

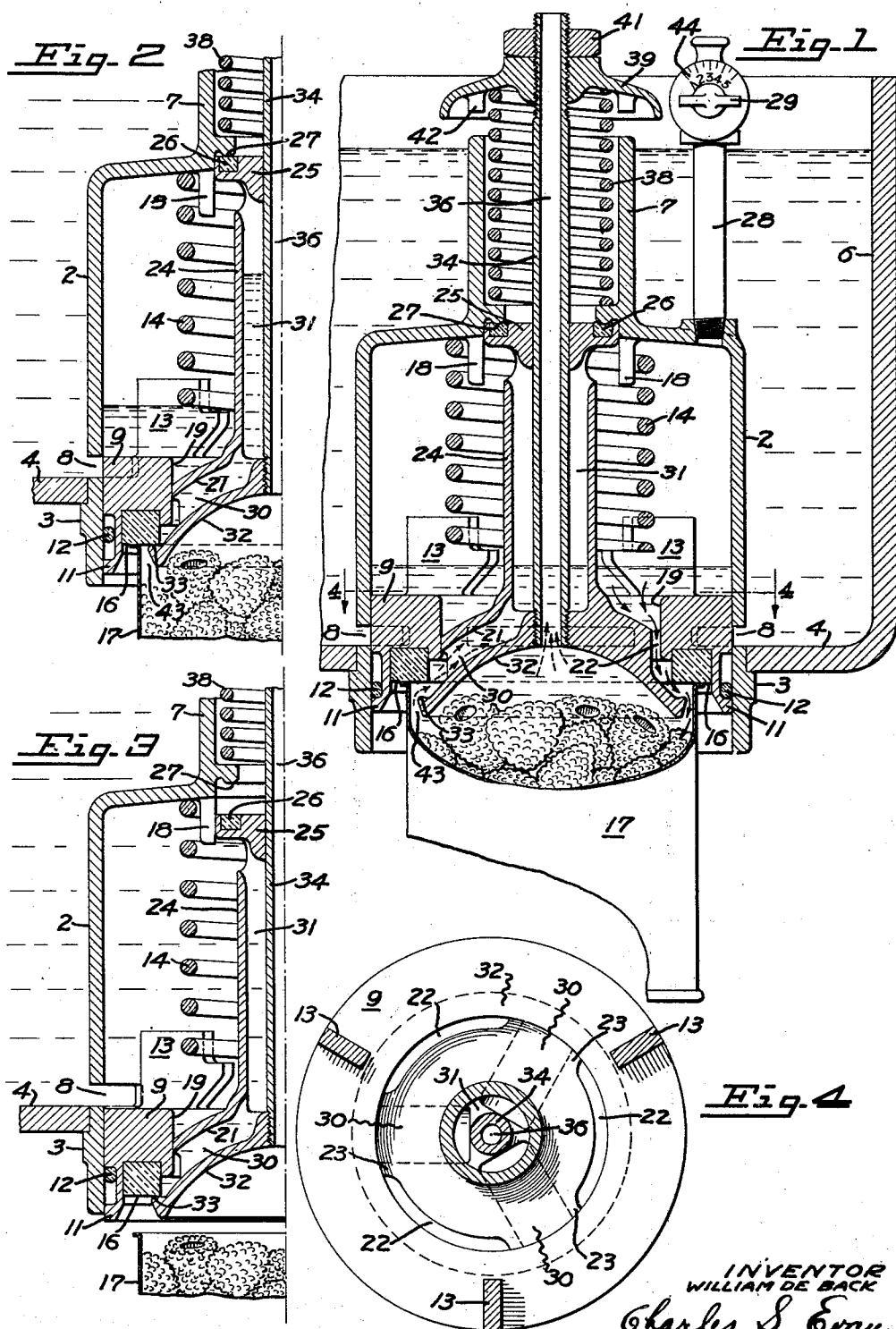
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FILLING VALVE

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FILLING VALVE

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My invention relates to filling valves, particularly adapted for incorporation in syruping machines used in the canning art, and is an improvement of the invention described in my co-pending application Serial Number 199,772.

One of the objects of the invention is the provision of a filling valve of improved construction for automatically depositing in the cans positioned beneath it a quantity of syrup which is left at a predetermined level in the filled can.

Another object of the invention is the provision of a filling valve from which there is no leakage after the filling and removal of the can.

Another object of the invention is the provision of a filling valve from which the syrup will automatically drain back into the syrup tank, when the latter is emptied.

Another object of the invention is the provision of a filling valve which introduces syrup around the periphery of the can in a smooth, even flow so that bubbles are avoided and all of the confined air in the can is displaced and permitted to escape from the can through the valve.

Another object of the invention is the provision of a filling valve provided with means for optionally withdrawing from the filled can a quantity of the syrup previously introduced; so that the syrup in the can, after filling, is left at a predetermined level, irrespective of the actual quantity of syrup in the can; or for allowing the can to be filled to a selected level between the predetermined level and the brim of the can, or even with the brim of the can.

The invention possesses many other objects and valuable features, some of which will be set forth in the following description of the invention which is illustrated in the drawings forming part of the specification. It is to be understood that I do not limit myself to the showing made by the said description and drawings, as I may adopt varying forms of my invention within the scope of the claims.

Referring to the drawings:

Figure 1 is a vertical sectional view

through the center of a filling valve assembly in the syrup tank of a syruping machine. A can filled with fruit is shown in position below the valve and the position of parts is that found while the syrup is running into the can around the inner upper edge thereof.

Figures 2 and 3 are similar sectional views of the left hand side of the valve structure. Figure 2 shows the parts as they appear shortly after the downward movement of the can has begun. The can is about to break contact with the valve and the valve housing is about to refill with syrup.

Figure 3 shows the position of parts after the can has reached its lowest position, clear of the valve structure. The bottom of the valve is closed and the filling ports open so that the valve housing is full of syrup.

Figure 4 is a horizontal section taken on line 4—4, Figure 1.

In terms of broad inclusion my filling valve, in its preferred form, comprises a housing or syrup chamber extending upwardly from the floor of the syruping machine syrup tank in which a number of similar valve structures are assembled in accordance with the usual practice. The housing is provided, flush with the floor of the tank, with ports so that when the ports are open, syrup from the tank may flow freely into the housing. A piston or inlet valve for controlling the housing ports is slidably arranged within the housing and is adapted to be operated by the movement of the can positioned below it on the can table of the syruping machine. The flow of syrup from the housing or syrup chamber into the can and the flow of displaced air from the can back into the housing is controlled by a domed plate or discharge valve, the movement of which is controlled by the inlet valve. A third valve connected to the plate valve is provided for controlling the discharge of air from the upper part of the housing; and the synchronization of the three valves is such that when the inlet valve is open to permit syrup to flow from the tank through the ports into the housing, the upper portion of the housing is open to permit the air in

the housing to escape, and the plate valve at the bottom of the structure is closed to prevent the escape of syrup. With the closing of the housing ports by the inlet valve, the air valve at the top of the housing also closes, and the plate valve opens to permit syrup to fall into the can, the syrup flowing down the inside of the can in separate arcuate streams, and displacing the air in the can. Some of the displaced air passes upwardly into the top of the housing to take the place of the syrup and some passes upwardly under the valve, from which point it escapes to the atmosphere. After the escape of the confined air a small amount of the syrup may remain in the housing and syrup will also be found at the same level in the several passages within the valve structure. With downward movement of the can the inlet valve falls, thus producing a lessened pressure in the empty upper part of the housing so that the syrup in the upper part of the can is sucked back into the valve structure. The proportioning of the parts is such that as the plate valve closes, only sufficient syrup has been left in the can to reach a predetermined level therein. Immediately after the plate valve closes to shut off the flow of syrup back into the valve, the air valve at the top of the housing opens, and this is immediately followed by the opening of the inlet valve so that syrup from the tank once more flows into the housing. A fourth valve for controlling the entrance of air into the housing is provided, so that, if so desired, the container can be filled to the brim with syrup when the air inlet valve is open; or at a selected level below the brim, if the valve is only partially open.

While the inlet valve is given an upward motion by the upward movement of the can engaged therewith, downward movement is imparted by a spring which is placed under tension by the can-impelled upward movement. Downward movement of the inlet valve imparts downward movement to the air discharge valve and plate valve, and this movement is opposed by a spring which is of course lighter than the inlet valve spring. It is obvious that there will be some slight variation in the quantity of syrup in successive cans, but the valves operate in such a manner that irrespective of the level of syrup in the housing when all flow has ceased, a predetermined quantity is sucked back into the housing as the can falls away from the valve structure and if the air inlet valve is closed, so that in the filled can the level of the syrup is precisely that desired, and uniform for all cans run through the syringing machine with a given setting of the valve structure.

In detail the syrupe valve comprises a housing 2 having a flange 3 adjacent its lower edge for facilitating its assembly in the floor 4 of the syringing machine syrup tank 6.

Only a small portion of the housing extends below the syrup tank, the greater portion extending upwardly on the inside of the tank and narrowing at the top to provide a neck 7 the open end of which lies above the level of the syrup in the tank as shown in Figure 1. Formed in the side of the housing, flush with the floor of the syrup tank, are ports 8 through which syrup may flow from the tank into the housing when cans are running through the syringing machine, or from the housing back into the tank when the latter is being drained.

Slidably arranged within the housing is an inlet valve of the piston type for controlling the ports 8, and comprising a ring 9 having a peripheral flange 11 depending therefrom. The flange is recessed to provide for a deformable packing ring 12 preferably of rubber so that leakage past the valve or flange is prevented. Extending upwardly from the ring 9 and serving to provide additional bearing surface against the housing are preferably four lugs 13. These lugs are notched to provide a seat for the spring 14 interposed between the inlet or ring valve and the top of the housing, and arranged to be compressed with the upward movement of the inlet valve and therefore to move the inlet valve downwardly when permitted to do so.

Arranged in a suitable annular groove on the under side of the inlet valve is a gasket 16 preferably of suitable deformable material, such as rubber, and against which the upper edge of the can 17 which is to be filled, seats, when the can is thrust upwardly under the valve structure by the operation of the mechanism comprised in the syringing machine. With such upward movement of the can, the upper edge seats against the gasket 16 and raises the inlet valve to close the ports 8. This upward movement compresses the spring 14 and as the can is lowered this spring forces the valve downwardly to once more open the ports 8.

Extending downwardly from the upper portion of the housing are a plurality of guide lugs 18. These guide lugs, together with the inside surface 19 of the ring 9, provide a slideway for the mounting of a dual valve structure, complementary to the inlet valve, for controlling the flow of syrup from the housing or syrup chamber into the can; for the passage of air from the can into the housing; and for the escape of air out of the upper part of the housing into the atmosphere.

This dual valve comprises a disk or plate 21 forming a sliding fit with the inside surface 19 of the ring valve. At spaced intervals, the periphery of the plate is provided with recesses 22 so that syrup may flow past the disk. Preferably there are three of these recesses, each extending over about 60° of the periphery and equally spaced there-

around. This leaves three peripheral segments 23 on the plate engaging the inner face of the ring valve. Extending upwardly from the center of the plate is a stem 24, terminating in a valve head 25, slidable within the guide lugs 18. The head is provided with an annular recess in which a gasket 26 is seated. The gasket is adapted to engage with the valve seat formed by the flange 27 extending inwardly from the housing wall at the upper end of the syrup chamber, so that the flow of air into and out of the syrup chamber may be controlled. Another valve for controlling the flow of air into the chamber is provided. Connected to the housing 2 by means of a pipe 28, extending above the level of the syrup in the syrup tank 6, is a petcock 29 which when open admits the passage of air into the housing.

Formed in the plate below the peripheral segments 23 are passages 30 opening at their outer ends on the inner side or edge of the plate, and at their inner ends opening into the chamber 31 within the stem 24. This chamber opens, as shown in Figure 1, into the upper end of the syrup chamber under the valve 25. The lower portion 32 of the dual valve is domed as shown; and is extended outwardly beyond the edge of the plate to provide a valve comprising a circular peripheral edge 33 adapted to seat against the gasket 16 to prevent syrup flowing out of the valve chamber. Preferably the peripheral edge of the domed plate valve thus formed is beveled as shown, to facilitate its entrance into the top of the can. This structure is of material aid in helping to straighten a deformed can and to permit such a can to pass through the syruper without difficulty. Extending upwardly through the head 25, and chamber 31, and secured in the domed lower portion of the plate valve, is a tubular stem 34 having a passage 36 opening at its upper end into the atmosphere and at its lower end into the under or outer side of the domed plate valve.

The passage 36 is open at all times except when the air in the can is completely displaced, then syrup will rise in the passage to the same level as in the other passages, and when the position of the valve parts is such as is shown in Figure 1, syrup may flow from the syrup chamber through the recesses 22 and over the edge 33 of the plate valve, and also thru the passages 30, but since these passages and the chamber 31 communicating therewith are of lesser total volume than housing 2, the syrup will empty from these passages sooner than thru recesses 22, hence it will be seen that at first six streams of syrup merge to form a stream which strikes the inside surface of the can and then after the passages 30 have emptied, the syrup will flow into the can in three smooth, arcuate streams which strike the inside surface of

the can and flow downwardly in between the pieces of fruit in the can, displacing the air therein without the formation of froth or bubbles. Part of this air passes upwardly from below or outside the valve, over the edge 33 of the plate valve between the streams of syrup, through the passages 30 and the chamber 31, and into the upper portion of the syrup chamber to replace the syrup as it flows out of the chamber, and an initial small part of the air will also pass thru the recesses 22, performing the same function. Part of the air in the can rises under the domed lower portion of the plate valve and escapes through the passage 36 into the atmosphere.

After the can has been completely filled, the syrup will assume approximately the same level in all the passages in the discharge valve, and housing. In Figure 1 the flow of syrup into the can is indicated by the full line arrows at the right hand side of the can, and the escape of air from the can through the passages 30 and 36 is indicated by dotted line arrows.

The valve structure just described is normally spring pressed upwardly by a coil spring 33 interposed between the upper face of the flange 27 in the neck 7 of the housing and a cap 39 threaded upon the upper end of the tube 34 and secured thereon by the locknut 41. This spring 38 is of lighter construction than the spring 14, so that when the spring 14 returns the ring valve 9 to its lower position following the withdrawal of the can, the gasket 16 is seated on the edge 33 of the plate valve, and the entire plate valve structure moves downwardly against the resistance of the spring 38 until the parts have assumed the position shown in Figure 3, with the air valve 25 and the ports 8 open. The extent of this downward movement is conveniently adjusted by positioning the cap 39 on the tube 34, the cap being provided with lugs 42 adapted to seat against the upper edge of the neck 7. It will also be noted that the cap is extended to protect the open upper end of the housing neck 7.

It will be obvious that the quantity of syrup required in the successive cans will vary somewhat, due to variations in the size of the fruit and the tightness of the pack. For this reason the housing 2 is made sufficiently large to hold a little more than enough syrup to fill a can requiring the maximum amount. For convenience it may be assumed that Figure 1 shows the conditions after the can has been filled with syrup; the petcock 29 closed; and the syrup level in the united can and valve structure stabilized, with a small quantity of syrup in the bottom of the syrup chamber. It may further be assumed that in the normal operation of the syring machine, the can 17 is about to start its downward movement to separate it from the valve. As it starts downwardly the spring

14 insures that the inlet valve follows it, maintaining a tight contact between the upper edge of the can and the gasket 16 until after the plate valve edge 33 is engaged by the gasket. Throughout this downward
 5 movement, and until the valve edge 33 engages the gasket, there is a lessening of pressure in the syrup chamber since the air valve 25 is still closed; and the petcock 29 is also closed. This lessening pressure in the
 10 top of the syrup chamber sucks the syrup upwardly through the passages 30 and recesses 22 into the chamber 31 until the valve edge 33 engages the downwardly moving gasket 16. As this occurs it will be found that syrup has
 15 been withdrawn from the can so that the passage 36 and under or outer side of the domed plate valve is clear of syrup, which has meanwhile risen in the chamber 31 and the syrup chamber, as shown in Figure 2. At this time
 20 the only syrup in the can above the lower edge of the plate valve 32 is that lying in a narrow annular space 43, Figure 2, between the upper edge of the can and the beveled face of the valve edge 33.

Continued downward movement of the inlet valve is accompanied by downward movement of the plate valve structure, tight contact being maintained between the valve edge
 30 33 and the gasket 16 so that no further syrup can escape from the syrup chamber. This downward movement opens the air valve 25 to establish communication between the atmosphere and the upper part of the syrup
 35 chamber, and also uncovers the ports 8 so that syrup may flow from the tank into the syrup chamber to fill it for the next succeeding can.

The downward movement of the united valve structure is halted by the engagement
 40 of the lugs 42 with the top of the housing neck 7, the valve parts then being in the position shown in Figure 3. The can continues its downward movement until its upper edge is clear of the lower edge of the
 45 flange 3 and then moves forwardly to be replaced by the succeeding can. The small quantity of syrup in the annular space 43 falls back into the can as the can separates from the gasket 16; and the level of the syrup
 50 in the can will be found to be the same for all cans, irrespective of the actual quantity of syrup in the can.

With the upward movement of the succeeding can to engage the gasket 16 of the
 55 ring valve, the movements just explained occur in reverse order. Upward movement of the inlet valve closes the ports 8, and compresses the spring 14, permitting the spring 38 to move the plate valve structure upwardly, maintaining contact between the valve
 60 edge 33 and the gasket until the air valve 25 seats to close the upper part of the syrup chamber. Further upward movement of the inlet valve breaks the contact between the valve edge 33 and the gasket, so that the parts

are once more in the position shown in Figure 1, and syrup is free to flow into the can to displace the air therein as previously explained.

It will be noted from the foregoing that
 70 instead of relying on a displacement member to insure the proper amount of syrup in the filled can, a syrup containing vessel is positioned upon the open end of the can and in extension thereof, the can filled completely,
 75 and then, if the petcock 29 is closed, a substantially constant predetermined quantity is sucked back into the syrup chamber and valve structure, leaving the level of syrup in the filled can at exactly the point desired. 80
 The only possible variable in this arrangement lies in a very minute variation in the volume of solids caught below the domed plate valve. It is found, however, in practical use that the fruit in the can is crowded
 85 gently under the chamber and that the amount of variation in the quantity of solids within the dome is so small as to be negligible; and that the liquid level in the filled can is substantially constant. 90

In canning raspberries or other substances having cavities that trap air, it is desirable to fill the can at various selected levels to permit the displacement of the air and still
 95 leave sufficient liquid over the can contents. Furthermore, the degree of subdivision of the can contents affects the amount of air entrapped: for example, finely sliced peaches will adsorb a greater quantity of air than
 100 larger slices, since a greater surface area of the contents is exposed. It is therefore necessary to regulate the liquid level to compensate for the air displacement, after the can has been filled.

When products such as sliced peaches, or
 105 any other product that will absorb a certain amount of liquid are canned, it is desirable to fill the can with liquid up to the brim, or at a selected level below the brim, in order to compensate for the quantity which is absorbed. This is also true when products, such
 110 as figs, are placed in the can hot, then covered with hot liquid, and the can sealed without exhausting. Upon cooling a certain amount of the liquid is absorbed by the figs,
 115 hence it is desirable to fill the can to the brim.

In order to regulate the level of the liquid in the can, it is evident that this can be done by controlling the degree of opening of the
 120 petcock 29. If the petcock is closed, a predetermined amount of liquid is sucked back. If the petcock is wide open, liquid will fill the can up to the brim, since none of it is sucked back. By regulating the degree of
 125 valve opening, the amount of air entering the housing is controlled, and various selective levels of liquid in the can may be obtained. To conveniently do this, a graduated scale and indicator 44 may be provided to show the degree of opening of the petcock. 130

It will be noted that since the housing enclosing the syrup chamber extends upwardly from the floor of the syrup tank and the ports 8 are flush with the floor, draining of the tank is accompanied by draining of the syrup chamber, the syrup flowing freely out of the ports 8 into the tank as the level of the syrup in the tank falls. This makes separate draining of each valve chamber unnecessary when it is desired to remove the syrup from the tank.

I claim:

1. A filling valve comprising a housing adapted to hold a quantity of liquid, a valve for controlling the flow of liquid into said housing, a valve for controlling the flow of liquid out of said housing, a valve for controlling the flow of air out of said housing, means for correlating said valves to close the discharge valve and open the air valve when the inlet valve is opened and to open the discharge valve and close the air valve when the inlet valve is closed, and a valve for controlling the flow of air into the housing.

2. A filling valve comprising a housing adapted to hold a quantity of liquid, a valve for controlling the flow of liquid into said housing, a valve for controlling the flow of liquid out of said housing and the flow of air from outside the valve into the housing, a valve for controlling the flow of air out of the housing, means for correlating said valves to close the discharge valve and open the air valve when the inlet valve is opened and to open the discharge valve and close the air valve when the inlet valve is closed, a conduit connecting the outer side of the discharge valve with the atmosphere, and a valve for controlling the flow of air into the housing.

3. A filling valve comprising a housing adapted to hold a quantity of liquid, an inlet valve for controlling the flow of liquid into said housing, a discharge valve for controlling the flow of liquid out of said housing, said discharge valve having a passage opening at one end into the housing and at the other end upon the inner side of the discharge valve, an outlet valve for controlling the flow of air from the housing, means activated by the inlet valve in its movement for correlating the valves to close the discharge valve and open the outlet valve when the inlet valve is opened and to open the discharge valve and close the outlet valve when the inlet valve is closed, and a valve for controlling the flow of air into the housing.

4. A filling valve comprising a housing adapted to hold a quantity of liquid, a valve for controlling the flow of liquid into said housing, a valve for controlling the flow of liquid out of said housing, a valve for controlling the flow of air out of said housing, means including a spring interposed between the housing and the inlet valve, for correlating said valves to open the air valve and

close the discharge valve when the inlet valve is opened, and a valve for controlling the flow of air into the housing.

5. A filling valve comprising a housing adapted to hold a quantity of liquid, a valve for controlling the flow of liquid into said housing, a valve for controlling the flow of liquid out of said housing, a stem mounted on the latter valve and projecting thru and above said housing, a valve for controlling the flow of air out of said housing, means including a spring interposed between the housing and the stem for correlating said valves to close the air valve and open the discharge valve when the inlet valve is closed, and a valve for controlling the flow of air into the housing.

6. A filling valve comprising a housing adapted to hold a quantity of liquid, a valve for controlling the flow of liquid into said housing, a valve for controlling the flow of liquid out of said housing, a valve for controlling the flow of air out of said housing, means for exerting an opening thrust upon the inlet valve, means for exerting an oppositely directed thrust upon the discharge and air outlet valves, and a valve for controlling the flow of air into the housing.

7. A filling valve comprising a housing adapted to hold a quantity of liquid, a valve for controlling the flow of liquid into said housing, a valve for controlling the flow of liquid out of said housing, a valve for controlling the flow of air out of said housing, means for exerting an opening thrust upon the inlet valve, means for exerting an oppositely directed thrust of lesser force upon the discharge and air outlet valves, and a valve for controlling the flow of air into the housing.

8. The combination with a filling valve having means for introducing into a container all the liquid it will hold and for withdrawing by suction a portion of the liquid, of means independent of the withdrawing means for controlling flow of air into the valve and the amount of liquid withdrawn.

9. The combination with a filling valve having means for introducing into a container all the liquid it will hold and for withdrawing by suction a portion of the liquid, of a valve independent of the withdrawing means for selectively controlling flow of air into the valve and the amount of liquid withdrawn.

10. A filling valve comprising a housing adapted to hold a quantity of liquid and having a port in a wall thereof, a movable inlet valve for opening and closing said port and for controlling the flow of liquid into said housing, a movable discharge valve for controlling the flow of liquid out of said housing and adapted to be closed by the inlet valve when the port is open, means for correlating the movements of the discharge and inlet valves whereby the discharge valve

will move a part of the distance together with the inlet valve when the inlet valve is moved to close the port, means for limiting movement of the discharge valve upon continued movement of the inlet valve, and an air inlet valve for selectively controlling the flow of air into the housing.

11. A filling valve comprising a housing adapted to hold a quantity of liquid and having a port in a wall thereof, a movable inlet valve for opening and closing said port and for controlling the flow of liquid into said housing, a movable discharge valve for controlling the flow of liquid out of said housing and adapted to be closed by the inlet valve when the port is open, a valve for controlling the flow of air out of said housing, means for opening said valve when the inlet valve is open and for closing said valve when the inlet valve is closed, including means for correlating the movements of the discharge and inlet valves whereby the discharge valve will move a part of the distance together with the inlet valve when the inlet valve is moved to close the port, means for limiting movement of the discharge valve upon continued movement of the inlet valve, and an air inlet valve for selectively controlling the flow of air into the housing.

12. In a filling valve, a housing adapted to hold a quantity of liquid, a ring slidably mounted in said housing, a movable discharge valve for controlling the flow of liquid out of said housing and adapted to be closed by the ring to prevent the flow of liquid from the housing, means for correlating the movements of the ring and discharge valve whereby the discharge valve will move a part of the distance together with the ring when the ring is moved, means for limiting movement of the discharge valve upon continued movement of the ring, and an air inlet valve for selectively controlling the flow of air into the housing.

13. The combination with a filling valve having means for introducing into a container all the liquid it will hold and for withdrawing a portion of the liquid, including a housing for containing the liquid and closed to the atmosphere outside thereof when the container is full of liquid and the housing has discharged liquid; of a valve communicating with said housing and with the atmosphere outside thereof for selectively controlling the quantity of liquid withdrawn.

In testimony whereof, I have hereunto set my hand.

WILLIAM DE BACK.