May 5, 1953 L. McGIHON 2,637,478

FILLING MACHINE AND VALVE THEREFOR

Filed May 1, 1948 4 Sheets-Sheet 1

FIG. 2

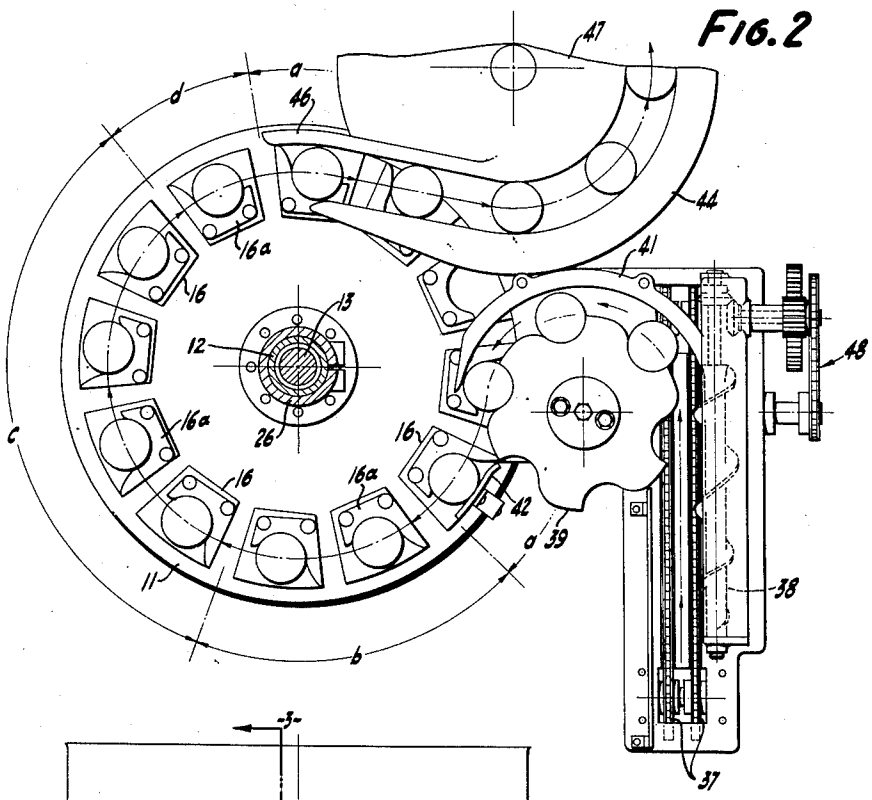
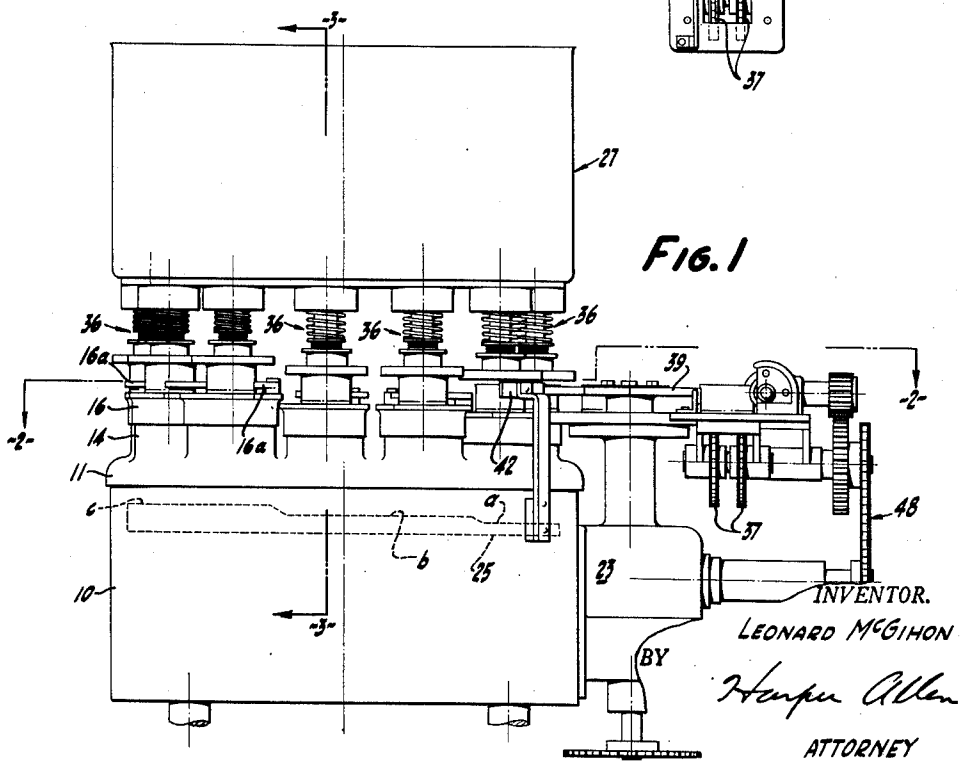


FIG. 1



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FILLING MACHINE AND VALVE THEREFOR

Filed May 1, 1948 4 Sheets-Sheet 2

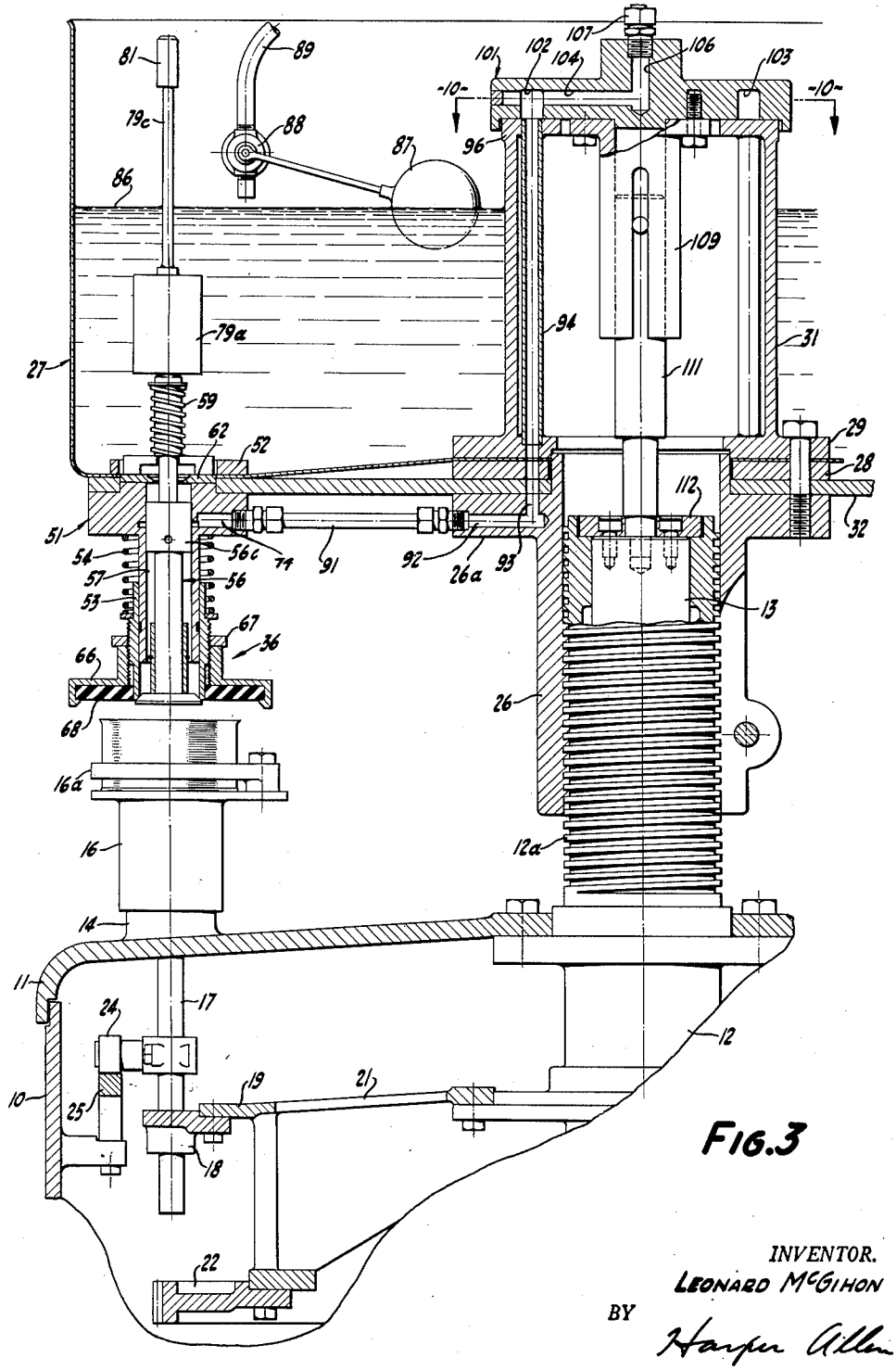


FIG. 3

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May 5, 1953 L. McGIHON 2,637,478

FILLING MACHINE AND VALVE THEREFOR

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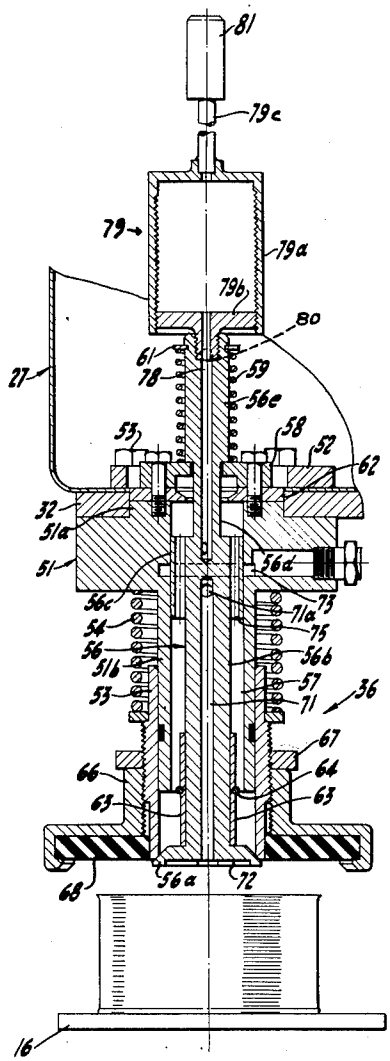
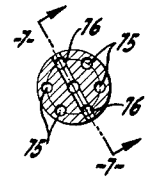


FIG. 4

FIG. 5



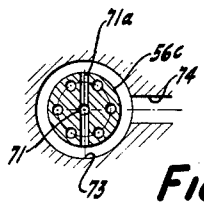


FIG. 6

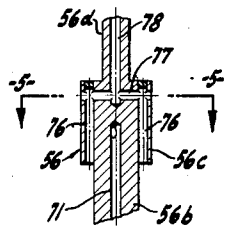


FIG. 7

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FILLING MACHINE AND VALVE THEREFOR

Filed May 1, 1948 4 Sheets-Sheet 4

FIG. 8

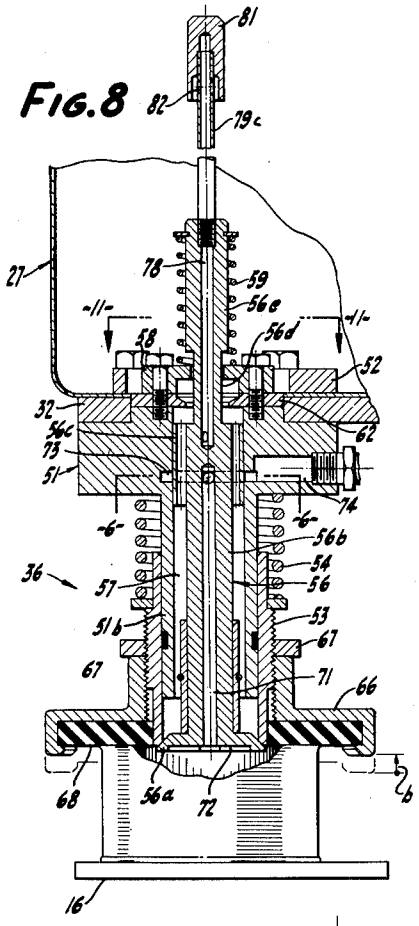


FIG. 9

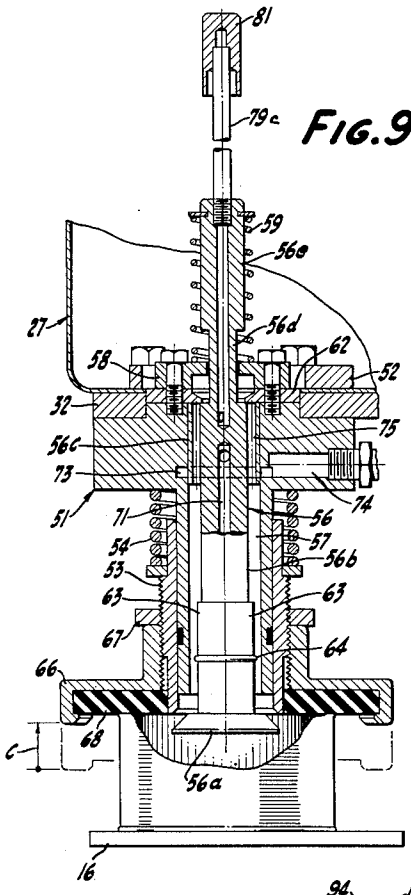


FIG. 12

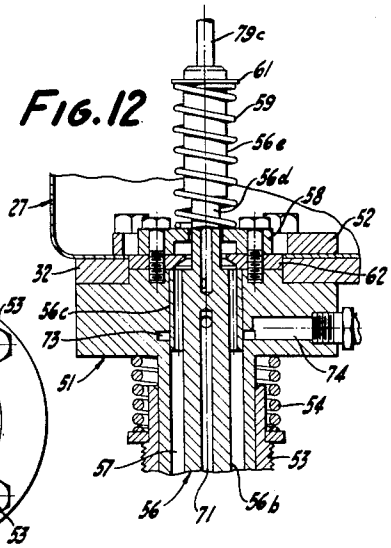
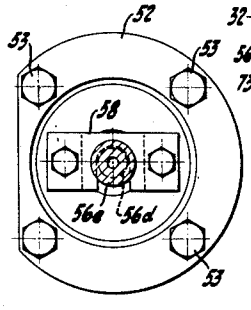


FIG. 11



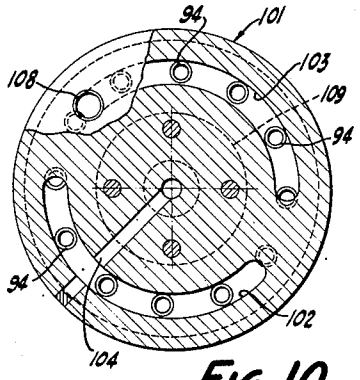


FIG. 10

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Patented May 5, 1953

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UNITED STATES PATENT OFFICE

2,637,478

FILLING MACHINE AND VALVE THEREFOR

Leonard McGihon, Oakland, Calif., assignor to King Sales & Engineering Co., San Francisco, Calif., a corporation of California

Application May 1, 1948, Serial No. 24,525

5 Claims. (Cl. 226—102)

1

The present invention relates to filling machines and valves therefor, and is concerned more particularly with the provision of an improved construction of the above type incorporating a filling valve for placing measured quantities of liquid into a can or other container.

In the canning of food products such as tuna fish, when packing the product in oil, it is desirable to fill an exact quantity of the oil within precise limits, so that the required amount of oil will be supplied but no excess amount of this expensive ingredient will be used. Also, quantity production requires filling equipment which can operate accurately in large capacity production lines and which is easy to adjust for different quantities of fill in accordance with the size of can in which the fish is being packed.

Accordingly, it is a general object of the present invention to provide an improved filling machine having a valve for discharging measured quantities of the liquid material and capable of operating at a high production rate.

Another object of the invention is to provide an improved filling valve of the foregoing type which is of simple construction and not likely to require servicing.

A further object of the invention is to provide a filling valve which can be easily adapted to vary the quantity of liquid measured thereby so that a substantial micrometer-type adjustment of the measured amount can be made.

Still another object of the invention is to provide an improved filling valve of the above type which can readily be converted to fill different measured quantities in accordance with the size of can being used in the packing operation.

Another object of the invention is to provide a filling valve construction which can be easily installed in and removed from the machine.

A further object of the invention is to provide a filling valve which is adaptable either to fill measured amounts or to fill to a desired head space in the can.

Still another object of the invention is to provide a filling valve which attains the foregoing objects and which can be employed in vacuum filling operations.

Other objects and advantages of the invention will be apparent from the following description of a preferred embodiment of the invention, as illustrated in the accompanying drawings, in which:

2

Figure 1 is a side elevational view of a filling machine embodying the instant invention.

Figure 2 is a sectional plan view of the filling machine taken as indicated by the line 2—2 in Figure 1.

Figure 3 is an enlarged fragmentary sectional view of the filling machine taken as indicated by the line 3—3 in Figure 1.

Figure 4 is a sectional view of the valve construction similar to Figure 3 showing the valve in its closed and inactive position as in Figure 3.

Figure 5 is a transverse sectional view through the piston portion of the valve member taken as indicated by the line 5—5 in Figure 7.

Figure 6 is a transverse sectional view through the valve member and the valve body taken as indicated by the line 6—6 in Figure 8.

Figure 7 is a vertical sectional view through the valve member taken as indicated by the line 7—7 in Figure 5.

Figure 8 is a sectional view of a filling valve similar to the section thereof shown in Figure 3 but illustrating the valve position for vacuumizing of the can and its contents.

Figure 9 is a view similar to Figure 8 with the valve shown as positioned to dispense the measured quantity of liquid into the can.

Figure 10 is a horizontal sectional view of the portion of the filling machine taken as indicated by the line 10—10 in Figure 3.

Figure 11 is a sectional plan view of the valve mounting plate taken as indicated by the line 11—11 in Figure 8.

Figure 12 is a fragmentary sectional view of the filling valve showing its adaptation for use in filling to a desired head space.

Referring to Figure 1, there is illustrated a filling machine embodying the instant invention (Figures 1, 2 and 3) including a base or frame casting 10 on which a rotary top or table 11 is mounted in a conventional manner by means including a central hub 12 journalled about a center post 13. The table 11 carries a plurality of substantially rectangular upright bosses 14 on each of which there is adjustably mounted a can lifter 16 of conventional construction. The lifter 16 is supported by a pair of shafts 17 (Figure 3) which are slidable in a boss 18 in a guide ring 19. The ring 19 is carried by means including a spider frame 21 supported on the main drive gear 22 which is driven through a gear box 23 from a

suitable source of power. The lifter shafts 17 carry a roller 24 engaged with a cam track 25 suitably supported on the main casting 10. The above parts are of generally conventional construction so it is believed that no further detailed description is required.

The upper end of the hub 12 (Figure 3) is threaded to provide a support screw 12a on which the split hub 26 of a bowl 27 is adjustably clamped to determine the height of the bowl with respect to the base. The bowl 27 is formed of suitable sheet metal such as stainless steel and has its inner periphery clamped between a clamping ring 28 and the bottom flange 29 of a center casting 31 of the bowl. The main bottom plate 32 of the bowl has its inner periphery clamped between the ring 29 and the upper flange 26a of the hub 23.

A series of filling valves 36 are secured to the bowl 27 respectively in alignment with the corresponding series of lift plates 16 and are described later in detail. For feeding cans in cooperative relation with the lift plates 16 and the filling valves 36, a conventional feed mechanism is provided including a pair of conveyor chains 37, a feed screw 38 and a star wheel 39, all of conventional construction. Cooperating with the star wheel 39 is an arcuate guide rail 41 for guiding cans about the wheel and onto the lift plates 16. A short arcuate guide rail 42 is provided at the discharge of the star wheel so that cans transferred onto the lift plates 16 are guided into engagement with the U-shaped centering brackets 16a thereon. Correspondingly, after the cans have been filled, a conventional discharge means is provided including a wiper arm 44 and an opposed guide rail 46 mounted above a rotary discharge disk 47. It will be understood, of course, that the feed mechanism is driven in synchronism with the table and the lift plates by a conventional drive indicated generally at 48 in Figures 1 and 2.

Referring to the filling valve, as illustrated in Figures 3 to 8, the valve is made up of a cylinder structure including the various cooperating parts later described which operate together to define the total volume of the measuring chamber and a piston structure which operates within the cylinder structure to control the operation of the valve in so far as the opening and closing thereof as well as the vacuumizing and filling with respect to the can. The cylinder structure includes a body 51 of annular shape which is provided with an upper portion 51a of reduced radius seating within an aperture in the bottom plate 32 of the bowl and being secured with respect to the bowl by a support ring 52 within the bowl and four cap screws 53 (Figure 11) extending through the ring 52, the bowl 27, its bottom plate 32 and threaded into the valve body 51. The body 51 has a lower tubular extension 51b about which a sleeve 53 is slidably mounted. The sleeve 53 is urged downwardly by a spring 54 so that the lower or valve seat end of the sleeve 53 engages the valve portion 56a of a valve member 56.

Above the valve portion 56a, the valve member 56 (Figure 4) has a portion of reduced diameter 56b which is spaced from the inner periphery of the tubular extension 51b of the valve body to provide a measuring chamber portion 57. Above the portion 56b of reduced diameter, the valve member 56 is provided with a piston portion 56c preferably lap-fitted within the valve body. Above the piston portion 56c, the valve member 56 has an upper reduced portion 56d immediately below an upper portion 56e of slightly larger diameter to provide a seat therebetween. This seat is engaged with a support strip 58 which is recessed to slide over the reduced portion 56d and engage below the portion 56e. A spring 59 is compressed between the strip 58 and a collar 61 on the portion 56e to provide a lifting force for the valve member 56 during operation of the valve. This lifting force is overcome normally by the spring 54. The two legs of the strip 58 seat against a stop ring 62 having a tapered aperture therein providing communication from the tank to the valve. This ring 62 is adjustable to change the valve from a measuring valve to a head space type valve as later described.

In mounting the valve on the tank, the valve body is first secured in place, then the spring 54 is compressed and the valve member 56 is passed through the valve body and the stop ring 62. The spring 59 is then compressed so that the stop plate 58 can be slid sideways into position with respect to the valve member 56.

To enable change in the volume of the measuring chamber 57, a pair of half-sleeves 63 are clamped about the portion 56b of the valve member by a conventional split-type clamping ring 64.

At the lower end of the valve 36 and adjustably threaded onto the valve sleeve 53, there is provided a lift collar 66 secured in place by a locknut 67 and having mounted therein a rubber seal ring 68 in the conventional manner.

The valve member 56 (Figures 4 to 7) is provided with a lower central passageway 71 extending from the recessed portion 72 at the lower end thereof to within the piston portion 56c thereof and communicating with a laterally extending passageway 71a (Figures 4 and 6) for communication with an annular recess 73 in the valve body 51 in one adjusted position of the valve member. The recess 73 communicates with a radial passage 74 which is adapted to communicate by means later described with a source of vacuum and with atmospheric pressure or air under pressure during the operation of the filling valve, all as later described. The piston portion 56c of the valve member 56 is provided adjacent its periphery with four vertical passages 75 which extend throughout the length of the piston portion to communicate with the chamber 57, both below and above the piston portion 56c. Also, two vertical passages 76 are provided which are closed at the top (Figure 7) by suitable plugs. These vertically extending passages 76 are in turn connected with a transverse passage 77 which intersects an upper central passage 78 in the valve member 56. The passages 75, 76, 77 and 78 all form part of the measuring chamber 57.

The measuring chamber preferably also includes a detachable and telescopically adjustable chamber member 79 (Figures 3 and 4) by means of which the capacity of the measuring chamber can be adjusted easily without removing any parts and with liquid in the tank. The chamber member includes a cylindrical body 79a which is internally threaded to engage over a threaded base 79b carried on the valve member by means of a lower threaded extension. The base 79b is preferably locked to the valve member by a set screw 80 indicated in dotted lines in Figure 4. A tube 79c is threaded into the upper end of the chamber body 79a and extends up above the liquid level in the tank and is employed in adjusting the body 79a. The upper end of the tube 79c is covered by a cap 81 (Figures 4 and 8) whose bottom peripheral flange extends over and shields a transverse aperture 82 of the tube which

provides for communication of the measuring chamber with the atmosphere at all times.

It will be seen that the plate **62** extends radially inwardly over the central bore in the valve body **51** and lies over the passage **75** so that in the uppermost position of the valve member shown in Figure 9 the tank is shut off from the valve as will be more clearly explained in connection with the operation of the valve.

In order to provide for a micrometer-like adjustment of the volume of the measuring chamber, the level of liquid indicated at **86** in Figure 3 is under the control of a float **87** and a valve **88** which is float controlled in a conventional manner and communicates through the pipe **89** with the source of liquid for the tank. By adjusting the operative level or height of the float **87** in controlling the valve **88**, the level of liquid in the tank can be controlled accurately. Correspondingly, the extent to which liquid will rise in the tube **79** can be accurately controlled, and thereby a slight adjustment of the level of liquid in the tank causes a corresponding adjustment of the volume of liquid in the measuring chamber.

In order to control vacuumizing of the cans before filling, the radial passage **74** (Figure 3) of each valve body is connected by a tube **91** with a radial passage **92** in the flange **26***a* of the bowl hub **26**. Each passage **92** communicates with a passage **93** extending upwardly through the flange **26***a*, the bottom wall **32**, the clamping ring **28** and the flange **29** and a tube **94** seated at its upper end in the top flange **96** of the center casting of the bowl **31**. Thus, the flange **96** presents a series of annularly spaced apertures at its upper surface, each aperture communicating with the associated valve. This upper surface of the flange **96** is ground to receive the correspondingly machined lower surface of a vacuum cap **101** (Figures 3 and 11) provided with respective fragmentary annular recesses **102** and **103** in the lower surface thereof. The recess **102** connects through radial passages **104** in the cap **101** with a central passage **106** connected through a fitting **107** with a suitable source of vacuum. The passage **103** communicates through a fitting **108** with atmospheric pressure or with a source of air under pressure as may be desired. The cap **101** is carried by a slotted collar **109** having sliding engagement with an upright shaft **111** carried on the center post **13** by a clamping plate **112**. Thus, the cap is maintained relatively stationary with respect to the ported flange **96** so that as the apertures therein rotate with the tank and with the valves, the passage system leading to the lower central aperture **71** of each valve will be subjected to the source of vacuum for a selected portion of each cycle of travel thereof and subsequently to atmospheric pressure or to a source of air under pressure for a selected period.

Operation

As will be understood from the foregoing description, the valve operates in conjunction with the filling machine, as the machine rotates, under the control of the successive levels of the lift cam **25** which determines the different periods that the valve is conditioned for its successive stages of operation. The lift cam **25** has four successive levels *a*, *b*, *c* and *d*, only the first three of which are seen in Figure 1. The fourth level, *d*, is indicated schematically in Figure 2. When the can lift member or plate **16** is positioned under control of the cam portion *a*, the valve is closed as shown in Figure 3, and is open to the tank to receive its charge of material.

When the plate **16** is lifted by the cam portion *b*, as shown in Figures 6 and 8, and a cam is interposed between the can lift plate **16** and the seal ring **68**, the valve sleeve **53**, together with its lift collar **66**, are lifted against the pressure of the spring **54**. The valve member **56** is lifted also by the spring **59** so that the annular radial passage **71***a* communicates with the annular recess **73** (Figure 8) and the can and its contents are subjected to vacuum for a selected period of time indicated at *b* in Figure 2. It will be noted that the lifting of the valve member from the position shown in Figure 4 to that shown in Figure 8 results in a discharge or return of some of the material within the measuring chamber back into the tank. In other words, as shown in Figure 4, the measuring chamber is filled to capacity and the excess material is subsequently returned to the tank during the two lifting movements of the valve member.

When the lift plate **16** (Figure 9) is controlled by the highest portion *c* of the cam track, i. e., during the portion *c* of its travel as indicated in Figure 2, the valve member **56** is lifted from the position shown in Figure 8 to that shown in Figure 9 when its radial passage **71***a* is out of communication with the annular recess **73** so that the source of vacuum is shut off. Also the upper end of the piston portion **56***c* engages the shut-off ring **62** so that the passages **75** are closed at the top and the valve chamber is closed off from the tank. Also, valve sleeve **53** is lifted away from the valve portion **56***a* so that the liquid in the measuring chamber can run into the can. Subsequently, the lift plate **16** is again lowered by the cam track portion *d* (not shown) which is at the same height as portion *a* and extends for about 30° of travel as indicated at *d* in Figure 2. During this time, the valve is again closed and the can is in communication with atmospheric pressure through the slot **103**.

It will be understood that the measured charge discharged into the can is made up of the material contained in the chamber or chamber portion **57**, the passages **75**, **76** and **78**, and the auxiliary chamber member **79**, so that the exact volume of the measured charge is controlled in part by the liquid level within the tank **27**. By adjusting this level under control of the float **87** a micrometer-like adjustment of the amount of fill can be obtained. Major adjustment of the valve to affect the volume of the measured charge can be made by removing or changing the size of the detachably mounted inserts **63** within the chamber **57** or by adjusting the bulb member **79** (Figure 3) or by varying its size.

To change the valve from filling a measured quantity to filling to a desired head space, in assembly of the valve on the machine, the shut-off plate or ring **62** is inverted or reversed in its mounting so that the tapered construction of its central recess has its largest diameter downwards as shown in Figure 12. In this position of the ring, even with the valve in lifted position, there is always communication between the tank and the can during the filling cycle. The amount of head space within the can is adjusted in the usual fashion with the adjustment of the collar **66**, Figure 8 on the valve sleeve **53** so that the valve sleeve **53** and the valve portion **56***a* will project into the can to the extent required for the desired head space.

In this adapted condition of the valve, the communication of each can with atmospheric pressure under control of cam portion *d* is used to break any vacuum in the can. When filling with heavier materials, air under pressure is employed in the place of atmospheric pressure to clean out the vacuum lines during travel of a valve under control of the cam portion *d*.

While I have shown and described a preferred embodiment of the invention, it will be apparent that the invention is capable of further variation and modification and its scope should be limited only by the scope of the claims appended hereto.

I claim:

1. In a filling machine, a substantially vertical cylinder structure normally open for admission of liquid at its upper end and comprising an upper stationary part and lower movable part telescopically engaged therewith, said movable part having a valve seat at its lower end, spring means urging said movable part downwardly, a valve and piston structure movably mounted within said cylinder structure for selective positioning in relative adjusted positions thereof and having a valve engaged by said valve seat under the urgency of said spring means, passage means in one of said structures for conducting fluid past said valve and piston structure in one relatively adjusted position of said structures in which said valve is engaged with said seat, said structures having cooperating surfaces operative to close said passage means in a second relatively adjusted position of said structures in which said valve and said valve seat remain closed, said structures having respective other passage means therein and disposed in cooperative relation in a third relatively adjusted position of said structures to place a container engaged with said movable part in communication with a source of vacuum, said valve seat part being movable from said second position to separate from said valve.

2. In a filling machine having a tank with means for maintaining a constant level of liquid therein, a cylinder structure communicating at its upper end with the tank and having a valve seat at its lower end, a valve and piston structure mounted in said cylinder structure for movement between relatively adjusted positions thereof and defining a chamber portion therewith and having a valve at its lower end for cooperation with said valve seat, passage means in one of said structures for conducting fluid from the tank past said valve and piston structure into said chamber portion in one relatively adjusted position of said structures in which said valve is engaged with said seat, and said structures having cooperating surfaces operative to close said passage means in another relatively adjusted position of said structures, and other passage means in said valve and piston structure leading from below said surfaces to above the level of liquid in the tank, said other passage means including an adjustable chamber member within said tank and below the level of liquid therein and a tube extending upwardly from said chamber member and terminating above the level of said liquid.

3. In a filling machine having a tank with means for maintaining a constant level of liquid therein, a cylinder structure communicating at its upper end with the tank and having a valve seat at its lower end, a valve and piston structure mounted in said cylinder structure for movement between relatively adjusted positions thereof and defining a chamber portion therewith and having a valve at its lower end for cooperation with said valve seat, passage means in one of said structures for conducting fluid from the tank past said valve and piston structure into said chamber portion in one relatively adjusted position of said structures in which said valve is engaged with said seat, and said structures having cooperating surfaces operative to close said passage means in another relatively adjusted position of said structures, and other passage means in said valve and piston structure leading from below said surfaces to above the level of liquid in the tank, said other passage means including an adjustable chamber member within said tank and below the level of liquid therein.

4. In a filling machine, a substantially vertical cylinder structure normally open for admission of liquid at its upper end and comprising an upper stationary part and lower movable parts telescopically engaged therewith, said movable part having a valve seat at its lower end, spring means urging said movable part downwardly, a valve and piston structure movably mounted within said cylinder structure for selective positioning in relatively adjusted positions thereof and having a valve engaged by said valve seat under the urgency of said spring means, passage means in one of said structures for conducting fluid past said valve and piston structure in the lowermost position of said piston structure with respect to said cylinder structure in which said valve is engaged with said seat, said cylinder structures having an annular surface operative to close said passage means in the uppermost position of said piston structure with respect to said cylinder structure, said structures having respective vacuum passage means therein and disposed in communication with each other in an intermediate position of said piston structure with respect to said cylinder structure to place a container engaged with said movable part in communication with a source of vacuum, said valve seat part being movable to separate from said valve with said piston structure in its uppermost position with respect to said cylinder structure.

5. In a filling machine, a substantially vertical cylinder structure normally open for admission of liquid at its upper end and comprising an upper stationary part and lower movable part telescopically engaged therewith, said movable part having a valve seat at its lower end, spring means urging said movable part downwardly, a valve and piston structure movably mounted within said cylinder structure for selective positioning in relatively adjusted positions thereof and having a valve engaged by said valve seat under the urgency of said spring means, said valve and piston structure including a piston portion engaged within said upper cylinder part and having respective annular end surfaces, passage means extending between said end surfaces of said piston portion for conducting fluid past said valve and piston structure in the lowermost position of said piston structure with respect to said cylinder structure in which said valve is engaged with said seat, said cylinder structures having an annular surface operative to close said passage means in the uppermost position of said piston structure with respect to said cylinder structure, said structures having respective vacuum passage means therein and disposed in communication with each other in an intermediate

position of said piston structure with respect to said cylinder structure to place a container engaged with said movable part in communication with a source of vacuum, said valve seat part being movable to separate from said valve with said piston structure in its uppermost position with respect to said cylinder structure.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
509,647	Beardsley	Nov. 28, 1893
811,185	Ten Eyck	Jan. 30, 1906
1,031,187	Larson	July 2, 1912
1,177,011	Brunskill	Mar. 28, 1916
1,852,308	Judge	Apr. 5, 1932
2,059,443	Davis	Nov. 3, 1936
2,168,380	Winton	Aug. 8, 1939
2,162,404	Kerr	June 13, 1939

FOREIGN PATENTS

Number	Country	Date
682,678	Germany	Oct. 20, 1939