for controlling the passage of fluid through said conduit, a vent opening to the atmosphere for conducting air from the container as it fills with fluid, and a second valve for establishing communication between said vent and the portion of said conduit on the outlet side of said first valve, said valves having alternate positions so that when one is open the other is closed.

2. A valve for filling containers with fluid from a reservoir comprising a valve to control the flow of fluid from the reservoir, means to actuate said valve including a lift engaged by the container,

a chamber to receive fluid released by said valve, said chamber having a discharge pipe terminating near the bottom of the container, said chamber having a vent port into the top of the container, said valve having a vent passage therein, said chamber being moved by said valve actuating means to bring said vent port into registering engagement with said vent passage to provide an enclosed air passage from the container to said vent passage.

3. A valve for filling containers with fluid from a reservoir comprising means to provide a passage to receive fluid from the reservoir, a valve mechanism to control the flow through said passage, said mechanism including a valve head and a seat therefor, said head and seat being relatively movable to effect opening and closing of the valve, an inclosure forming part of said passage located on the container side of said valve, said inclosure being immovable with respect to said seat, said inclosure having a fluid outlet into the container and an air inlet from the container, and a vent in said valve head, said vent and said air inlet forming an enclosed air passage when the valve head is removed from its seat.

4. A valve for filling containers with fluid from a reservoir, comprising a valve body having a passage communicating with the reservoir, a spring-pressed lift telescoping on said valve body and having an annular seal to be engaged by the lip of the container, said lift having a conical valve seat therein, valve head having an opening therethrough and provided with a hollow stem communicating with the fact of said valve head through said opening, closure means on said lift normally spaced below the face of said valve head and having an air vent port in alignment with the opening in said valve head, and a spring-pressed stop mounted on the reservoir and adapted to engage said stem after the lip of the container is sealed on said lift to remove said valve head from its seat and press its face into engagement with said closure means.

5. A valve for filling containers with fluid from a reservoir comprising means to provide a passage to receive fluid from the reservoir, a valve mechanism to control the flow through said passage, said mechanism including a valve head and a seat therefor, said head and seat being relatively movable to effect opening and closing of the valve, an inclosure adopted to form part of said passage located on the container side of said valve, said inclosure being immovable with respect to said seat, said inclosure having a fluid outlet into the container and an air inlet from the container, a vent in said valve head, said vent and said air inlet forming an enclosed air passage when the valve head is removed from its seat, and a conduit extending down into the container to conduct the fluid from said fluid outlet to the bottom of the container, said valve when returned to its seat serving to shut off the flow of fluid and to vent said conduit by establishing communication between said vent and said inclosure.

6. A valve for filling containers with liquid from a reservoir, comprising a valve body having a passage communicating with the reservoir, a spring-pressed lift telescoping on said valve body and having an annular seal to be engaged by the lip of the container, said lift having a valve seat therein, a stem valve having an air vent, closure means on said lift having an air vent port in alignment with the air vent of said valve, and a spring-pressed stop adapted to engage the stem of said valve after the lip of the container is sealed on said lift to remove said valve from its seat and press said valve into engagement with said port.

7. A valve for filling containers with fluid from a reservoir comprising a valve body having a passage to receive fluid from the reservoir, a valve mechanism including a valve head and a lift having a valve seat normally engageable by said valve head to close said passage, said lift being operable by engagement of a container therewith to unseat said valve head and open said passage, an end closure on said lift for cooperation with the latter to enclose said valve head, said end closure being spaced from the face of said valve head to form a chamber therebeneath, means maintaining said end closure in spaced relation to the face of said valve head during actuation of the lift whereby to enable said chamber to receive the fluid from said passage and collect it into a common body, and a pipe to conduct the fluid collected in said chamber to the bottom of the container.

8. A valve for filling containers with fluid from a reservoir comprising a valve body having a passage to receive fluid from the reservoir, a valve head having an air vent therethrough, a lift having a valve seat normally engageable by said valve head to close said passage, said lift being operable by engagement of the container therewith to unseat said valve head and open said passage, an end closure on said lift for cooperation with the latter to enclose said valve head, said end closure being spaced from the face of said valve head to form a chamber therebeneath, a boss formed on said end closure within said chamber for engagement with the face of said valve head when the lift is actuated to maintain the end closure in spaced relation to the face of said valve head whereby to enable said chamber to receive the fluid from said passage and collect said fluid into a common body, said boss being provided with a port therethrough in alignment with the air vent in said valve head to form a continuation of said air vent when the boss engages with the face of the valve head whereby to communicate said air vent with the upper region of the container during the filling operation, and a pipe communicating with said chamber and depending into the container to conduct the fluid collected in said chamber to the lower region of the container.

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