FILLING HEAD FOR CONTAINER FILLING MACHINES

Fig. 1.

Fig. 17.

Fig. 18.

Fig. 19.

INVENTOR:

Rudolph H. Breeback

ATTORNEYS.
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INVENTOR:

Rudolph H. Breeback,

BY

Kushmau, Carby & Kushmau

ATTORNEYS
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Fig. 6.

Fig. 7.

Fig. 8.

INVENTOR:

Rudolph H. Breeback,

BY

Cushman, Darby & Cushman

ATTORNEYS.
INVENTOR:

Rudolph H. Breeback,

BY

(Cushman, Darby & Cushman)

ATTORNEYS.
The present invention relates to filling heads, and, more particularly, to filling heads used with carbonated beverage filling machines.

Primarily, the present invention relates to a filling head for use on a beverage filling machine of the rotary type, such as disclosed in United States Patent No. 2,202,033 issued May 28, 1940 to Robert J. Stewart and Willet L. Gladfeather. In the aforementioned Stewart and Gladfeather patent, the filling machine disclosed is of the rotary type and includes a rotating filling table having a plurality of vertically reciprocal container supporting platforms on its periphery and a rotating superstructure containing a reservoir for carbonated liquid and a superposed body of gas and a plurality of filling heads positioned in communication with the reservoir. There is one filling head positioned in vertical alignment above each platform on the rotating filling table. The platforms receive containers at an infeed station from a star wheel carried on a stationary work table and then the containers are raised into sealing engagement with the filling head for filling. After the containers have been filled the platforms are lowered and the containers are removed from the rotating filling table by an outfeed star wheel and transferred theretoform to suitable container closing mechanism.

Filling machines of the type disclosed in the aforementioned Stewart and Gladfeather patent have filling heads which include a rotary disk valve mounted for rotation on a radius of the filling machine. The rotary disk valve includes upwardly and downwardly extending operating arms which are arranged to contact fixed trips spaced about the rotary part of the filling table. The disk valve usually has a plurality of passageways therethrough for liquid and gas. The cycle of the filling valve during the filling of a container is to move from the closed position to a counterpressure position wherein gas passageways in the disk valve are aligned with passageways in the filling head, placing the container in communication with the body of gas superposed on the liquid in the liquid reservoir. After the container has been placed under a predetermined counterpressure, the disk valve engages another trip and moves to a position wherein the liquid passageway therein is aligned with the passageway in the filling head to permit liquid flow into the container from the reservoir. Simultaneous with the aligning of the liquid passageway in the disk valve with liquid passageways in the filling head for filling, a gas passageway in the disk valve also aligns with gas passageways in the filling head, whereby the container is vented. After filling of the container, the disk valve is again rotated to a closed position so that the container may be removed from the filling head.

In the filling of containers with a carbonated liquid, including beer, a disadvantage of the prior filling heads utilizing rotary disk valves, is the leakage of liquid and gas wherein the disk valve contains both liquid and gas passageways. Unless the valve seat and the rotary disk valve are perfectly lapped, the gas pressure from the reservoir of the filling machine acting against the rotary disk valve tends to separate the valve from the valve seat, thereby permitting leakage of the liquid. Although the leakage of liquid around the filling head is small, it results in an unsightly appearance of the filling machine, as well as an unsanitary condition, if the leakage is permitted to exist. Consequently, maintenance is constantly required on the valves of the filling machine to make sure that there is no leakage of liquid from the filling head.

Even though the disk valves of filling heads of present rotary filling machines are provided with accurately lapped seating surfaces to seat with the seat face of the filling head, the constant striking of the valve-operating arms with the fixed cams on a rotary path will have an adverse tendency to cause the disk valve to rock on the seat face. This, coupled with the pressure of the gas passages, assists in causing leakage of liquid from the liquid passages and, as stated above, constant maintenance of the valves and the filling heads must be maintained to eliminate this difficulty.

Therefore, an object of the present invention is the provision of a filling head adapted for use with rotary type of filling machines, the filling head being so designed as to eliminate leakage of liquid about the filling valve.

Still another object of the present invention is the provision of a filling head for carbonated beverage filling machines, the filling head having separate passageways for gas and liquid throughout so that the gas pressure is never acting on the valve containing the liquid passageways.

A still further object of the present invention is to provide a filling head for carbonated beverage filling machines utilizing separate disk valves for liquid and gas passageways, thereby separating the gas passageway from the liquid passageway in such a manner that the liquid valve is never subjected to gas pressures.

A further object of the present invention is the provision of a filling head for carbonated beverage filling machines utilizing separate disk valves for gas and liquid passageways, the separate rotary disk valves being controlled by a common valve operator.

A still further object of the present invention is to provide a filling head for carbonated beverage fillers, the filling head being provided with a liquid check valve operable to prevent the flow of liquid if a container is improperly seated against the filling head or if the container leaks. Ancillary to the preceding object, it is an object of the present invention to provide a check valve in the liquid flow passage of the filling head, the check valve being provided with means to prevent a vacuum lock once it has been operated and the condition causing its operation having been eliminated.

An additional object of the present invention is to provide a filling head for filling containers with a carbonated beverage, the filling head being so arranged as to be capable of flowing a maximum quantity of liquid to the containers without increasing the velocity of flow of liquid.

These and other objects and advantages of the present invention will be apparent from the following specification, claims and accompanying drawings, in which:

Figure 1 is a front elevational view of a filling head of the present invention showing a container supported on a container supporting platform in vertical alignment therewith and further, showing the valve-operating arm schematically in its various operating positions.

Figure 2 is a diagrammatic sectional view of the filling
head of Figure 1 attached to a rotary filling machine, illustrating a number of flow passages through the filling head, only a portion of the filling machine being shown for the purpose of clarity.

Figure 2 is a sectional view taken on the line 3—3 of Figure 2 but showing the liquid filling disk valve and the gas disk valve in the neutral or closed stage position, the view being on a larger scale than both Figures 2 and 3.

Figure 3 is a sectional view similar to that of Figure 3 but showing the liquid filling disk valve and the gas disk valve in the position they occupy for the counter-pressure stage, as well as for the blow out stage.

Figure 4 is a sectional view similar to that of Figure 3 but showing the liquid filling disk valve and the gas disk valve in the position they occupy for the filling stage.

Figure 5 is a bottom view of the body of the filling head showing the seat face for the liquid filling disk valve.

Figure 6 is an elevation view of the body of the filling head shown in Figure 5.

Figure 7 is an elevation view of the body of the filling head similar to Figure 6 but showing the seat face for the gas disk valve.

Figure 8 is a sectional view taken on the angled line 9—9 of Figure 7.

Figure 9 is a sectional view taken on the angled line 10—10 of Figure 8.

Figure 10 is a sectional view of the body of the filling head shown in Figure 9.

Figure 11 is a front elevation view of the body of the liquid filling disk valve.

Figure 12 is a fragmentary sectional view of the liquid filling disk valve taken on the line 12—12 of Figure 11.

Figure 13 is a sectional view of the liquid filling disk valve taken on the line 13—13 of Figure 11.

Figure 14 is a rear elevation view of the gas disk valve of the filling head of the present invention.

Figure 15 is a side elevation view of the gas disk valve of Figure 14.

Figure 16 is a vertical sectional view of the gas disk valve of Figure 14 and taken on the line 16—16 of Figure 15.

Figure 17 is a side elevation view of the valve shaft of the filling head of the present invention.

Figure 18 is an end elevation view of the valve shaft shown in Figure 17 and looking from the left.

Figure 19 is a sectional view of the valve shaft shown on the line 19—19 of Figure 17.

The arrangement of the filling head of the present invention is illustrated in Figures 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, and 20 of the drawings and is intended for use in filling containers with beer or other carbonated beverages but it will be understood that containers may be filled with other beverages with the arrangements of the invention so long as the beverages are filled under a gas pressure. Further, the particular embodiment of the filling head disclosed herein is for filling containers, such as cans, but it is intended that the invention herein could be practiced in the art of filling bottles or the like by merely changing the nozzle portion of the filling head as is known in the art or as shown in the aforementioned Stewart and Gladfelder patent.

Referring to Figures 1 and 2, the filling head of the present invention is generally designated by the numeral 10 and is attached to a rotary type filling machine generally designated by the numeral 12. The rotary filling machine 12 is of the type disclosed in the aforementioned Stewart and Gladfelder patent and includes a stationary work table 14, a rotary filling table 16 carried by a center post or column (not shown) and a superstructure 18 also carried by the center post. The rotary table 16 is provided on its periphery with a plurality of vertically movable container supporting platforms 20 which are adapted to receive containers C from the level of the work table and elevate them vertically into sealing engagement with filling head 10. The superstructure 18 of the filling machine 12 includes a centrally disposed reservoir 22 for a carbonated liquid and a superposed body of gas. Superstructure 18 also includes a horizontally extending skirt 24 and a vertically extending vertical flange 26, as best shown in Figure 2. The filling heads 10 are secured to the flange 26 of the superstructure 18 by means of a bolt assembly 28, one filling head being positioned in vertical alignment with each platform 20.

A container C is positioned on each platform 20 as the platform passes an infeed station (not shown) and then the container is raised vertically into sealing engagement with filling head 10. As will be explained in more detail later in the specification, the gas and liquid valves of the filling head pass through various stages to fill the container with the carbonated liquid from reservoir 22. After the container is lifted into sealing engagement with the filling head, a valve-operating arm 30 on the filling head moves from the full line position of Figure 1 to the dotted line position 40 shown in Figure 2 and the valve is opened. When the valve-operating arm 30 is in position A shown in Figure 3, the container is in communication with the gas containing portion of reservoir 22 and the container is placed under counterpressure. In other words, the pressure of the gas above the liquid in the reservoir is utilized to place the container under a pressure greater than atmospheric pressure. After the container has been placed under a proper amount of counterpressure, which may be slightly less than the pressure of gas in the reservoir, the valve-operating arm 30 is moved to position B by a fixed trip 34 schematically shown in Figure 1, and in this position the liquid in the reservoir is placed in communication with the container 22. The liquid flows into the container and simultaneously with the flow of liquid into the container, the gas in the container is vented therefrom through the filling head and the liquid passing through the container is then lowered by the platform away from sealing engagement with the filling head and to the level of work table 14 where it is transferred from the rotating filling table 16 to suitable closing mechanism (not shown). After the container C has been moved out of sealing engagement with the filler in the container supporting platform 20 and prior to the positioning of another container on the container supporting platform, the valve-operating arm 30 may be momentarily moved, by a fixed trip (not shown), to the position B and then back to the closed full line position of Figure 1 so as to blow out the gas passages and remove therefrom any liquid or foam which may have entered during the filling stage of the cycle as is the usual practice.

In more detail, filling head 10 includes a body 38 having a nozzle portion 40 depending downwardly therefrom, the nozzle portion 40 having a horizontally disposed container engaging face 42 for receiving, in sealing engagement therewith, the lip of container C. In the particular embodiment of the invention disclosed an annular gasket member 44, carried by the nozzle portion 40 and made of a resilient material, such as rubber or a rubber-like product, engages the lip of the container to form a seal therewith. The upper portion of cavity 38 is provided with a flange member 46 which is adapted to seat against the outer planar face 48 of a mounting plate 50. Suitable apertured gaskets 52 are positioned between the mounting plate 50 and the flanges 26 and 20 respectively. The body 38 of filling head 10 is provided with a circular recess 54 facing outwardly from the filling machine and extending transversely of a radius of the filling machine. A second circular recess 56 is
also provided in the body 38, the recess 56 being op-positely disposed to the recess 54. Both recesses 54 and 56 respectively lie in vertical planes with respect to the interior of the body 38, the liquid valve 60 having a planar face 62 adapted to rotate with respect to body 38 in the recess 54. A suitable apertured gasket 64 pos-itioned in the recess 54 provides a valve seat face for disk valve 60. A second disk valve 66, having a planar face 68, is adapted to rotate with respect to body 38 in the recess 56. Body 38 and the recess 56 provides a valve seat face for disk valve 66.

Referring now to Figures 6, 7 and 9, it will be noted that body 38 of filling head 10 is provided with an enlarged liquid passageway 72 which opens in a port 74, the port 74 communicating with an aperture 76 in mounting plate 50. The aperture 76 is aligned with an outlet pipe 78 connected to the flange 26 of the skirt 24. The other end of pipe or conduit 78 is connected to the lower or liquid containing portion of the gas and liquid reservoir 22, as shown at 80 in Figure 2. Passageway 72 extends through body 38 and then vertically downwardly to a point where it is divided or bifurcated into two passageways, one passageway 82 opening directly to the recess 54, as indicated at 83, while another passageway 84 extends transversely across body 38 and then opens to the recess 54, as indicated at 86 in Figure 6. The diameters of passageways 82 and 84 are each less than the diameter of the single passageway 72 leading into body 38 but the accumulative total area of the two passageways 82 and 84 respectively is as great or greater than the cross-sectional area of the large passageway 72, thereby permitting a maximum flow of liquid through the body 38. Body 38 includes at a single passageway 88 opening to the recess 54 at 90, this pas-sageway extending downwardly to the nozzle portion 40 where it is divided into a plurality of passages 92, as indicated in the dotted lines of Figure 2. The nozzle portion 40, as disclosed herein, may be of the type described and illustrated in my preceding application, Serial No. 576,891, filed April 9, 1956, and entitled Filling Machine. In my aforementioned application a filling head having a liquid flow nozzle which divides the liquid passage into a plurality of passages is described in detail.

The liquid disk valve 60 of the present invention provides for a maximum outlet volume of liquid at a minimum rate of flow by utilizing as much available space as possible for the liquid passages therethrough so that the velocity of liquid flowing through the filling head does not have to be extremely fast. Carbohydrates liquid cannot be flowed into containers at a high rate of flow as the liquids will foam because of the release of the dissolved gases. The filling head 10 utilizing the disk valve 60 permits increased speed in filling a container without the danger of foaming as the liquid is still flowed relatively slow into the container. As best shown in Figures 11, 12 and 13, liquid disk valve 60 is provided with a pair of spaced inlet ports 94 and 96 respectively. The ports 94 and 96 are spaced apart a distance equal to the spacing between the ports 83 and 86 in the body 38 and are adapted to be aligned with these ports during the filling stage of the cycle of operation. Ports 94 and 96 are connected to individual liquid passages 98 and 100 respectively, the passages 98 and 100 extending through the disk valve 60 on opposite sides of its axis of rotation and then converging into a single passageway 102 which opens in an outlet port as indicated at 104. A port 104 and passageway 102 have a diameter substantially equal to the diameter of the port 90 and passageway 98 with which they align during the filling stage.

When the disk valve 60 has its ports aligned with the ports in body 38, liquid can flow through the body where it is divided into two streams and then through the disk valve in two streams where it is then combined into a single stream and flows to the recess 54 and 56 where it may be again divided into a plurality of streams for delivery to the container C. By providing the passage arrangement in disk valve 60, as just de-scribed, it will be noted that the maximum available area of the disk valve is used for the liquid flow and consequently more liquid can be flowed through the disk valve than in prior disk valves where both the gas and liquid passages were in the same disk valve.

Referring to Figures 7, 8 and 10, body 38 of filling head 10 is provided with an angled gas passage 106 which opens in a port 108 on the flanged portion 46 of the body 38 and in a port 110 in the recess 56. Port 108 of passage 106 is in alignment with a passage 112 in mounting plate 50. Passage 112 in mounting plate 50 is connected to the gas containing portion of reservoir 22 by a tube (not shown) in a similar manner to that disclosed in the aforementioned Stewart and Gladdie patent. Body 38 has a second gas passage 114 which opens to the recess 56 in the port 116. The other end of gas passage 114 communicates with a gas passage 118 in the nozzle portion 40 of the filling head, as shown in Figure 1.

Disk valve 66 is provided with a pair of gas passages 120 and 122 respectively, as shown in Figure 16. The gas passage 120 is provided with ports 124 and 126, where-as the gas passage 122 is provided with ports 128 and 130. As will be explained later in the specification, the ports of gas passages 120 and 122 will be aligned with gas passages in the body 38 during various stages of the filling cycle for either supplying counterpressure to the container or venting gas from the container during the liquid fill stage.

Body element 38 of filling head 10 is provided with a bore 132 therethrough, the bore being on the aligned axes of the recesses 54 and 56. A tubular sleeve or bear-ing 134 is carried in the bore 132. Disk valve 60 is provided with a bore 136 therethrough and disk valve 66 is also provided with a bore 138 therethrough. Each of the disk valves 60 and 66 are adapted to rotate on the bearing or tubular sleeve 34, as shown in Figure 2.

A shaft 140, having a shank portion 142 or lug 144 on one end thereof is adapted to fit through the tubular bearing 132 from the gas disk valve end and extend out from the liquid disk valve, as shown in Figure 2. Gas disk valve 66 is provided with a slotted collar 146 which receives the key or lug 144. A portion of shaft 140 which extends out of the liquid disk valve 60 is squared, as indicated at 148 in Figures 17, 18 and 19 and is adapted to receive the valve-operating arm 30. Valve-operating arm 30 is provided with a complementary square slot therethrough so that when it is slipped onto the squared portion 148 of shaft 142 it will be in effect keyed to shaft 142. The outer side of liquid disk valve 60 is provided with a slotted collar 150 which is adapted to receive lugs or keys 152 formed on the valve-operating arm 30 to thereby key the valve-operating arm to liquid disk valve 60 so that when the arm is rotated, it will rotate disk valve 60 and through the shaft 140 on which it is also keyed will rotate the gas disk valve 66.

Even pressure is applied to the valve seats of liquid disk valve 69 and gas disk valve 66 by a spring 154 act-ing against the end of valve-operating arm 130 and against a nut 156 threaded onto the threaded end 158 of shaft 140. It is now evident that the tighter the nut 156 is screwed onto the shaft 140, the pressure of each disk valve 60 and 66 against the seat face of the recesses 54 and 56 respectively will be equal as the key 144 on shaft 140 bears against disk valve 66 whereas the operating arm 30 bears against disk valve 60. On the other hand, when gas pressure acts against the disk valve 66, tending to separate it from its valve seat, the liquid disk
valve 60 will fit tighter on its seat with no chance of leaking, as any outward pressure against the key or lug 144 will tend to cause the shaft 140 and the disk valve 60 to be moved toward the right as viewed in Figure 2.

Reffing to Figures 2, 8 and 9 it will be noted that the liquid passage 72 in the filling head body 38 is enlarged where it enters the filling head. Mounted within the enlarged portion of the liquid passage 72 is a ball check valve 160 which normally rests in the full line position as shown in Figures 2 and 9. A pin 162 welded into the body 38, as indicated at 164, prevents the ball 160 from falling out of the filling head when the filling head is removed from the filling machine. A valve seat 166 provided in the passage 72 is adapted to receive the ball check valve 160 when an abnormal liquid flow condition occurs. Such an abnormal liquid flow condition could occur when a container is improperly sealed against the nozzle portion 40 of filling head 10 or when a container breaks. Under such conditions, when filling valve of filling head 10 is in the liquid filling stage there will be no counterpressure in the container and the flow of liquid through the filling head will be increased to such an extent as to pick up the ball 160 and seat it on the valve seat 166. This prevents further flow of liquid into the container. When the liquid disk valve is moved to the shut-off position, the ball would ordinarily remain in its set position on the valve seat 166, as there would be a vacuum lock caused by the liquid flow passage 72 being closed off at the liquid disk valve 60. The valve seat 166 is provided with a notch 168 so that when the ball 160 is in its set position as shown in the dotted lines of Figure 9, there will be a restricted passage 170 past the ball. By providing the restricted passage 170 when the ball 160 is seated against the valve seat 166, the ball 160 will be able to return to its full line position when the liquid disk valve is moved to the closed position, as there is no chance of a vacuum lock in front of the ball.

In the operation of the filling head of the present invention, the various stages of filling a container by a filling machine incorporating the filling head will be discussed in detail under the headings “Closed or Neutral Stage,” “Counterpressure Stage,” “Filling and Vent Stage” and “Blow-Out Stage.”

Closed or Neutral Stage

When an empty container C is first placed on the platform 20 of filling machine 12, the valve-operating arm 30 will be in the position shown in Figure 1. The ports 98 and 100 of the nozzle portion 40 of filling head 10 will be in communication with the passage 120 in the gas disk valve 66, as shown in dotted lines of Figure 1. Referring to Figure 3 which discloses a fragmentary sectional view of the filling head, the liquid disk valve 60 is superimposed on the gas disk valve 66. Only the gas passages of the gas disk valve 66 are shown and these are in dotted lines. In the shut-off or closed stage, the liquid passages 98 and 100 and their ports 94 and 96 respectively, will not bridge the ports 86 and 83 of body 38. Likewise, the outlet port 102 of disk valve 60 does not bridge the port 90 in body 38.

Gas disk valve 66 will have the ports of its gas passages 120 and 122 in such a position that they also are not in communication with the gas valve body 38. Under these conditions there will be no flow of gas to or from the container or will there be any flow of liquid to the container.

Counterpressure stage

After container C has been placed on container supporting platform 20, the platform is raised so that the container lip engages and seals with the gasket 44 of the nozzle portion 40 of filling head 10. The rotary filling table 16, as well as the superstructure 18 will have traveled to a position where the trip 52 engages the lower arm 33 of the valve-operating arm 30 in the dotted line position A of Figure 1. Movement of the valve-operating arm 30 to the counterpressure position, as shown in Figure 4, aligns the ports 124 and 126 of passage 120, the gas disk valve 66 with the ports 110 and 112 respectively of body element 38. The gas in the gas containing portion of reservoir 22 can now flow through the passages 112, 106, 120, 114 and 118 into the container. After the proper counterpressure has been established in container C valve-operating arm 30 will be moved to the liquid passing-through position shown in Figure 2 and the gas and the gas containing portion of reservoir 22. During the counterpressure stage, the rotating filling table 16 and the superstructure 18 are moving about the vertical axis of the filling machine to a position where the valve-operating arm 30 strikes the filling and venting trip 34. The path of travel of the filling head 10 and the container between the position where the valve-operating arm has engaged the counterpressure trip 32 to the position where it engages the filling and venting trip 34 is of such a length that counterpressure can be established in the container to a desired amount which may be substantially the same pressure as the gas within the reservoir or a pressure slightly less than the pressure of the gas within the reservoir.

During the counterpressure stage, the liquid passages in disk valve 60 are not aligned with the liquid passages in the body 38 nor is the gas passage 122 of gas disk valve 66 aligned with gas passages in the body 38.

Filling and Vent Stage

Engagement of the lower slider of valve-operating arm 30 with the fixed trip 34 will move disk valves 60 and 66 to the filling and vent position, as shown in Figure 5. The disk valve 66 does not appear in Figure 5 as it is positioned behind the disk valve 60 just as in Figures 3 and 4. However, the gas passages of disk valve 66 are imposed on the figure in their relative position to the liquid passages of disk valve 66.

During the filling and vent stage the ports 94 and 96 of disk valve 60 align with the ports 86 and 83 respectively of body 38, whereas the port 102 of disk valve 60 aligns with the port 90 in body 38. Liquid can now flow into the container C from reservoir 22 through the conduit or pipe 78, and passageway 72, where it is divided into two streams that flow through the disk valve in the passageways 98 and 100. The two streams of liquid flowing through the disk valve on opposite sides of the axis of rotation of the disk valve converge in a single stream and flow back through body 38 in the passageways 102 and 88. The stream of liquid flowing through valve 60 may again be divided into a plurality of streams flowing through the individual conduits 92 into the container C, as described in my aforementioned United States application, Serial No. 576,891.

Simultaneously with the alignment of the liquid ports to cause liquid flow into the container, the gas disk valve 66 has moved to a position where its passage 121 has its ports 123 and 130 aligned respectively with the ports 110 and 116 in body 38. The counterpressure gas established within container C can now be vented from the container through the passages 118, 114, 122, 106 and 112 back to the gas containing portion of reservoir 22. Of course, it is within the scope of the present invention that the gas may be vented to atmosphere or to a reservoir other than the liquid gas reservoir 22, as disclosed in my aforementioned application, Serial No. 576,891.

A float valve 200, provided in the lower end of the gas passage 118 of nozzle portion 40 of filling head 10, is adapted to be closed by a rise in liquid level in the container C. The float valve 200 closes the vent passage in the filling head after liquid in the container has risen to a predetermined height, and thereby stops further flow of liquid into the container.

After the container has been filled to a predetermined level, as determined by the float valve 200, the upper arm of valve-operating arm 30 strikes the fixed trip 36 which moves disk valves 60 and 66 simultaneously back.
to the shut-off position, as disclosed in Figure 3. The container may now be lowered away from the filling head and removed from the rotating filling table 18 for transfer to suitable closing mechanism (not shown).

Blow-out stage

After the container C has been lowered from the filling head 10 and removed from the container supporting platform 20, the valve-operating arm 30 is momentarily operated in a clockwise direction by a fixed trip (not shown) to align the gas passage 120 of gas disk valve 66 with the ports 110 and 116 in body 38. The gas pressure from the body of gas above the liquid in reservoir 22 will then cause the passages 114 and 118 to be blown out thereby eliminating any foam or liquid which may get into the passages during the filling stage. During the blow-out stage the passages in the gas disk valve 66 are aligned identical with the flow passages used during counterpressure, as illustrated in Figure 4. The blow-out stage is very brief and is terminated as soon as the filling head moves past a second closing trip (not shown) which causes the flow passages in the disk valves 60 and 66 to close, as previously described under the section "Closed or Neutral Stage."

The filling head 10 of the present invention, utilizing separate valve disks 60 and 66, for liquid and gas flow respectively, provides a filling head that is substantially free of liquid leaks as there is no gas pressure acting on the liquid disk valve at any time during its operation. Further, the gas pressure acting on the gas disk valve has a tendency to make the liquid disk valve seat tighter on its valve seat in the body 38 of filling head 10. Utilizing a separate disk valve for liquid flow also enables a container to be filled faster without the increased velocity of liquid flow through the filling head. Bigger liquid passages may be used in the filling head body and, the disk valve may utilize its entire space for just liquid flow passages.

It will be perceived that the structure and the operation described above attains all of the objects and advantages stated heretofore in the specification.

The terminology used in this specification is for the purpose of description and not limitation, the scope of the invention being defined in the claims.

1. A filling head for carbonated liquids, a body element adapted to be secured to a reservoir for a body of the liquid and a superposed body of gas, said body element being provided with a first valve seat face and a second valve seat face, a shaft extending through said body element, a disk valve carried by said shaft and rotatable on said first seat face, a second disk valve carried by said shaft and rotatable on said second seat face, said body element including a first liquid flow passage open to the reservoir and to said first seat face and a second liquid flow passage open to said seat face and a container in sealing engagement with the filling head, said body element including a gas flow passage open to the reservoir and said second seat face and a second gas flow passage open to said second seat face and a container in sealing engagement with the filling head, said body element including a liquid flow passage in said body element, said second disk valve having at least one passage therein adapted to be aligned with the liquid flow passages in said body element, said second disk valve having at least one passage therein adapted to be aligned with the gas passages of said body element, and means to operate said first and second disk valves in stages to control the flow of liquid and gas respectively in said body element.

2. In a filling head for carbonated liquids, a body element adapted to be secured to a reservoir for a body of the liquid and superposed body of gas, said body element including a first planar seat face and a second planar seat face and a nozzle portion for sealing engagement with a container, said first and second seat faces of said body element being oppositely disposed from each other, a shaft extending through the body element on the axis of said first and second seat faces, a first disk valve cooperating with said first seat face and carried on said shaft for rotation therewith, a second disk valve cooperating with said second seat face and carried on said shaft for rotation therewith, said body element including a first liquid flow passage open to said seat face and to the liquid of said reservoir and a second liquid passage open to said seat face and to a container in engagement with the nozzle portion of said body element, said first disk valve including a liquid passageway adapted to place said first liquid passage in said body element in communication with said second liquid passage in said body element, said liquid passageway in said first disk valve being bifurcated so that a portion extends through said first disk valve on one side of said shaft and another portion extends through said first disk valve on the other side of said shaft, said body element including a first gas flow passage open to said second seat face and to the body of gas in said reservoir and a second gas flow passage open to said second seat face and a container in sealing engagement with the nozzle portion of said filling head, said second disk valve having a passage therein adapted to place said first gas passage in said body element in communication with said second gas passage in said body element, and means to cause rotation of said shaft and said first and second disk valve elements, said means including a valve operating arm carried on said shaft and keyed to one of said first and second disk valves.

3. In combination with a rotary filling machine, a filling head for carbonated liquids, a body element adapted to be secured to a reservoir for a body of the liquid and a superposed body of gas, said body element being provided with a gas passage adapted to open to the body of gas in the reservoir and a container in sealing engagement with the filling head, a valve mechanism carried by said body element intermediate the length of said gas passage for opening and closing the same, said body element having a planar seat face, a disk valve rotatable on said seat face, said body element including a first liquid flow passageway open to the reservoir and branch- ing into at least two liquid flow passages opening to said seat face and a second liquid flow passageway opening to said seat face and to a container in sealing engagement with the filling head, said disk valve having a liquid flow passageway therein including a plurality of liquid passages each being adapted to communicate with one of the branching liquid flow passages of said first liquid flow passage, said plurality of liquid passages of said liquid passageway extending through said first disk valve on opposite sides of its axis of rotation and converging into a single liquid passage adapted to communicate with the opening of said second liquid flow passage to thereby permit flow of liquid to the container, and means to operate said disk valve and said valve mechanism in stages to control the flow of liquid and gas through the liquid and gas passageways respectively of said body.

4. A filling head of the character described in claim 3, wherein said last mentioned means interconnects said disk valve with said valve mechanism.

5. A filling head of the character described in claim 3, wherein said valve mechanism includes a disk valve cooperating with a valve seat on said body element, said disk valve having at least one passage therein for placing the gas containing portion of the reservoir in communication with the container in sealing engagement with the filling head.

6. In combination with a rotary filling machine, a filling head for carbonated liquids, a body element adapted to be secured to a reservoir for a body of the
liquid and a superposed body of gas, said body element being provided with a gas passage therethrough adapted to open to the body of gas in the reservoir and a container in sealing engagement with the filling head, a valve mechanism carried by said body element intermediate the length of said gas passage for opening and closing the same, said body element having a planar seat face, a disk valve rotatable on said seat face, said body element including a first liquid flow passageway opened to the reservoir and diverging into at least two liquid flow passages opening in ports on said seat face and a second liquid flow passageway opening in a port on said seat face and into a container in sealing engagement with the filling head, said disk valve having a liquid flow passageway therein, the liquid flow passageway in said disk valve including at least two liquid flow passages opening in ports and adapted to be aligned with the ports of the two liquid passages of said first passageway, said two liquid passages in said disk extending through said disk valve on opposite sides of the axis of rotation of said disk valve and then converging into a single liquid passage opening in a port adapted to be aligned with the port in said seat face of said second liquid flow passage, and means to operate said disk valve and said valve mechanism in stages to control the flow of liquid and gas through the liquid and gas passageways of said body element.

7. A filling head of the character described in claim 6, wherein the liquid flow passageway open to said reservoir has a diameter greater than a diameter of either of the liquid flow passages in which it diverges.

8. A filling head of the character described in claim 7, wherein the ports of the liquid passages in said disk valve which cooperate with the ports of said first liquid passageway which are in the seat face have a diameter equal to the diameter of the ports of said first passageway, and wherein the port of the liquid passageway of said disk valve which cooperates with the port of said second liquid passageway has a diameter greater than the diameter of either of the first mentioned ports in said disk valve.

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