Sept. 8, 1959 M. BATTINICH 2,903,023

METHOD AND APPARATUS FOR FILLING CANS AND THE LIKE

Filed Nov. 13, 1956 2 Sheets-Sheet 1

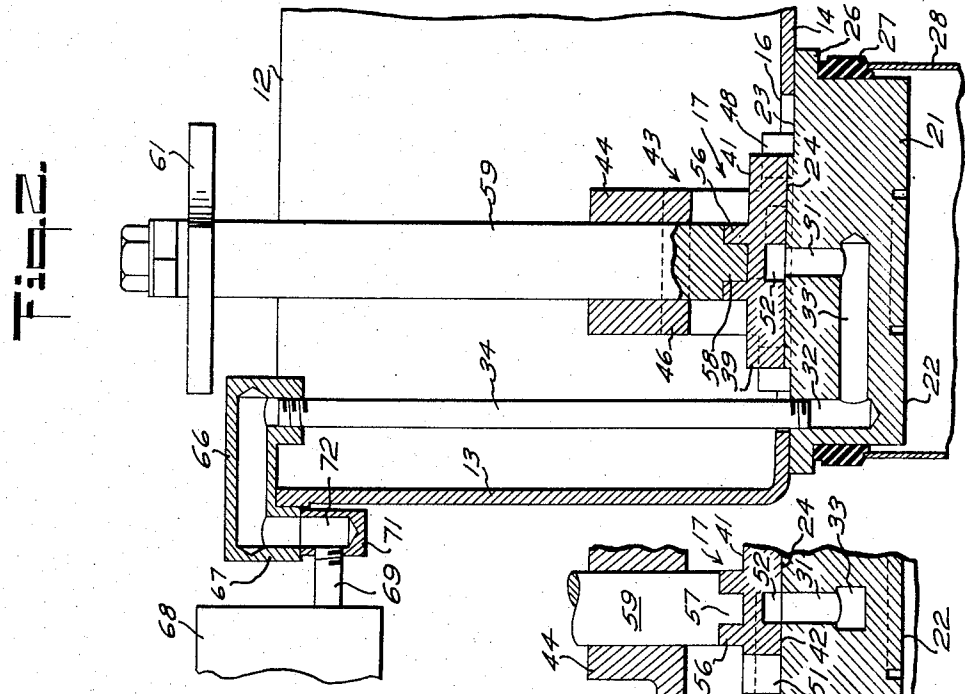


Fig. 2.

Fig. 4.

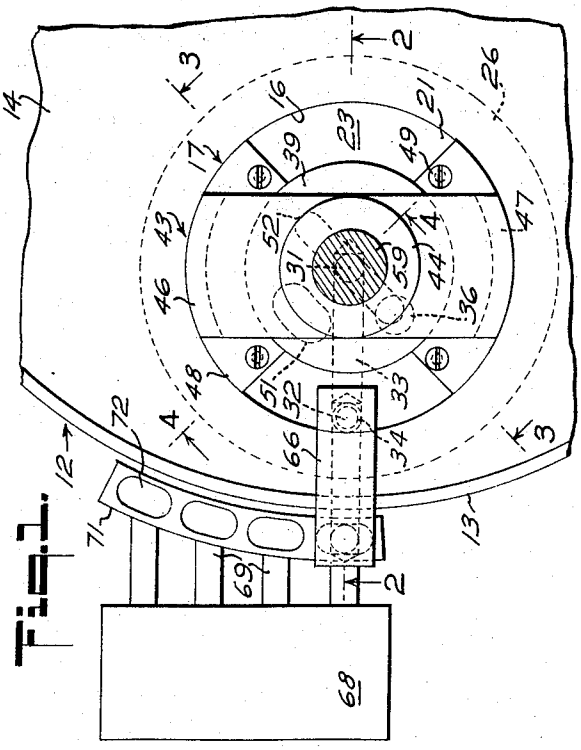


Fig. 1.

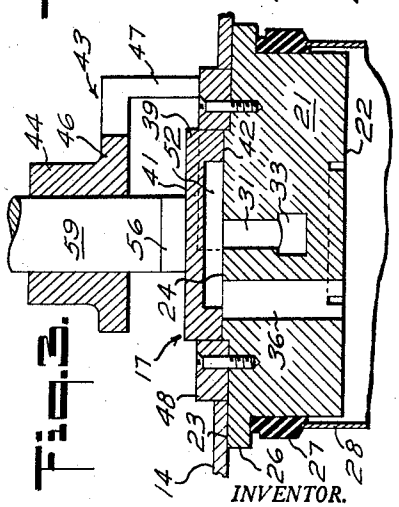


Fig. 3.

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METHOD AND APPARATUS FOR FILLING CANS AND THE LIKE

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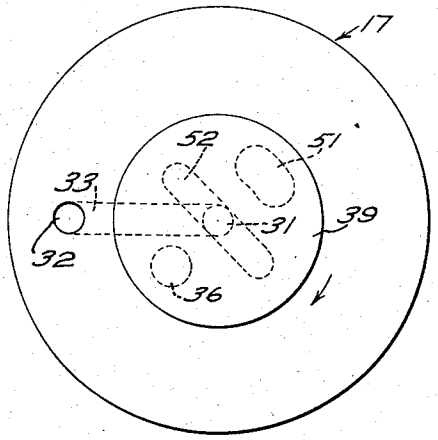


Fig. 5

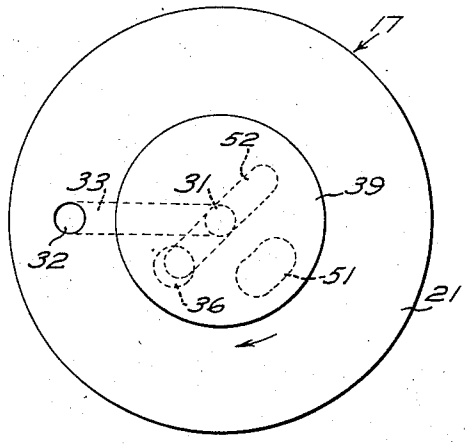


Fig. 6.

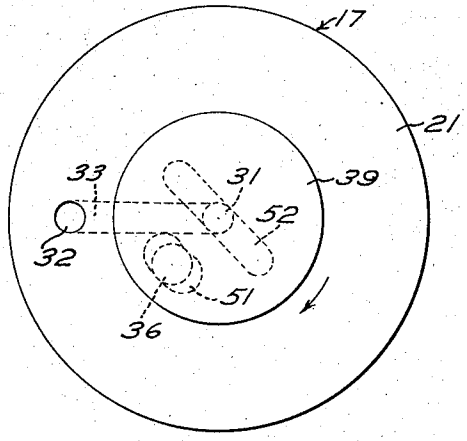


Fig. 7.

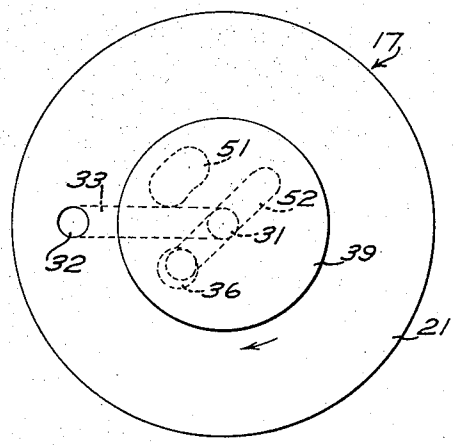


Fig. 8.

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METHOD AND APPARATUS FOR FILLING CANS AND THE LIKE

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Application November 13, 1956, Serial No. 621,882

7 Claims. (Cl. 141—61)

The present invention generally relates to the art of filling containers with liquid, and is more particularly directed towards a novel method and filler valve for accomplishing such purpose.

Heretofore, there have been developed a wide variety of filler valves which are usually arranged circumferentially around the bottom of a bowl containing the liquid to be dispensed into the respective cans. The cans are delivered underneath the bowl in alignment with the respective valves, and suitable means are incorporated with such valves to effect an opening thereof at one portion of bowl rotation so that liquid from the bowl may enter the open topped can. As an example of one type of such valve, reference may be had to my copending application, Serial No. 598,371, wherein a valve of this character is disclosed.

In the art of filling cans, the capacity requirements are constantly being increased so that a larger number of cans may be filled in a given period of time. Obviously, the longer it takes the liquid from the bowl to flow into the can, the longer such filling period will require. However, it has been found that if the can or container to be filled is partially vacuumized or evacuated prior to the introduction of the liquid, the liquid in the bowl will be assisted by the pressure differential between the bowl and can and rapidly fill the same. This results in a minimum filling period required for each can and optimum output of filled containers.

It is therefore an object of the present invention to provide a filling valve and a method of filling cans in which the can is simply and effectively evacuated prior to the introduction of liquid therein.

Another object of the invention is to provide apparatus of the character described which is extremely simple in construction and operation, which eliminates the need for conventional springs and other valve closing mechanisms, and which may be incorporated on a liquid filler bowl with a minimum of expense or difficulty.

A further object of the invention is to provide a filler valve and method of filling cans in which the can is evacuated prior to filling so as to expedite the filling operation, and the can is then vented to the atmosphere so as to break the vacuum seal between the can and valve and effect a release thereof.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of the preferred form of the invention which is illustrated in the drawings accompanying and forming part of the specification. It is to be understood, however, that variations in the showing made by the said drawings and description may be adopted within the scope of the invention as set forth in the claims.

Referring to said drawings:

Figure 1 is a top plan view of a portion of a filling apparatus including the valve of the present invention.

Figure 2 is a cross-sectional elevational view taken substantially in the plane indicated by line 2—2 of Figure 1.

Figure 3 is a cross-sectional view taken substantially in the plane indicated by line 3—3 of Figure 1.

Figure 4 is another cross-sectional view taken substantially in the plane indicated by line 4—4 of Figure 1.

Figures 5 through 8 are generally diagrammatic views illustrating the valve in various operational positions.

In broad terms, the apparatus and method of the present invention comprises the positioning of a valve adjacent the bottom of a receptacle or bowl, bringing a can to be filled subjacent said bowl and in alignment with the valve, then producing a partial vacuum in the container so as to evacuate most of the air therefrom, opening the valve to place the interior of the can in communication with the bowl whereby a combination of liquid head and pressure differential will cause the liquid to rapidly flow from the bowl to the container, and then venting the can to the atmosphere so as to break the vacuum seal between the container and valve. Such an arrangement will produce an extremely rapid and efficient means of filling, while insuring a proper maintenance of liquid height in the individual containers.

Referring now more specifically to the structure disclosed in the drawings, the valve of the present invention is adapted to be operatively installed on a receptacle or filler bowl, generally indicated by the numeral **12** and including side walls **13** and a bottom wall **14**. The bowl bottom **14** is provided with a plurality of circumferentially spaced openings **16** in which the valves **17** of the present invention are adapted to be operatively inserted. As is common with this type of filling arrangement, the bowl as well as the valves mounted thereon, rotate about a central vertical axis, and cans are fed underneath the bowl and in axial alignment with the respective valves so that during the approximate 330 degree of rotation during which they are in contact with the valves, the valves will open and liquid from the bowl **12** will flow into the can, the valves close, and the can is then separated and discharged from the bowl. Also, as is well known in the art, the primary engagement and separation of the can from the valves is effected by providing a lift for the cans as they approach the bowl which forces the same into engagement with the filling valves and then, is caused to descend to effect a separation thereof. As this arrangement is well known in the art, no detailed description is deemed necessary for an understanding of the present invention.

Each of the valves **17** includes a stationary cylindrical plate-like member **21** having a flat horizontal lower surface **22**, and a similar upper surface **23** provided with a central circular raised boss **24**. Member **21** may be mounted on the bottom of bowl **13** in any suitable manner in concentric relation to the opening **16** therein. The upper outer peripheral surface of the member is formed with an annular ring **26** against which a can sealing gasket **27** bears. In this manner, when a cylindrical can **28** is raised towards member **21**, the can bead will engage gasket **27** and provide a seal between the can and the lower valve surface **22**.

For a purpose to be hereinafter explained, member **21** is provided with a central axial bore **31** extending from upper surface **23** to a position medially of the upper and lower surfaces. Also, adjacent the outer periphery of the member, a similar vertical bore **32** is provided with a transverse bore **33** providing free communication between the lower ends of the respective bores. The upper end of bore **32** may be threaded to receive a vertical tube **34** whose upper end preferably extends beyond the upper edge of the bowl, or in any event, above the liquid level therein. Another vertical bore **36** is provided in member **21** in the area of the boss, such bore extending completely through the surfaces **22** and **23** thereof and serves as a liquid passage from the interior of the bowl to the

interior of a can 28 when the latter is positioned against gasket 27.

Since the member 21 in effect comprises a portion of the bottom of bowl 12, liquid in the bowl would continuously gravitationally flow through passage 36 in absence of some control mechanism to selectively open and close the same. In accordance with the present invention, such mechanism includes a disk-like valve member 39 having parallel horizointal upper and lower surfaces 41 and 42 respectively and a diameter substantially equal to that of the raised boss 24. The lower surface of member 39 is disposed in rotatable sealing engagement with the upper surface of the boss and the member is maintained in axial concentricity with the boss by means of a housing 43. The latter includes a vertical cylindrical sleeve 44 having a horizontal flange 46 extending outwardly from the lower edge thereof at diametrically opposed portions. The distal ends of flange 46 are formed with vertical legs 47, the lower ends of which are provided with arcuate inwardly directed flanges 48, the latter having suitable apertures for receiving machine screws 49, engageable with tapped holes in surface 23 of member 21 for securing the housing to such member. In this manner, the opposed flanges 48 bear against the peripheral edge of boss 24 and likewise against the outer peripheral surface of the upper valve plate 39 so as to maintain the latter in proper position overlying the stationary valve member 21.

Valve member 39 is provided with a vertical passage 51 extending therethrough, and preferably, such passage extends along an arcuate path from the axial center of the member, and is positioned to selectively register with filler passage 36 upon rotation of the member. Also, as an important feature of the invention, lower surface 42 of valve member 39 is provided with a diametrical groove 52, extending for substantially the entire horizontal width of the member, and disposed in generally normal relationship to a diameter including the center of passage 51. As will be clear from the drawings, groove 52 has substantially the same width as bore 31 of member 21 and is in continuous communication therewith during rotation of valve 39. However, it will also be noted that the ends of the groove will communicate with filler bore 36 in member 21 during such rotation, that is, during each 360 degrees of rotation, filler bore 36 will be twice placed in communication with bore 31 for a purpose to be explained in connection with a description of the operation of the valve mechanism.

To effect rotation of valve member 39, the upper surface 41 thereof is provided with a cylindrical boss 56 having a continuous diametrical slot 57 therethrough and adapted to receive a depending lug 58 of a drive shaft 59. Shaft 59 is journalled in housing sleeve 44 for free rotation, and at its upper end is provided four equally circumferentially spaced cams 61 adapted to be engaged by stationary trip members, not shown, provided adjacent the bowl. With this arrangement, which forms no independent part of the present invention, as the respective cams 61 are engaged by the trip members, the shaft 59 and the valve member 39 will be rotated through a ninety degree cycle, and then remain in such position until the bowl rotates sufficiently to permit the next cam to be engaged.

In view of the above, an explanation of the functioning of the parts is in order, and for a better understanding of the operational cycle, reference may be had to Figures 5 through 8 of the drawings.

Figure 5 illustrates the position of the parts when a can 28 is first brought into engagement with the sealing gasket 27. As shown, valve member 39 is positioned so that groove 52 as well as passage 51 is offset from filler passage 36 in the stationary valve member. Next, as seen in Figure 6, member 39 has been rotated 90 degrees clockwise whereby groove 52 registers with the filler passage 36. Thus, the interior of the can 28 has free communication to the tube 34 through passage 36, groove 52, and bores 31, 33 and 32. Accordingly, conditions prevailing in said tube will be imparted to the can.

As an important feature of this invention, the upper end of tub 34 is provided with a hollow horizontal extension 66 having a downwardly directed hollow element 67 at the end thereof. A stationary vacuum header 68 extends adjacent a portion of the bowl periphery and communicates through ducts 69 to an arcuate shoe 71 having a plurality of upwardly directed openings 72 provided thereon and registrable with element 67 upon bowl rotation. Thus, as the bowl rotates, element 67 will be placed in communication with the vacuum shoe, and with the valve positioned as illustrated in Figure 6, effectively evacuate air from the can. The reason for providing a plurality of openings 72 is so that more than one can will not be in direct communication with the shoe at any one time. This situation could well result in a partially evacuated can communicating with a new can under atmospheric conditions and effecting a pressure rise in the former.

As the bowl continues its rotation, element 67 will pass the end of shoe 71 with the can substantially vacuumized and during this period, valve member 39 is caused to rotate another ninety degrees to the position shown in Figure 7. In such position, the passages 51 and 36 will be in registration, thereby permitting liquid in the bowl to gravitationally flow into the can, the evacuated condition of the latter greatly increasing the pressure differential between the head and bowl resulting in extremely rapid filling.

Following the filling cycle, the valve member is rotated to a position shown in Figure 8 with groove 52 placing bore 31 and passage 36 again in communication. This position is somewhat analogous to the evacuation position illustrated in Figure 6, except that in the present instance, the tube 34 is not in communication with a vacuum source, but merely to the atmosphere. This atmosphere venting effects a release of the vacuum seal between can and valve and permits a lowering of the can away from the filling mechanism.

From the foregoing description, it will be readily appreciated that mere rotational displacement of the upper valve member 39 will permit the successive cycles of sealing, can evacuation, liquid filling and atmospheric venting. Obviously, the circumferential displacement of the cam trip members for effecting rotation of shaft 59 is not necessarily uniform as the evacuation and filling cycles will occupy the greater portions of bowl rotation. The parts are all simple to construct and to disassemble for cleaning and may be depended upon to perform their requisite functions over extended periods of time with little or no special servicing.

What is claimed is:

1. Apparatus of the character described including a stationary plate having upper and lower surfaces and a single first bore extending between said surfaces, means defining a second central axial bore extending from said upper surface of said plate and terminating medially of said surfaces, in radial spaced relation to said first bore, said plate having a horizontal bore in communication with said second bore and extending exteriorly of said plate, a movable valve member in planar contact with said stationary plate and adapted to rotate about the axis of the latter in sliding relation thereto, said valve member having a diametrical groove in the surface thereof confronting said stationary plate with a medial portion of said groove in continuous communication with said second bore during valve member rotation and sequential communication with said first bore, whereby upon each rotation of said movable plate, said second bore and first bore will be twice placed in communication with each other through said groove, and said movable plate further having an axial passage therethrough lying substantially on a diameter thereof normally related to the diameter of said groove and adapted

to overlie said stationary plate first bore once during each rotation of the valve member.

2. A filler valve comprising a stationary disk-like member adapted for mounting in a bottom opening of a liquid supply bowl, said member having a central axial bore extending from the upper surface thereof and a transverse bore communicating with the bottom of said axial bore positioned intermediate the upper and lower surface of said member, said member further having an axial filler bore extending therethrough in parallel radially spaced relation to said central bore and offset from said transverse bore, a rotatable valve element overlying said member and said axial bores in rotatable sealing engagement with the upper surface thereof, said element having a diametrically extending groove on the lower surface thereof with a central portion of the groove in continuous communication with said central bore and each end portion of the groove in intermittent engagement with said filler bore upon each plate rotation, and means defining a passage extending axially through said element in spaced relation to said groove and sequentially registrable with said filler bore upon element rotation, and said transverse bore having an end portion uncovered by said valve member.

3. A valve as set forth in claim 2 further characterized by said valve passage being positioned along a diameter of said valve substantially normal to the length of said groove.

4. Apparatus as set forth in claim 3 including a vertically disposed shaft engageable with said valve element and extending upwardly therefrom, and means adjacent the upper end of said shaft adapted for engagement with cams to rotate said shaft and valve element.

5. Apparatus of the character described comprising a vacuum source, a stationary plate having parallel upper and lower surfaces and adapted for mounting in the bottom wall of a liquid supply bowl, said plate having a first and a second generally parallel spaced vertical bore extending from said upper surface to a position medially of said surfaces and a horizontal bore interconnecting the lower ends of said vertical bores, a vertically disposed tube connected to the first of said vertical bores and adapted to be connected to said vacuum source, the second vertical bore being positioned centrally of said plate, said plate further having a third axial bore extending between said surfaces in offset relation to said

horizontal bore, a rotatable valve element having parallel upper and lower surfaces with the lower surface thereof in rotatable sealing engagement with the upper surface of said plate and overlying said second and third bores, said element having a diametrical groove on the lower surface thereof overlying said second bore and a spaced axial passage sequentially registering with said third bore of said plate upon rotation of said element, and the respective end portions of said groove each registering with said second bore during each rotation of said element.

6. Apparatus as set forth in claim 5 in which said tube is operatively connected to said vacuum source when said third bore is in communication with one end portion of said groove and is vented to the atmosphere when said third bore is in communication with the other end portion of said groove.

7. An improved valve comprising a plate adapted for fixed mounting in the bottom of a bowl containing a fluid to be dispensed and including a first central bore and a second parallel bore extending from the upper surface of said plate and terminating upwardly of the lower surface thereof and a third radially spaced axial bore extending completely therethrough, said plate having a horizontal bore interconnecting said first and second bores, a valve member rotatably slidable in sealing engagement on the upper surface of said plate, a bracket including an arcuate horizontal flange secured to the upper surface of said plate with the inner peripheral portion of said flange rotatably journalling said valve member, a sleeve on said bracket in alignment with said central bore, a shaft journalled in said sleeve and engageable with said valve member for rotating the latter upon shaft rotation, and said valve member having conduit means thereon intermittently establishing communication between said first and third bores during plate rotation, and said valve member having a vertical passage therethrough intermittently registering with said third bore during valve member rotation.

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