United States Patent [19]

Matejek

[11] **3,830,265**

[45] **Aug. 20, 1974**

[54] **METHOD AND APPARATUS FOR FILLING A CONTAINER**

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[73] Assignee: **American Can Company**, Greenwich, Conn.

[22] Filed: **Aug. 14, 1972**

[21] Appl. No.: **280,225**

[52] **U.S. Cl.** **141/6**, 137/170.1, 141/39, 141/48, 141/302, 141/374

[51] **Int. Cl.** **B65b 3/18**

[58] **Field of Search** 141/6, 4, 5, 7, 37, 39–43, 141/44–61, 89–92, 99, 198, 199, 302, 140, 250, 324; 137/170.1

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Primary Examiner—Houston S. Bell, Jr.

Attorney, Agent, or Firm—Robert P. Auber; Joseph J. Orlando; George P. Ziehmer

[57] **ABSTRACT**

A method and apparatus for filling a container with liquid whereby the container to be filled is purged of air, sealed and then pressurized with a counterpressure gas. A plunger containing filling liquid is introduced into the container and the liquid transferred from the plunger to the container by means of a valve in the plunger operable subsequent to the pressurization of the container.

17 Claims, 14 Drawing Figures

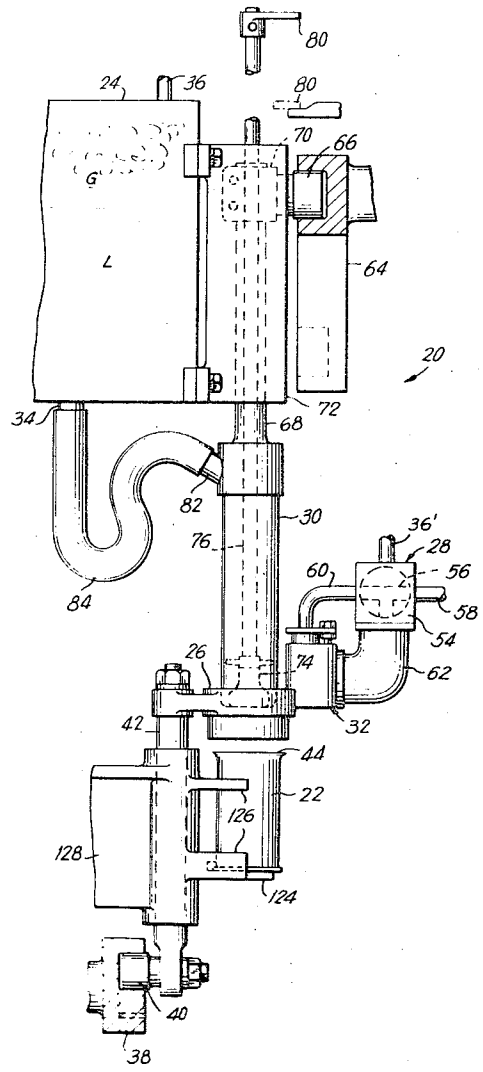

FIG. 1

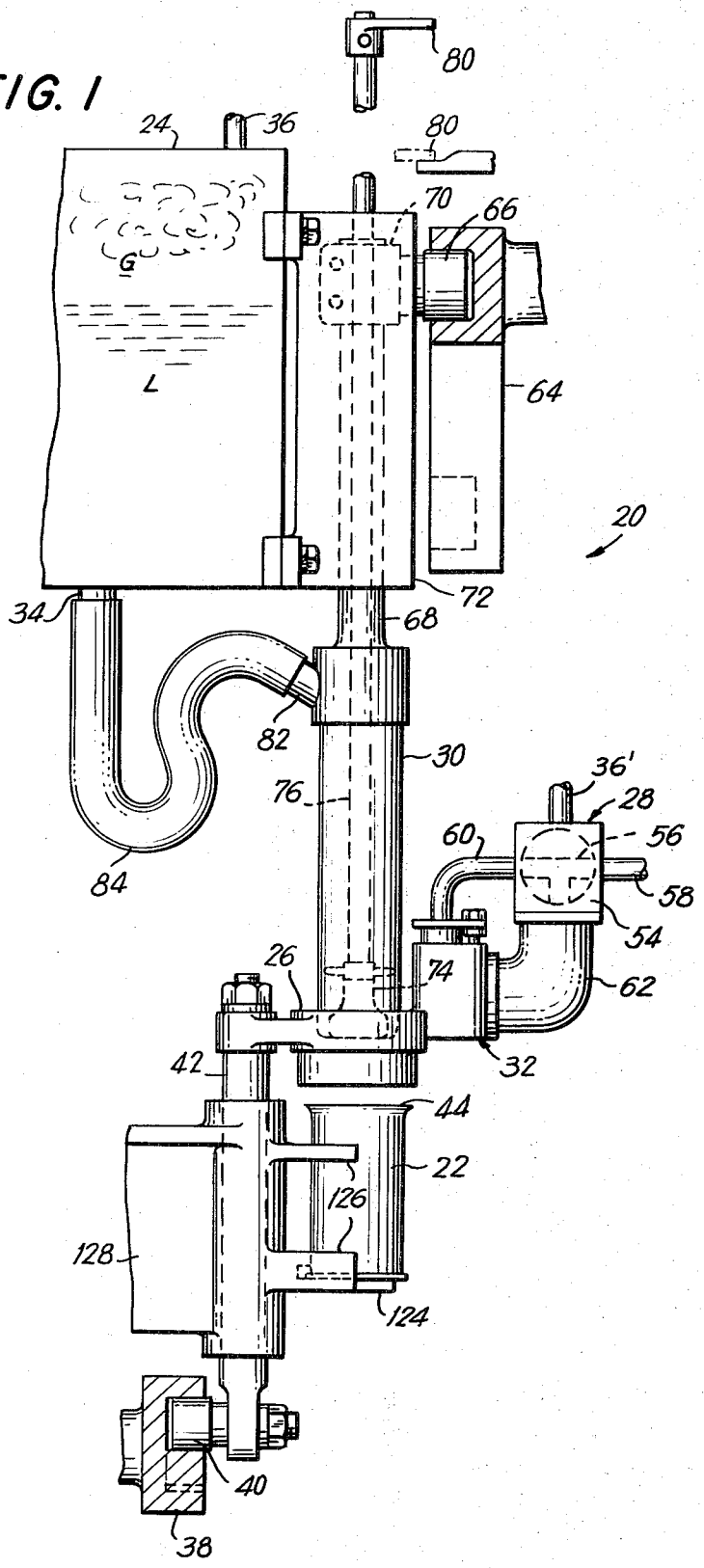
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FIG. 4

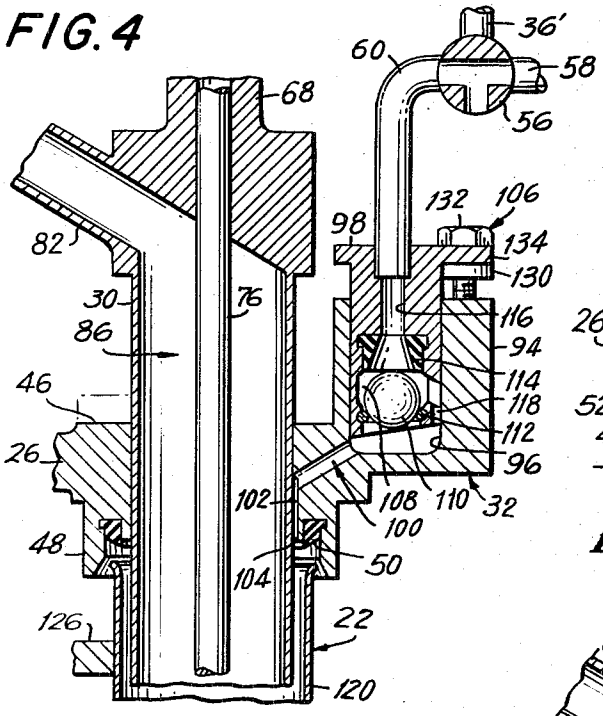


FIG. 2

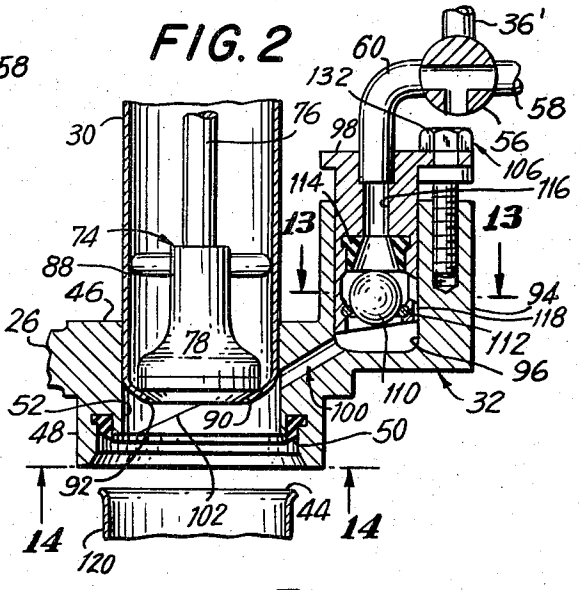


FIG. 3

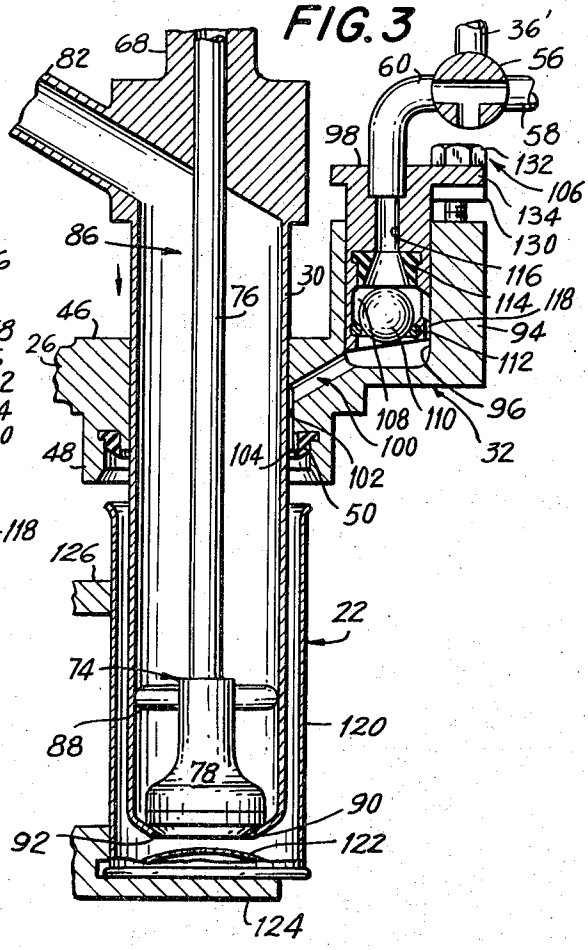


FIG. 5

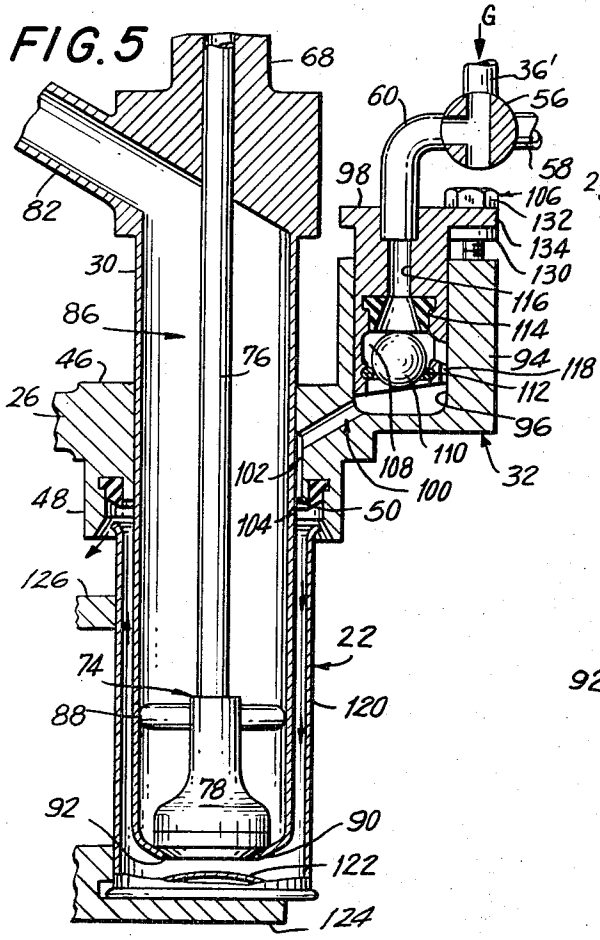


FIG. 6

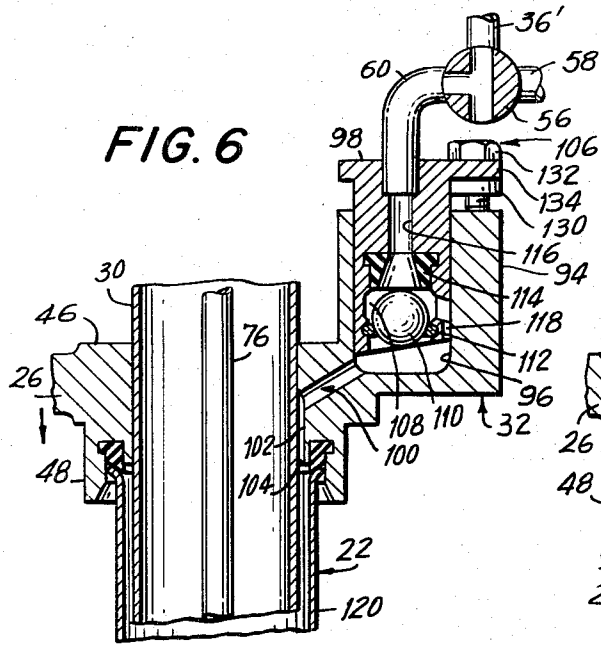


FIG. 9

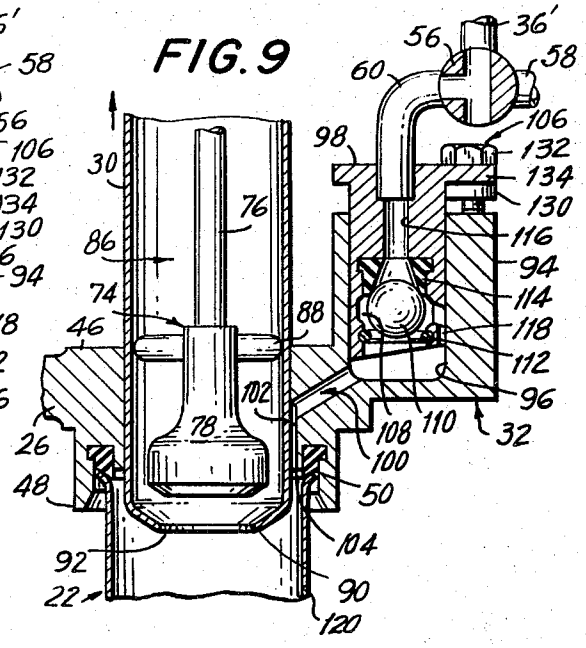


FIG. 7

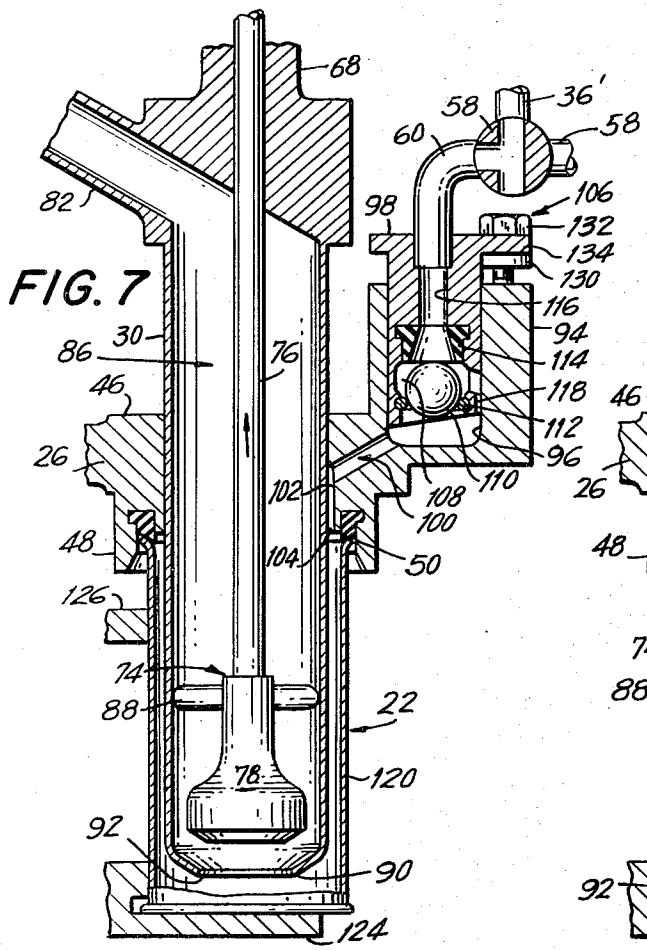


FIG. 8

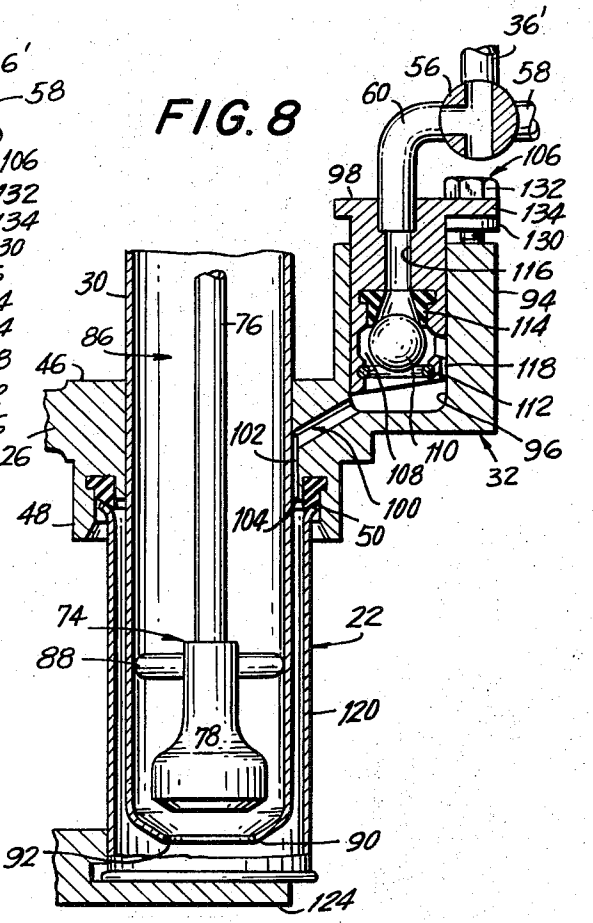


FIG. 10

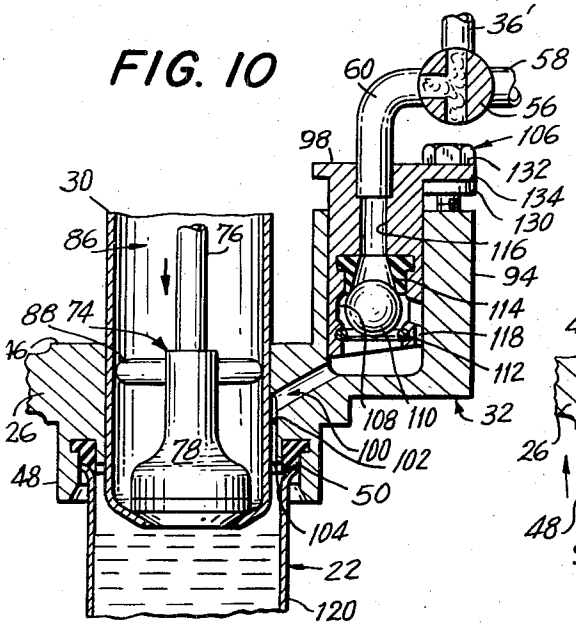


FIG. 12

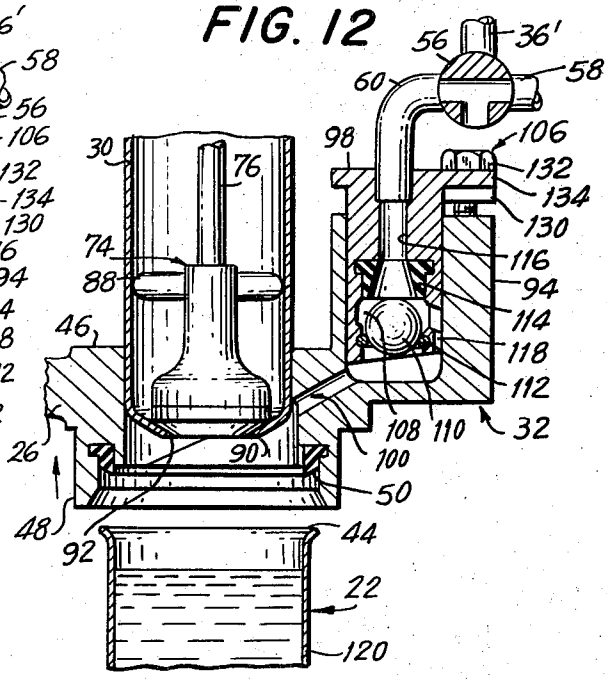


FIG. 11

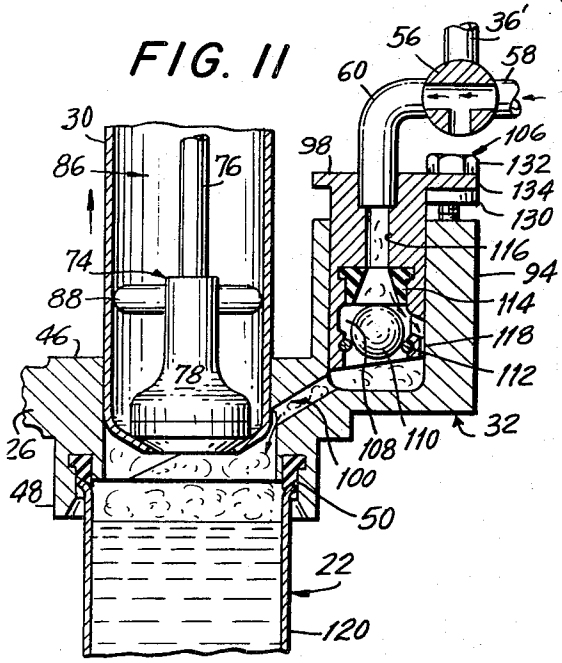
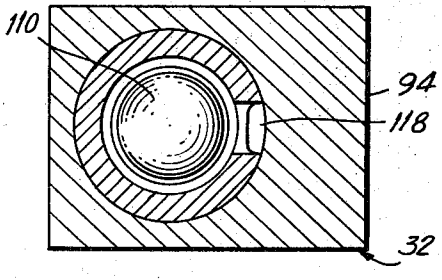


FIG. 13



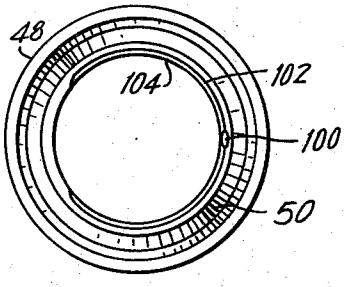


FIG. 14

METHOD AND APPARATUS FOR FILLING A CONTAINER

The present invention relates generally to a method and apparatus for filling containers with gas containing liquids such as beer and other carbonated beverages. More particularly, the present invention relates to a method and apparatus which more quickly and efficiently fills containers with gas containing liquids.

The high speed production techniques of modern industry require that filling machines which fill containers with gas containing liquids operate both speedily and efficiently to fill the greatest number of containers with a minimum of spillage. One of the major problems encountered in utilizing such high speed filling machines is foaming of the gas containing liquid during the filling operation which interferes with the operation and results in partially filled containers. Thus, a principal objective of such machines is to fill containers quickly and efficiently without causing excessive foaming of the liquid. Such filling machines generally utilize a plurality of filling heads such as described in U.S. Pat. No. 3,067,785, to Meyer, granted Dec. 11, 1962. Filling heads according to the Meyer patent are at the present time widely used in the beer industry. The patent describes a container filling head extending downwardly from the bottom of a reservoir containing liquid and a counterpressure gas, the filling head having a centrally disposed vertically movable valve stem with a gas passage extending longitudinally therethrough, a gas control valve at the upper end of the gas passage for admitting counterpressure gas into the stem passageway from the reservoir, a plurality of nozzles annularly positioned to spirally and downwardly direct the liquid along the side wall of the container, an annular poppet valve vertically movable with the stem to transfer the liquid from the reservoir to the nozzles, an annular sealing means for sealing the open end of the container from the atmosphere, and an air check valve located below the valve stem to check the flow of gas from the container when the liquid therein reaches a predetermined level. In the operation of the filling valve according to the Meyer patent the empty container is brought vertically into sealing engagement with the sealing means of the filling head and then counterpressure gas, which is confined immediately adjacent and above the liquid in the reservoir, is admitted into the container by means of the gas control valve and gas passage to pressurize the container. Next, the liquid poppet valve is opened by means of the pressure in the container in cooperation with a resilient means, i.e., a spring, to introduce liquid at the same pressure as the counterpressure gas from the reservoir to the nozzles which are annularly positioned near the open end of the container. The nozzles direct the liquid spirally downward along the side wall of the container, thus minimizing foaming of the liquid, until the container is substantially filled and the liquid level activates the check valve to check the flow of counterpressure gas and air from the container back to the reservoir. The gas containing head space which remains is then snifted, i.e., the pressure within the head space equalized with atmospheric, by means of a snifting valve which opens a conduit connecting the container head space with the atmosphere thereby venting the pressurized gas in the head space and relieving the head space pressure. The filled container is then vertically lowered from the filling head and removed from the filling machine to be closed by a subsequent operation. As is evident from the foregoing description of the Meyer apparatus and its operation there are a multitude of stages in the container filling operation all of which are necessary to the proper operation of the apparatus and many of which are duplicated by other similar type devices. Obviously, each one of the separate stages performed by the Meyer apparatus and method as well as other similar devices is, to some extent at least, time consuming. In addition, in the operation of the Meyer apparatus, as well as many other similar devices currently in use, the container is physically moved into position for filling and after the operation it is physically removed. This movement of the filled container away from the filling apparatus substantially increases the possibility of spillage. Other disadvantages of the Meyer apparatus are contamination of the counterpressure gas with air and residual pressurized gas in the head space of the filled containers.

In order to increase the speed with which containers are filled with gas containing liquids it is necessary, utilizing the prior art devices, to increase the number of filling heads which are utilized with a filling machine since until now it had not been possible to eliminate in whole or in part any of the various stages of the filling operation. Thus, in order to obtain a high output of filled containers by increasing the number of filling heads it has heretofore been necessary to increase the size of the filling machine thereby increasing both the spacial requirements and cost of the machine.

It is, therefore, a primary object of the present invention to provide a method and apparatus for filling containers with a gas containing liquid which operates with increased speed and greater efficiency than similar devices heretofore known in the art thereby keeping to a minimum the spacial requirements and costs of filling machines utilizing the apparatus.

The above object, as well as others which will hereinafter become apparent, is accomplished according to the present invention by providing a method and apparatus by which the container to be filled is first purged of air, then sealed and pressurized with a counterpressure gas at a pressure greater than atmospheric. Next, the filling liquid, at the same pressure as the counterpressure gas, is introduced into the container to completely displace the counterpressure gas from the container and fill the container. Briefly, the apparatus of the present invention comprises a source of counterpressure gas at a pressure greater than atmospheric, a conduit for directing the counterpressure gas from the source to the open end of the container to be filled, means for sealing the open end of the container from atmosphere, gas control valve means operable prior to the sealing of the open end of the container for introducing the counterpressure gas into the container to purge the air therefrom and to pressurize the container subsequent to the sealing of the open end of the container, a plunger reciprocally movable into the container and containing a filling liquid at the same pressure as the counterpressure gas, valve means in the plunger operable subsequent to the pressurizing of the container for transferring by means of gravity an initial portion of the liquid contained in the plunger to the container to completely displace the counterpressure gas contained in the unoccupied space of the container and for filling the container with the liquid as the

plunger is withdrawn toward the open end of the container, and means for checking the flow of liquid from the container when the counterpressure gas therein is completely displaced. The method by which the apparatus according to the present invention performs the operation of filling a container comprises purging the air contained in the container, sealing the open end of the container, introducing a plunger containing pressurized liquid into the container through the open end thereof, pressurizing the container having the plunger therein with a counterpressure gas at the same pressure as the liquid and greater than atmospheric, completely displacing the counterpressure gas contained in the container by transferring by means of gravity a first portion of the liquid in the plunger to the container, checking the flow of liquid from the container after the counterpressure gas therein has been completely displaced, and filling the container with liquid from the plunger by withdrawing the plunger toward the open end of the container.

The present invention will be described and understood more readily when considered together with the embodiment shown in the accompanying drawings, in which:

FIG. 1 is a side elevational view of the apparatus for filling a container according to the present invention showing the container in position for filling;

FIGS. 2-12 are enlarged vertical cross-sectional views of portions of the apparatus and container of FIG. 1 showing the various stages of the filling operation;

FIG. 13 is a cross-sectional view of a portion of the apparatus taken along line 13—13 of FIG. 2; and

FIG. 14 is a cross-sectional view of a portion of the apparatus taken along line 14—14 of FIG. 2.

Referring now to the drawings, there is shown in FIG. 1 a filling apparatus according to the present invention, generally designated 20, for filling a container such as can 22. The filling apparatus 20 basically comprises a filling tank or reservoir 24, a sealing head 26, a gas control valve 28, and a plunger 30. Filling tank 24 is adapted to contain a gas containing filling liquid, designated L, and a gas under pressure, designated G, which may serve as the counterpressure gas for the filling operation. The pressurized gas G contained in tank 24 is the same gas as the gas contained in liquid L and serves to maintain the gas in solution in liquid L. The gas containing liquid L may be a carbonated beverage such as beer or soda, in which case the gas G would be carbon-dioxide. Filling tank 24 is provided with a liquid outlet, generally designated 34, and a gas conduit, generally designated 36.

Sealing head 26 is reciprocally movable by means of cam 38 and roller 40 to sealingly engage the open end, generally designated 44, of container 22. As clearly seen in FIGS. 2 through 12, sealing head 26 comprises a body portion 46, a container centering sleeve 48, a sealing ring 50, and a centrally located passage 52 passing through body portion 46.

Gas control valve 28 comprises a valve body 54 housing a three-way valve, generally designated 56, and has connected thereto conduits 58, 60 and 36'. Conduit 60 joins gas control valve 28 with check valve 32 and conduit 58 connects gas control valve 28 to the atmosphere. Conduit 36' joins gas control valve 28 with the pressurized gas G contained in filling tank 24 via gas conduit 36. Three-way valve 56 has two positions, the first position provides a direct communication between conduits 58 and 60 and the second position provides a direct communication between conduits 36' and 60. Support means 62 is provided to support gas control valve 28 on sealing head 26.

Plunger 30, which is adapted to be reciprocally movable into container 22, is actuated by a cam and roller, respectively designated 64 and 66 in FIG. 1. Roller 66 is fastened to the upper portion 68 of plunger 30 by means of attaching bracket 70. A mounting bracket, generally designated 72, slideably supports the upper portion 68 of plunger 30 on filling tank 24. Slideably mounted within plunger 30 is a stem valve, generally designated 74, having a stem portion 76, longitudinally extending through plunger 30 and the upper portion 68 of plunger 30, and a valve portion 78 positioned at the lower extremity of plunger 30. Stem valve 74 is actuated independently of plunger 30 by a cam and roller (not shown) at the upper portion of stem 76 which moves arm 80 of stem 76, relatively to plunger 30, between the positions shown in phantom and in solid lines in FIG. 1. As most clearly seen in FIG. 1, plunger 30 is provided with a liquid inlet, generally designated 82, which is connected with the liquid outlet 34 of filling tank 24 by means of flexible conduit 84. As clearly seen in FIGS. 2, 3, 4, 5, and 7, liquid inlet 82 communicates with a liquid chamber, generally designated 86, within plunger 30. Valve portion 78 is provided with a centralizing hub, generally designated 88, and is normally positioned on valve seat 90 of liquid opening 92 at the lower extremity of plunger 30.

Check valve 32, as clearly seen in FIGS. 2 to 12, comprises a valve housing, generally designated 94, having a chamber 96 therein for slideably accepting a valve plunger generally designated 98. Valve housing 94 is attached to sealing head 26 wherein a channel, generally designated 100, provides communication between the lower portion of chamber 96 and passage 52 of sealing head 26. Channel 100 opens into passage 52 at an enlarged portion, generally designated 102, of the passage. Enlarged portion 102 may extend entirely around passage 52 but preferably it extends about a major portion of the passage, as clearly seen in FIGS. 1, 12 and 14, and defines a space, generally designated 104 in FIG. 14, opening towards the open end 44 of container 22 between plunger 30 and passage 52 of sealing head 26. Plunger 98, which is slideably movable within chamber 96 by means of adjusting bolt 106, is provided with a float chamber, generally designated 108, housing a float ball 110 which is retained in chamber 108 by O-ring 112 and rubber seat 114. Communication between conduit 60 and float chamber 108 is provided by means of passage 116 which passes through the body of plunger 98 and opens into seat 114. A bypass channel, generally designated 118 and clearly seen in FIGS. 2 through 13, provides a passageway from the bottom of chamber 96 into float chamber 108, when float ball 110 is seated on O-ring 112.

Container 22, in addition to having an open end 44 also includes a side wall, designated 120, and a bottom wall, designated 122. As clearly seen in FIG. 1, container 22 is supported by support plate 124 and arms 126 which extend from the main frame 128 of a rotary filling machine (not shown).

FIGS. 2 through 12 depict the various stages of operation of the filling apparatus described above. FIG. 2 depicts the initial or starting position of the apparatus

where the container 22 is positioned for the filling operation. As can be seen from the drawing, valve portion 78 of stem valve 74 is seated on seat 90 and three-way valve 56 is in its initial or first position connecting conduits 58 and 60 thereby providing communication between check valve 32 and the atmosphere. Chamber 86 of plunger 30 is filled with liquid from filling tank 24 which enters chamber 86 through flexible conduit 84 and liquid inlet 82.

In the first step of the operation, which is depicted in FIG. 3, plunger 30 is moved in the direction of the arrow by means of cam and roller 64 and 66 into container 22 through the open end 44 of the container. Plunger 30 is extended to within a short distance of the bottom wall 122 of container 22. The remaining parts of the apparatus are stationary during this first step. Next the sealing head 26 is moved by means of cam and roller 38 and 40 from the position shown in phantom to the position shown in solid lines in FIG. 4. The container 22 is aligned with the apparatus by means of centering sleeve 48 contacting the open end 44 of the container to thereby center the container. In this position the sealing ring 50 is vertically spaced from the rim of opening 44. The remaining parts of the apparatus remain stationary during this second step of the operation. In the next step, three-way valve 56 is positioned so that conduits 36′ and 60 are aligned as seen in FIG. 5. The pressurized gas G, contained in filling tank 24, is thus permitted to pass through conduits 36, 36′ and 60 and past ball valve 110 via bypass channel 118 and into channel 100. The pressurized gas G then enters enlarged portion 102 of passage 52 and is directed downwardly through space 104 into container 22. The counterpressure gas G which enters container 22 purges the air therefrom as indicated by the arrows in FIG. 5. At this point it should be noted that since plunger 30 is already positioned within container 22 a relatively small volume of air need be purged from the container since plunger 30 preferably occupies a large volume of the container. Next, sealing head 26 is brought into sealing engagement with the open end 44 of container 22 by means of the continued actuation thereof by cam and roller 38 and 40. As can be seen in FIG. 6, sealing head 26 is moved downwardly in the direction of the arrow from the position of FIG. 5 so that sealing ring 50 sealingly engages the rim of the open end 44 of container 22. With the container thus sealed, and three-way valve 56 still in its second position, counterpressure gas G continues to be introduced into container 22 until the pressure in the container equals the pressure of the gas G contained in filling tank 24. It should also be noted at this point that a relatively small amount of gas need be introduced into container 22 to pressurize it inasmuch as plunger 30 preferably occupies the major portion of the volume in container 22. In the embodiment of the invention depicted in the drawings, plunger 30 occupies approximately 75 percent of the volume of container 22.

In the next phase of the filling operation, depicted in FIG. 7, valve portion 78 of stem valve 74 is lifted off its seat 90 by the stem valve cam and roller (not shown) which vertically lifts arm 80 and stem 76, as clearly seen by the direction arrow. Since the interior of container 22 is at the same pressure as filling tank 24, the liquid contained in plunger 30 flows through liquid opening 92 of the plunger by means of gravity to fill the container around plunger 30. Simultaneously with this filling of the container around plunger 30, the liquid displaces the gas in the container which travels back to filling tank 24 through check valve 32 and gas control valve 28. The liquid continues rising in the container and check valve until the liquid closes the check valve by lifting float ball 110 off O-ring 112 to seat the ball against the rubber seat 114 as seen in FIG. 8. Thus, all the space below seat 114 is completely filled with liquid, the gas therein having been returned uncontaminated to filling tank 24.

With the stem valve 74 still in the open position, plunger 30 is withdrawn, as indicated by the direction arrow in FIG. 9, toward the open end 44 of container 22 by the action of cam 64 and roller 66. When the liquid opening 92 of plunger 30 reaches a position such that a pre-determined amount of liquid fills the container 22, plunger 30 is halted and stem valve 74 closed, as indicated by the arrow in FIG. 10. At this stage of the filling operation the amount of liquid desired to be finally contained in container 22 is held within container 22, enlarged portion 102, channel 100, chamber 96, and the portion of float chamber 108, below float ball 110.

In order to equalize the pressure within container 22 with atmospheric pressure to thereby avoid the creation of a vacuum when sealing head 26 is removed from sealing engagement with open end 44 of container 22, three-way valve 56 is moved to a position so that conduits 58 and 60 are in communication. Thus, as clearly seen in FIG. 11, as plunger 30 is withdrawn in the direction of the arrow, the liquid contained in the passages of the check valve 32 and sealing head 26 drains into container 22 and the container head space fills with atmospheric air. Finally, sealing head 26 is moved by means of cam 38 and roller 40 out of sealing engagement with and vertically away from open end 44 of container 22, as indicated by the direction arrow in FIG. 12. The filled container is now in condition to have an end closure seamed thereon by means of a closing machine which is no part of the present invention.

In order to allow for fine adjustment of the liquid level in the container a means is provided whereby the level of the liquid permitted in chamber 96 may be adjusted. Thus, plunger 98 of check valve 32 may be raised or lowered within chamber 96 by means of adjusting bolt 106 which is provided with a flange 130 spaced below head 132 of bolt 106 so as to receive shoulder 134 of plunger 98 therebetween. Thus, an upward force is exerted on shoulder 134 of plunger 98 by flange 130 when bolt 106 is raised thereby raising plunger 98. Raising plunger 98 increases the free volume within chamber 96 thereby increasing the amount of liquid which can be held in the chamber. To decrease the amount of liquid in the chamber bolt 106 may be lowered thereby lowering plunger 98 as desired.

It is to be understood that the foregoing general and detailed descriptions are explanatory of the present invention and are not to be interpreted as restrictive of the scope of the following claims.

What is claimed is:

1. An apparatus for filling a container having a bottom wall, a side wall, and an open end, said apparatus comprising:

a. a source of counterpressure gas at a pressure greater than atmospheric;

b. conduit means for directing said counterpressure gas from said source to the open end of said container;

c. sealing means for sealing the open end of said container from the atmosphere;

d. valve means operable prior to the sealing of said open end of said container for introducing said counterpressure gas into said open end of said container to purge the air from said container and to pressurize said container with counterpressure gas subsequent to the sealing of said open end;

e. plunger means being reciprocally moveable into said container through the open end of said container, said plunger means occupying the major portions of the interior volume of said container when moved therein and having a chamber for containing liquid, at the same pressure as said counterpressure gas said liquid to be transferred to said container;

f. valve means in said plunger operable when said plunger is positioned in said container and subsequent to the pressurizing of said container with counterpressure gas for transferring by means of gravity first an initial portion of the liquid contained in said plunger means to said container to completely displace the counterpressure gas contained in the unoccupied space of the container and for filling said container with liquid as said plunger means is withdrawn toward the open end of said container; and

g. means for checking the flow of liquid from said container when the gas therein is completely displaced.

2. The apparatus for filling a container as defined in claim 1 which further includes means for equalizing the pressure in the filled container with the atmosphere so that said plunger means may be withdrawn from the container and the seal broken without creating a vacuum in the container.

3. The apparatus for filling a container as defined in claim 2 wherein the means for equalizing the pressure within the filled container with the atmosphere and the valve means for introducing counterpressure gas into the container include a three way gas control valve having two positions, in the first position of said valve the gas conduit means is uninterrupted, in the second position of said valve the open end of said container communicates with the atmosphere.

4. The apparatus for filling a container as defined in claim 1 which further includes a source for said liquid and a liquid conduit means for directing said liquid from said source to said plunger means.

5. The apparatus for filling a container as defined in claim 4 wherein the liquid source and the counterpressure gas source are contained in a filling tank with the counterpressure gas filling the space in said tank above said liquid.

6. The apparatus for filling a container as defined in claim 1 wherein the liquid transferring valve means includes a valve at the lower most portion of said plunger means which is adjacent the bottom wall of said container when said plunger means is moved to the lowest position in said container.

7. The apparatus for filling a container as defined in claim 1 wherein the counterpressure gas which is displaced from said container by the transfer thereto of the initial portion of liquid contained in said plunger means is conducted back to said counterpressure gas source by means of said counterpressure gas conduit means.

8. The apparatus for filling a container as defined in claim 1 wherein the means for checking the flow of liquid from the container when the counterpressure gas therein is completely displaced includes a check valve in said counterpressure gas conduit means vertically spaced from the open end of said container, said check valve including a float ball adapted to be raised by the level of liquid in said conduit means between said check valve and the open end of said container to close said conduit means and isolate said counterpressure gas source from the filled container.

9. The apparatus for filling a container as defined in claim 1 wherein the means for checking the flow of liquid from said container when the counterpressure gas therein is completely displaced comprises an adjustable check valve vertically spaced from the open end of said container, said check valve including a housing, a first chamber within said housing, a channel connecting said first chamber and the open end of said container, a vertically movable valve plunger in said first chamber, a float chamber in said plunger communicating with said first chamber, a gas passage in said plunger connecting said float chamber with said counterpressure gas conduit means, a float ball in said float chamber adapted to be raised by the level of liquid to close said gas passage, and an adjusting means for vertically moving said plunger to thereby vary the free volume of said first chamber.

10. The apparatus for filling a container as defined in claim 1 wherein said sealing means includes a body portion having a centralizing sleeve for centering the container to be filled, a sealing ring in said body portion adapted for sealing engagement with the open end of said container, a centrally located passage through said body portion for said plunger means to enter said container through the open end thereof, an enlarged portion in said passage opening toward the open end of said container when said plunger means is in said container, a channel through said body portion connecting said counterpressure gas conduit means and said enlarged portion of said passage, and means for moving said body portion for sealing engagement of said sealing ring with the open end of said container.

11. An apparatus for filling a container having a bottom wall, a side wall, and an open end, said apparatus comprising:

a. a filling tank for containing liquid to be filled into the container and a counterpressure gas above said liquid, said counterpressure gas and said liquid being at a pressure greater than atmospheric;

b. a plunger adapted to occupy a major portion of the interior volume of said container and having a chamber therein, said plunger being reciprocally movable into said container through the open end thereof;

c. liquid conduit means connecting said filling tank with said plunger whereby liquid is transferred from said filling tank to the chamber of said plunger;

d. sealing means including a body portion having a centralizing sleeve for centering the container to be filled, a sealing ring in said body portion adapted for sealing engagement with the open end of said container, a centrally located passage through said

body portion for said plunger to enter said container through the open end thereof, an enlarged portion in said passage opening toward the open end of said container when said plunger is in said container, a channel through said body portion from said enlarged portion, and means for moving said body portion for sealing engagement of said sealing ring with the open end of said container;

e. an adjustable check valve vertically spaced from the open end of said container, said check valve including a housing, a first chamber within said housing communicating with the channel in the body portion of said sealing means, a vertically movable valve plunger in said first chamber, a float chamber in said valve plunger communicating with said first chamber, a gas passage in said valve plunger communicating with said float chamber, a float ball in said float chamber adapted to be raised by the level of liquid to close said gas passage, and an adjusting means for vertically moving said valve plunger to thereby vary the free volume in said first chamber;

f. a three-way gas control valve having two positions, the first position providing an interconnection between the counterpressure gas in said filling tank and the gas passage in the valve plunger of said check valve, the second position providing an interconnection between the gas passage in the valve plunger and the atmosphere; and

g. valve means at the lowermost portion of said plunger which is ajacent the bottom wall of said container when said plunger is moved to the lowest position in said container, said valve means being operable when said plunger is positioned in said container and subsequent to the pressurizing of said container with counterpressure gas for transferring by means of gravity first an initial portion of the liquid contained in said plunger to said container to completely displace the counterpressure gas contained in the unoccupied space of said container and for filling said container with liquid as said plunger is withdrawn toward the open end of said container.

12. A method for filling a container having a bottom wall, a side wall, and an open end, said method comprising:

a. purging the air contained in said container;

b. sealing the open end of said container from the atmosphere;

c. introducing a plunger containing pressurized liquid into said container through the open end thereof, said plunger occupying a major portion of the interior volume of said container;

d. pressurizing said container having the plunger therein with a counterpressure gas at the same pressure as said liquid and greater than atmospheric;

e. completely displacing the counterpressure gas contained in said container by transferring by means of gravity a first portion of the liquid contained in said plunger to said container;

f. checking the flow of liquid from said container after completely displacing the counterpressure gas contained in said container; and

g. filling said container with liquid from said plunger.

13. The method for filling a container as defined in claim **12** wherein the step of purging the air from said container includes introducing counterpressure gas into said container.

14. The method for filling a container as defined in claim **12** wherein the step of sealing the open end of said container comprises moving a sealing means into sealing engagement with the open end of said container.

15. The method for filling a container as defined in claim **12** wherein the step of pressurizing the container with the counterpressure gas comprises introducing the counterpressure gas into said container from a source of counterpressure gas.

16. The method for filling a container as defined in claim **12** wherein the step of displacing the counterpressure gas from the container comprises opening a valve in the lowermost portion of said plunger thereby permitting a portion of the liquid contained in said plunger to be transferred by means of gravity to said container.

17. The method for filling a container as defined in claim **12** wherein the step of filling said container with liquid from said plunger comprises withdrawing said plunger toward the open end of said container thereby transferring by means of gravity the liquid contained in said plunger to said container.

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