Sept. 22, 1953 L. McGIHON 2,652,965

LIQUID FILLING VALVE

Filed Feb. 20, 1948

FIG. 1

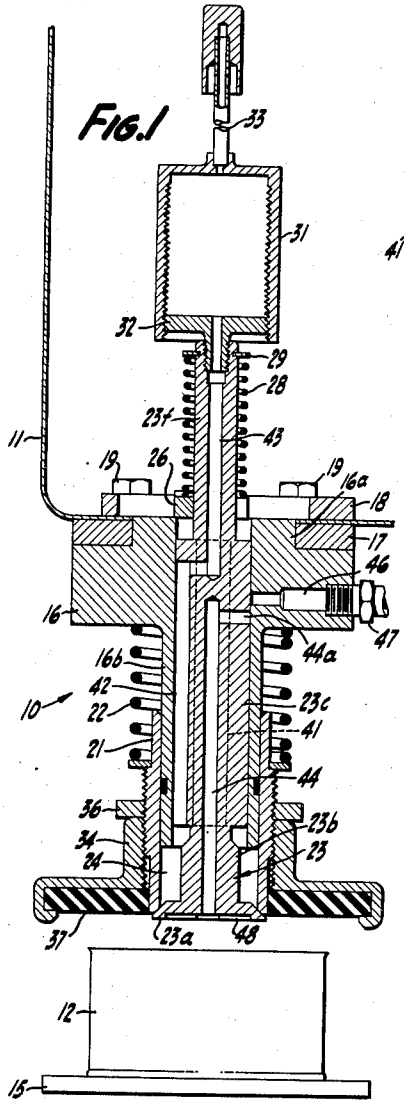


FIG. 5

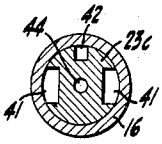


FIG. 2

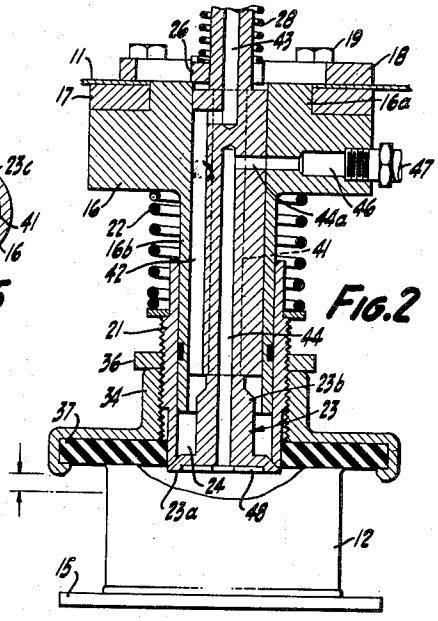


FIG. 3

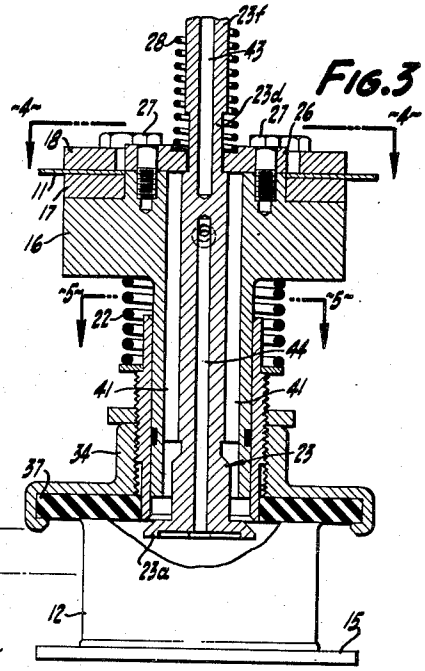


FIG. 4

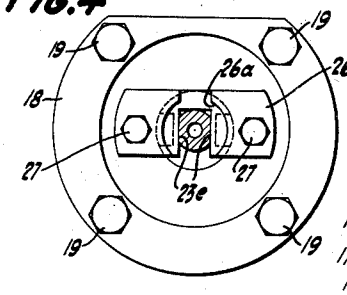
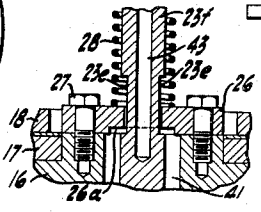


FIG. 6



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LIQUID FILLING VALVE

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3 Claims. (Cl. 226—124)

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The present invention relates to filling machines and valves therefor, and is concerned more particularly with the provision of an improved valve construction which is useful in handling both heavy and light liquid materials to fill measured amounts into containers or to fill containers to a desired head space. Filling machines and valves of the general character disclosed herein are disclosed and claimed in my copending application Serial No. 24,525, filed May 1, 1948, for Filling Machine and Valve Therefor, to which reference is made for portions of the filling machine not specifically disclosed herein.

In the drawings,

Figure 1 is a vertical sectional view through a filling valve embodying the instant invention as installed in the tank of a filling machine.

Figure 2 is a fragmentary view similar to Figure 1 showing the valve in partially operated condition wherein a vacuum or other source of air pressure is connected to the interior of a can engaged with the valve.

Figure 3 is a view similar to Figure 2 but taken at right angles thereto and showing the valve in open position.

Figure 4 is a fragmentary plan view taken as indicated by the line 4—4 in Figure 3.

Figure 5 is a fragmentary sectional view taken as indicated by the line 5—5 in Figure 4.

Figure 6 is a fragmentary sectional view similar to Figure 3 but showing the valve as assembled for head space filling operation.

Valves of the type disclosed and claimed herein are generally used as rotary type filling machines wherein a plurality of filling valves are mounted about the periphery of a filling tank and with respect to which the cans are brought into operative relation by means of can lifters. Referring to Figure 1, there is shown a filling valve 10 mounted on a filling bowl or tank 11 and with respect to which a can 12 is shown in operative relation on a can lifter 15. The details of construction of the filling machine, the bowl and the can lifter are shown in said copending application.

The filling valve includes a cylinder structure including various cooperating parts later described, which cooperate to define the total volume of the measuring chamber, and a piston and valve structure which operates within the cylinder structure to control the operation of the valve in opening and closing as well as the vacuumizing and filling of the can. The cylinder structure includes a body 16 of annular shape which is provided with an upper portion 16*a* of reduced

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diameter seating within an aperture in the bottom plate 17 of the bowl and being secured with respect to the bowl by a support ring 18 within the bowl and four cap screws 19 (Figures 1 and 4) extending through the ring 18, the bowl 11 and its bottom plate 17, and threaded into the valve body 16. The body 16 has a lower tubular extension 16*b* about which a sleeve 21 is slidably mounted. The sleeve 21 is urged downwardly by a spring 22 so that the lower or valve seat end of the sleeve 21 engages the valve portion 23*a* of the piston and valve structure or valve member 23.

Above the valve portion 23*a* the valve member 23 has a portion of reduced diameter 23*b* which is spaced from the inner periphery of the tubular extension 16*b* of the valve body to provide a measuring chamber 24. Above the portion 23*b* of reduced diameter, the valve member 23 is provided with a piston portion 23*c* which is preferably lap-fitted for relatively sliding movement within the valve body 16. Above the piston portion 23*c* the valve member 23 has an upper reduced portion 23*d* and this portion 23*d* (Figure 3) is provided with opposite flat sides 23*e* (Figure 4) for engagement by a recessed guide and stop plate 26 which is secured by cap screws 27 onto the valve body 16. A spring 28 is compressed between the plate 26 and a ring 29 (Figure 1) seated in the extension 23*f* of the valve structure.

Above the valve and piston portion 23, there is provided an adjustable measuring chamber 31 whose base plate 32 is threaded into the upper end of the valve member 23 and which is open to the atmosphere through a capped pipe extension 33 at its upper end.

At the lower end of the valve, and adjustably threaded onto the valve sleeve 21, there is provided a lift collar 34 secured in place by a locknut 36 and having mounted therein a rubber seal ring 37 of conventional construction for engagement by the can 12.

The piston and valve structure of the filling valve are provided with respective passage means providing for filling of liquid from the bowl into the valve and into the measuring chamber therein to provide for communication of this measuring chamber with the atmosphere and also to provide for connection of the interior of a can engaged with the valve to a source of vacuum or to a source of air under pressure when required in the filling operation.

The passage means for filling of the valve with liquid are formed as opposite external grooves 41 (Figures 3 and 5) in the piston portion 23*c* of the

valve and extend from end to end of this piston portion being smaller in cross section than the overlapping portions of the stop plate **26** so that the upper ends of these passages **41** can be closed by the stop plate **26** as shown in Figure 3 when a measured amount of liquid is trapped in the valve and separated from the tank as later described.

The passage means for communication of the chamber with the atmosphere include an external groove **42** (Figures 1 and 5) in the piston portion of the valve which extends from the lower end thereof but stops short of the upper end and communicates with an internal passageway **43** leading to the measuring chamber **31**. These passages **42** and **43**, together with the measuring chamber **31** and a portion of the pipe **33**, up to the liquid level of the bowl cooperate to form the actual measured capacity of the filling valve for depositing a measured charge of liquid into a can.

The passage means for placing a can in communication with a source of vacuum or air under pressure comprises a lower central passage **44** in the valve member which has a lateral branch **44***a* at its upper end adapted in a partially lifted position of the valve to register with a transverse passage **46** in the valve body having a fitting **47** secured therein by means of which this passageway can lead to a source of vacuum or a source of air under pressure during rotation of the filling bowl as disclosed in said copending application. In the raised position of the valve member the passages **44***a* and **46** remain in communication so that the shut-off of the vacuum is controlled at a remote point by the construction shown in said copending application. To insure vacuumizing of the container without interference from the contents therein, the lower face of the valve is recessed cross-shaped at **48**.

The operation of the valve is as follows: With the valve positioned as shown in Figure 1, the spring **22** is extended so that the valve **23***a* is engaged with its seat and the annular shoulder at the upper end of the piston portion **23***c* is spaced below the stop plate **26** so that the filling passages **41** are open at both ends and the measuring chamber is in communication with the liquid in the bowls and liquid will flow into the valve and will rise through the passage **41** and the passage **43** into the measuring chamber **31** and up into the pipe **33** to the level of liquid in the bowl. When a can is engaged with the lift collar **34**, as shown in Figure 2, and a partial lifting of the valve is effected, the valve member **23** rises with the sleeve **21** under the influence of the spring **28** so that the passages **44** and **44***a* are in communication with the passage **46** so that the source of vacuum is connected through the valve body and the piston structure to the can. In this position the shoulder at the end of the piston portion **23***c* is still spaced slightly below the stop plate **26** and during this operation a portion of the liquid within the measuring chamber has been forced back into the bowl. Further lifting movement of the can under control of its conventional lift cam, as disclosed in said application, moves the lift collar **34** to the position shown in Figure 3 and the sleeve **21** has been lifted away from the valve portion **23** after engagement of the upper end of the piston portion **23** with the stop plate **26**, that is, after the upper ends of the passages or grooves **41** have been closed by the stop plate **26**. As this closing takes place the valve is opened at the bottom so that the measured amount of liquid contained in the chamber **24**, the passages **41**, **42** and **43**, as well as the measuring chamber **31** and the tube **33**, flows through the valve and into the can under atmospheric pressure as determined by the amount of vacuum placed in the can itself.

To use the valve to fill to the head space rather than to fill a definite measured amount of liquid, the stop plate **26** is inverted in assembly so that the recess **26***a* therein faces downwardly and does not close the upper ends of the passages **41** in the position of the valve shown in Figure 3. As a result the valve is never empty and the source of liquid to the can is always at the bottom of the valve. The escape of air from the can is through the center passage in the valve and the vacuum system or, if desired, it may be provided to atmosphere through suitable means.

While I have shown certain preferred embodiments of the invention, it will be understood that the invention is capable of variation and modification from the form shown so that its scope should be limited only by the scope of the claims appended hereto.

I claim:

1. In a filling valve, a cylinder structure normally open for admission of liquid at its upper end and having a valve seat at its lower end, a valve and piston structure in said cylinder structure defining a chamber therewith and having a valve at its lower end for cooperation with said valve seat, said valve and piston structure including an intermediate piston portion having a sliding fit within the cylinder structure and an upper portion of reduced size projecting beyond said cylinder structure, an external longitudinal groove extending from end to end of said piston portion and forming a liquid passage, stop means for said valve and piston structure positioned to close said groove in the raised position of said valve and piston structure, a second external groove in said piston portion extending from the lower end thereof and ending short of the upper end thereof, and an internal passage in said upper projecting portion and communicating with said second groove, said second external groove and said internal passage forming an air passage.

2. In a filling valve, a cylinder structure normally open for admission of liquid at its upper end and having a valve seat at its lower end, a valve and piston structure in said cylinder structure defining a chamber therewith and having a valve at its lower end for cooperation with said valve seat, said valve and piston structure including an intermediate piston portion having a sliding fit within the cylinder structure and an upper portion of reduced size projecting beyond said cylinder structure, an external longitudinal groove extending from end to end of said piston portion and forming a liquid passage, and a recessed stop plate at the top of said cylinder structure having non-rotative sliding engagement with said upper portion and positioned for engagement by said piston portion.

3. In a filling valve, a cylinder structure normally open for admission of liquid at its upper end and having a valve seat at its lower end, a valve and piston structure in said cylinder structure defining a chamber therewith and having a valve at its lower end for cooperation with said valve seat, said valve and piston structure including an intermediate piston portion having a sliding fit within the cylinder structure and an upper portion of reduced size projecting beyond said cylinder structure, an external longitudinal

groove extending from end to end of said piston portion and forming a liquid passage, a second external groove in said piston portion extending from the lower end thereof and ending short of the upper end thereof, and an internal passage in said upper projecting portion and communicating with said second groove, said second external groove and said internal passage forming an air passage.

LEONARD McGIHON.

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