Apparatus for and process of filling a beverage dispensing syphon package.

A drink dispensing syphon package is disclosed having a syphon head (304) configured to fit over neck (350) of a bottle (352) in sealing relationship. A lever (340) is mounted to exterior surface (360) of body (362) by breakaway filaments and a spring strip. In use, the user pulls upward on lever (340) to rupture the filaments. The strip (230) pivots an end of lever (340) through opening (342) in body (362) and through actuating rod (348). Actuating rod (348) is attached to interior surface of the body (362) by a resilient diaphragm. The invention relates to apparatus for and a process of filling such a container which uses a permanent syphon filling head for cooperation with a valve in the necked opening of the container when the container is supported in a pivotable cradle. A source of liquid under pressure for supply to the container is connected to the filling head as is means for removing gas from within the container.
APPARATUS FOR AND PROCESS OF FILLING A BEVERAGE DISPENSING SYPHON PACKAGE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to the storage and dispensing of water or flavored beverages under gas pressure of between 90 and 150 psi (10 atmospheres). Such products are commonly known as syphon seltzer water, as distinguished from present day bottled sparkling waters or lightly carbonated flavored beverages which are charged to pressures of 50 to 60 psi (3 to 4 atmospheres). For further purposes of comparison, champagne is unasked from seltzer water, as distinguished from syphon seltzer water, as distinguished from champagne is unasked from seltzer water, as distinguished from champagne is unasked from seltzer water, as distinguished from champagne is unasked from seltzer water, as distinguished from champagne is unasked from seltzer water, as distinguished from

...
INVENTION OF THE SYPHON BOTTLE

Charles Plinth is credited as being the first to preserve "aerated waters" in a reservoir which would deliver a portion of its contents at different times. His patent on a Regency portable fountain in 1813 was identical in construction with the fountains then commonly used in which the motive force was compressed atmospheric air. Plinth substituted carbonic acid gas for air in his apparatus. It consisted of a vessel with a tube passing from an opening in the top almost to the bottom; the upper part of the tube was furnished with a stop-cock and delivery tube, from which the water was drawn off under pressure of the carbonic acid gas.

Deleuze and Dutillet, Paris jewellers, who apparently were adverse to consuming an entire bottle of champagne at one sitting were granted a patent in 1829 on a "siphon champenois" which consisted of a hollow corkscrew which was passed through the cork into the bottle. The upper part of the screw terminated in a vertical tube bearing a nearly horizontal spout. A lever operated a valve, which when opened and the bottle was tipped, gave exit to the champagne under pressure of the contained gas.

The forerunner of the present day syphon seltzer bottle was patented in 1837 by Antoine Perpignan, as it was known for one hundred years, died because of the lack of a container system, not because any superior product replaced it.

SUMMARY OF THE INVENTION

The present invention recognizes and fulfills the one basic commercial fact of our day; a beverage product must meet all of the requirements for distribution and sale through our present day supermarket system. These requirements are (1) Safety; the container must not explode even if mishandled. (2) Inexpensive; the bottle and valve must be so inexpensive that they need not be returned and routed back through the chain of distribution to the factory. (3) The bottle and valve must be light weight; water is already a heavy product and the container cannot add appreciably to the weight or containers of sufficient volume cannot be handled through the checkout stand and be bagged along with other grocery products. (4) The bottle must be made of a material that can be recycled in those states which have instituted laws for the recycling of containers. (5) The head mechanism must be simple, yet easily attached and detached from the container so that most everyone can accomplish the process without any danger or effort.

The key to the accomplishment of the above objectives is the separation of the head and valve actuation function from the valve and seal function and the selection of a high strength, non-frangible container. Specifically, the valve and seal mechanism are contained almost totally within the neck of the container, while the head, which contains the valve actuator, is a separate member which can be retained by the consumer and used over and over again. The container may be charged up to 150 psi. To emphasize the high capacity of the container, it is to be noted that 150 psi is the bursting pressure of standard glass bottles used for lightly
carbonated beverages.

A container system for storing and dispensing a pressurized fluid is claimed in EP-A-0164218 from which the present application is divided. A reusable valve containing head is used in conjunction with a dispensable non-frangible container and a removable closure economically uses the same thread as can be used to retain the head and also provides a pressure retaining function as a precaution additional to the pressure retention provided by the valve. The danger of glass breaking under high pressure is avoided by having the container of substantially non-frangible plastics material. In the preferred embodiment of the container apparatus the dispenser has a removable and replaceable head which is suitable for economical production and for continual reuse in the home or bar, a simple and reliable diaphragm arrangement separating the manual operating mechanism from the liquid dispensing path.

In practice, the container is filled with carbonated water to a pressure from about 90 to 150 psi. A standard aluminium screw type cap or other simple closure is placed on the bottle. The cap is under no pressure and merely serves to protect the valve from contamination and accidental discharge if the valve should break away from the neck. The container is distributed through the standard distribution channels like any other bottled or canned beverage, without any special precautions and shelved in a supermarket along with the standard lightly carbonated flavoured beverages, which are under the greatly reduced pressure of about 50 to 60 psi. The container is distributed and shelved without the head and spigot mechanism. The head and spigot may be sold separately or distributed free of charge with the sale of one or more containers. The customer refrigerates the container of seltzer water and, before using, removes the disposable cap and attaches the head mechanism to the container. The high pressure is sufficient to discharge the entire contents of the container without appreciable loss of carbonation due to the use of the syphon tube. When the entire contents of the container have been discharged, the head may be detached and placed on a freshly refrigerated container of seltzer water. The used syphon seltzer non-frangible container may be discarded or recycled by returning it to a recycling centre as desired.

When the head is tightly attached to the container, should the valve leak, the head will hold the pressure. In the unlikely event that the valve should break away from the neck of the container, the head would safely hold the damaged valve within the head.

Unlike standard syphon seltzer bottles which may be accidentally discharged while being carried by simply pressing down on the lever on the head mechanism, the present containers cannot be accidentally discharged. The head is never placed on the container until it is ready for use. The only way to discharge the container of the present invention while it is in the distribution chain is to remove the protective cap, throw it away, and then poke a small long, sharp object down through a small hole in the valve which is down inside the neck of the container. Note that the cap may be provided with a tamper proof lower skirt.

The present invention relates to a filling apparatus for a syphon package as specified in claim 1.

The invention should be more readily apparent to those skilled in the art, after review of the following more detailed description of the invention, taken together with the drawings, in which:

**BRIEF DESCRIPTION OF THE DRAWINGS**

Figure 1 is a perspective view of the container of the present invention with the valve inserted and the cap and head removed.

Figure 2 is a cross sectional view of a container of the patent application EP-A-0164218 shown in an enlarged scale with the midsection of the container removed. Portions of the valve mechanism are not shown in section for purposes of clarity in showing their relationship with the rest of the mechanism. The preferred valve and plug apparatus is shown. One of the forms of the syphon tube is shown.

Figure 3 is a cross section of a portion of the container on an enlarged scale with the cap removed and a head member attached to the form of the valve shown in Figure 2.

Figure 4 is an exploded perspective view of the head, valve and a portion of the syphon tube shown in figures 1 - 3.

Figure 5 is an enlarged side view of the container with a portion in cross section. The bottle is attached to a base for convenience in standing in a vertical position. This view shows the shape of the bottle prior to filling.

Figure 6 is a side view of the container of Figure 5 with portions in cross section. The container is shown filled with carbonated water and is under pressure of between 90 to 150 psi. The valve and disposable cap are shown on the sealed and filled container.

Figure 7 is a cross-section view of another syphon head assembly and package incorporating the assembly.

Figure 8 is an exploded perspective view of the syphon head assembly shown in Figure 7.
DESCRIPTION OF THE PREFERRED EMBODIMENTS

Turning now to the drawing, more particularly to Figure 1, a method is disclosed for storing and dispensing fluids containered under gas pressure comprises selecting a plastic, metal, composite or other substantially non-frangible container capable of safely withstandin in excess of three atmospheres of pressure and preferably a 1.8 liter bottle capable of safely carrying liquids at 150 psi (10 atmospheres). The container is formed with a neck portion having an external attachment member. Preferably, the bottle is an 18 to 20 mil polyester terephthalate (PET) bottle. Polyester terephthalate (PET) is furnished by various manufacturers, including Eastman Chemical Products, Inc. One of the manufacturers of the bottle is Plaxicon Company in the City of Industry, California using equipment and molds manufactured by NISI.

ASB Machine Company, Ltd. of Japan, with offices in Torrance, California. The unusually high strength is due to the bi-axial orientation of the molecules in the plastic. Additional information on bottle manufacture is set forth in "A Layman's Guide to Pet Chemistry and Processing", Edward E. Dennison, Eastman Chemical Products, Inc. and "One-Stage Processing of Pet Bottles", Eastman Kodak Company. The external attachment member on the outside wall of the neck may be the formation of screw threads in the plastic.

A valve means is selected which is mounted substantially within the container neck portion for maintaining gas pressure of at least three atmospheres and preferably up to about 150 psi or about 10 atmospheres. A tube, commonly known as a syphon tube, is connected to the valve and has a distal end which extends to a point adjacent to the bottom. The fluid flows up through the hollow syphon tube and through the valve when opened. The container is filled with liquid, such as carbonated water pressureized to about 10 atmospheres.

A cap member for removably covering the opening in the neck portion of the bottle is selected, which is removed prior to placing the head on the bottle and dispensing the fluid. The cap preferably is of light weight aluminum formed with internal threads, tamper proof and recyclable or disposable. The cap should have a thin flexible seal member for preventing the inside of the bottle and valve from becoming contaminated in the distribution system. The cap is not under pressure, unlike all caps for lightly carbonated beverages.

The last step in the method is to select a head member which is removably affixed to the external attachment member on the neck portion of the container. A preferred means of attachment is by internal threads formed on the inside wall of the head member. The head member has a manually engageable valve actuating member, such as a lever. A remote valve actuating member, such as a pin, is selectively operable by the valve actuating member and is positioned for engagement with the valve means. A substantially impermeable liquid and gas sealing means, such as a rubber membrane, separates the manually engageable valve actuating member and the remote valve actuating member. The head is formed with a chamber which receives the fluid and channels it to a channel in spout.

In Figures 2, 3, and 4, a safety neck plug member is shown which encloses the valve means and is integrally connected to the syphon tube. The neck plug member is preferably attached to the inside wall of the container by an adhesive. A suitable adhesive is General Electric...
RTV Silicone Adhesive. Another method of attaching wall 49 of neck plug 19 is to use a solvent to soften the PET and weld the plug to the neck wall of the container. Spin welding may also be employed.

Continuing to refer to Figures 2, 3, and 4, the valve means includes an inner chamber 21 formed in neck plug member 19 having upper and lower portions 22 and 23. A valve seat 24 is formed in the upper portion of the valve chamber. This may simply be an annular protrusion. A valve cup 25 is positioned for registration with the valve seat in a valve closed position and is movable to a valve open position away from the valve seat. Sealing means, such as a rubber washer 26, is positioned within the cup for sealing registration with the valve seat in the valve closed position. A spring retainer 27 is mounted in the lower portion 23 of the chamber 21 and flared portion 101 of the syphon tube and a spring member 28 is mounted in the spring retainer member and biases the valve cup to the valve closed position.

The manually operable means for selectively opening the valve for release of the contents of the container may be any member capable of depressing the valve cup 25. A suitable head member 10 is illustrated in Figures 3 and 4 for actuating the valve. A guide member 29 having threads 99 is threadably inserted into an opening 30 formed in the head to engage head internal threads 31. Pin 14 is mounted for vertical reciprocation within opening 32 of the guide member. Lever 13 is formed with a protrusion 33 which bears on cup 34. Injection molded plastic washer 35 bears against annular protrusion 36 which surrounds cup 34. The lever pivots about end point 100.

Assembly and operation of the valve and head illustrated in Figures 2-4 is as follows. A syphon tube 5 is selected having a length which will reach to flow into the syphon tube even though the end 6. Note that open-

45 and the top portion encircles protrusion 46 on valve cup 25. Rubber washer 26 is placed in valve cup 25, which in turn is placed on the spring 28. Note that washer 26 may be formed with a small opening 47 to retain the end 48 of pin 14. Safety neck plug member 19 is then adhered to flange 40 of the syphon tube thereby compressing spring 28 and forcing sealing washer 26 into sealing engagement with valve seat 24 formed in the plug member. The entire plug and syphon tube assembly is then placed into the container and the side wall 49 is adhered to the inner neck wall of the container by a suitable adhesive or by spin welding.

Filling of the container with carbonated water is as follows. A suitable filling apparatus depresses valve cup 25 and the liquid enters through opening 50 in plug member 19 and into inner chamber 21. The water is forced past openings 51 and 52 and into syphon tube 5. The water flows through member 37 and then into the bottle. When the container is filled to the desired amount, the valve cup is released and spring 28 forces the cup and washer 26 into sealing engagement with valve seat 24. Pressure in the container also tends to force washer 26 into sealing engagement. A cap 9 is then threaded onto the container to prevent contamination of the end surface 53 and opening 50 of the plug. The cap member may be provided with a flexible sealing member 54 to further enhance the seal to prevent contamination. As previously noted, the cap is not under any pressure since the container pressure is entirely held by the sealing washer 26 within the safety plug.

Another important feature is the fact that the entire valve means and plug member is within the neck of the bottle except for a thin flange 55 which may rest on the upper rim 56 of the bottle. Flange 55 mechanically prevents the plug from slipping inside the bottle when the plug is first assembled and adhered to the inside wall of the neck of the container. It may also serve to provide an abutment when the cap is screwed onto the bottle.

The container is shipped through the distribution chain with the cap on and without any head mechanism. The container is shelved in supermarkets and other retail stores, where it is purchased directly by the ultimate consumer and carried to a home or business place. The container is chilled in the refrigerator and, when ready for consumption, the cap 9 is removed from the bottle and the head member 10 is screwed onto the container. The guide member 29 mates with conical surface 53, which is a rigid non-compressible sealing surface, at its matching concave surface 58. Pin 14 is inserted through opening 50 in the plug member and opening 47 in washer 26. Preferably there is a detent 59 into which the end 48 of pin 14 is inserted. All of the above operations are carried out
without releasing any pressure from the container. Note that there are no compressible parts. All of the parts have a fixed length for accurate mass assembly of the valve and safety plug, in order to withdraw a part or all of the contents of the container, it is simply necessary to depress lever 13 inserted through opening 102 in the head 10, which causes projection 33 to move downwardly against cup 34, which in turn presses downwardly on the head 60 of pin 14 through sealing membrane member 15. Depressor of lever 13 causes pin 14 to move downwardly and end 48 to depress valve cup 25, carrying washer 26 with it. Spring 28 is compressed against abutment 45 in the spring retainer 27. Gas pressure within the container forces the carbonated water up through syphon tube 5, through openings 52 and 51 in the spring retainer and into inner chamber 21. The liquid is forced between seal 28 and the valve seat 24 up past the flutes 61 in pin 14 and into chamber 16 in the head. Drain opening 62 permits the liquid under pressure to be propelled through channel 98 in guide member 29 and through channel 17 in the spout 18. As soon as the lever 13 is released, spring 28 forces valve cup 25 to move upwardly and to seal washer 28 against valve seat 24. Pin 14 is forced upwardly and causes lever 13 to return to its raised position. Thus, the container remains charged with sufficient gas to completely empty the container whenever desired at a later time. There is no escape of gases while the lever is in the raised position, since the gas remains in the upper portion of the container and continues to act on the surface 83 of the water, rather than on the seal between washer 26 and seat 24.

It is standard practice in industry to provide a plastic base member for plastic bottles. The drawings illustrate such a standard base as indicated by the number 103. The base is attached to the bottle by applying adhesive at areas 94 and 95. By applying the adhesive to the base of the bottle and an upper part of the base, the base will remain affixed to the bottle in spite of the expansion and contraction of the bottle which results from the varying pressure in the bottle, as affected by varying temperature and varying fill levels of the bottle. The difference in shape of the bottle is shown in Figure 5 when the bottle is empty and in Figure 6, which shows the shape of the bottle when it is filled and pressurized. Note particularly the indentation along line 96 in Figure 5 at a point just above the top edge 97 of the base 103. In Figure 6, when the bottle is filled, indent 96 disappears and becomes a smooth curved line. Some vertical growth occurs in the bottle, but it is not as dramatic as the diameter expansion. The difference in vertical height is, however, of sufficient importance that is necessary to make provision for this dimensional change as has been described above in the various syphon tube end members and the provision for openings in the edge of the end member.

It is not intended that cap 9 be subject to pressure at any time. If, however the valve should leak, and build-up pressure, danger from the cap may be obviated by providing a plurality of vertical slots in the outer sidewall of the neck of the bottle which cross threads 3. Thus, when the cap is loosened, if there should accidently happen to be any pressure against the cap, the pressure would safely vent through the vertical slots to atmosphere, the instant the cap seal was broken. The vertical slot system is presently found on plastic bottles which are under light carbonation.

Figure 7 shows a syphon assembly 110 and a seltzer water package 112 incorporating the syphon assembly 110. The package 112 includes a high strength polyester terephthalate (PET) bottle 114 of the type described in the above referenced application, having a wall thickness of from about 18 to 20 thousandths of an inch. The bottle 114 has a necked opening 116 with exterior threads 118. The syphon assembly 110 includes an insert assembly 120 (see also Figure 2), bonded to the inside wall 122 of the necked opening 116 and extending into the bottle 114. A head assembly 124 (see also Figure 2) is attached to the necked opening by means of threads 126 on body 128, which mate with the threads 118 on the necked opening 116. When assembled in this manner, the head assembly 124 engages the insert assembly 120 during use of the seltzer water package 112.

The insert assembly 120 includes a tube 130 which extends from the necked opening 116 into the seltzer water 132 in bottle 114 and to bottom 134 of the bottle. Openings 136 are provided at end 138 of the tube 130 to allow the seltzer water 132 to enter the tube 130.

The tube 130 has a flanged upper end 140 within the necked opening 116. A resilient, substantially frustoconical shaped valve sealing member 142 rests on end 140 of the tube 130. Insert 144 fits over the valve sealing member 142 and is bonded to edge 146 of the tube end 140. The tube end 140 and insert 144 are both bonded in sealing engagement to the interior surface 122 of necked opening 116. Valve sealing member 142 has a raised portion 148, which normally seals centrally disposed passageway 150, which extends through the insert 144. A cruciform cross-section valve guide 152 extends upward from the raised portion 148 into the passageway 150. Openings 154 are provided around the raised portion 148 through the valve sealing member 142.

Figure 9 shows the necked portion 116 of the bottle 114 and the insert assembly as the packaged seltzer water 132 is sold. A conventional
aluminum twist-off cap 156 is fastened over the necked opening 116 by means of the screw threads 118. Pressure from the seltzer water 132 in bottle 114 is not applied to the cap 156 because passageway 150 is sealed by the raised portion 148 of the valve sealing member 142.

In use of the package 112, the purchaser removes the cap 156 and replaces it with the syphon head assembly 124, as shown in Figures 7 and 8. The package 112 is then ready to dispense the necked opening 116 by means of the screw actuator 160, consisting of an actuating rod 162, a head assembly 124, as shown in Figures 7 and 8. The actuator 160 moves the cap 156 and replaces it with the syphon diaphragm 164 and a ring 166 for bonding the seltzer water 132.

In practice, tube 130, valve sealing member 142, insert 144, activator 160, head body 128 and lever 174 are preferably separately fabricated from a suitable plastic material in a molding operation. For this purpose, an injection molded co-polyester plastic is preferably employed. The body 212, lever 222, cap 232 and spigot 216 are formed by a one piece mold cavity, with separate cores from above into upper chamber 242, from below into lower chamber 244 and from the side to form the rod 238, flexible diaphragm 240 and the passageway 218. A slider within the core used to form spigot 216 forms the passageway 218.

Prior to attachment of the body 212 to a container, the syphon tube 216 is attached to the inside, surface 220 of the body 212, by spin or ultrasonic welding the flange 258 in place. Tip 257 of rod 238 engages opening 259 of tube 256 in a sealing fit when tube 256 is in place. After the syphon tube 256 is attached in the body 212, the top 232 is snapped into position in flange 236, as shown in Figure 12. Figure 12 shows closure 210 in place on neck 217 of a plastic bottle 219, permanently attached by welding. Flange 274 extending around the neck of the bottle 217 provides support for the body 212 against lateral shearing forces, such as might occur if the bottle 219 were dropped. The bottle 219 is filled with highly carbonated water 276 through spigot 216, as is conventional in seltzer bottling, by inserting a suitable member through opening 278 in body 212 to engage rod 238 to apply force for moving end 257 of
with prior to sale. If desired, a removable label or through opening 278 to engage the rod 238 to discharge the highly carbonated water 276 from the
dure is explained more fully below in connection with Figures 16-22. When so filled, the bottle 219 is stored, shipped and sold in the form shown in
Figure 12. Since lever 222 must be inserted through opening 278 to engage the rod 238 to discharge the highly carbonated water 276 from the
bottle 219, the presence of intact break away filaments 226 and 228 on the package assures the user that the package 211 has not been tampered with prior to sale. If desired, a removable label or other sealing strip may also be placed over the opening 278 during storage and shipment of the package 211.

Figure 13 shows the syphon head closure 210 during the process of activating the syphon head closure for dispensing the seltzer 276 from bottle 219 by insertion of the lever 222 through opening 278. The user pulls upward on the lever handle 280, first rupturing the filament 226. Spring strip 230 guides the lever 222 with continued upward force on the handle 280, so that end 248 of the lever 222 enters the opening 278. The second break away filament 228 breaks during this travel. The spring strip 230 is configured so that it will guide the end 248 into cavity 246 in rod 238 to give the configuration shown in Figure 14. Nipples 281 on either side of the lever 222 engage inside surface 220 of the upper chamber 242 to keep the lever 222 in place once it has been inserted through opening 278. Edge 283 of opening 278 serves as a fulcrum for raising rod 238 when downward force is applied to handle 280.

Figure 15 shows the syphon head closure 210 actuated by a user. Downward force on the handle 280 of the lever 222 is converted to upward force on the rod 238 by fulcrum edge 283, thus moving tip 257 out of sealing engagement with opening 259 in the syphon tube 256. The seltzer water 276 is then discharged by the carbon dioxide pressure in bottle 219 through opening 256 into lower chamber 244 and out passageway 218 of spigot 216. When the user releases the downward force on handle 280 of lever 222, the downward biasing force of diaphragm 240 on rod 238 returns the head closure 210 to the position shown in Figure 14, with tip 257 sealing the opening 259. If desired, a compressed spring can be inserted between end 285 of rod 238 and top 232, and top 232 bonded in place, to provide additional downward biasing force on rod 238. When the bottle 219 is empty, it and the head closure 210 are recycled or discarded.

Figures 16 and 17 show a third embodiment of a package 300. This package 300 includes an insert assembly 302, which is inserted in the neck 350 of a bottle 352, and a head closure 304, which is screwed by threads 306 onto mating threads on the neck of the bottle. With this embodiment, the bottle 352 containing the seltzer water 356 is sold with the insert assembly 302 in place in the neck of the bottle and a conventional aluminum twist off or plastic snap on cap fastened over the neck of the bottle. The end user replaces the cap with the head closure 304.

The insert assembly 302 includes a tube 310 which extends from the neck 350 of the bottle into the seltzer water 356 and to the bottom of the bottle 352. Openings 312 are provided at end 314 of the tube 310 to allow the seltzer water to enter the tube 310. The tube 310 has a flanged upper end 316 within the neck of the bottle. A resilient, substantially frustoconical shaped valve sealing member 318 rests on end 316 of the tube 310. Insert 320 fits over the valve sealing member 318 and is bonded to edge 322 of the tube end 316. The tube end 316 and insert 320 are both bonded in sealing engagement to interior surface 358 of the bottle neck. Valve sealing member 318 has a raised portion 324, which normally seals centrally disposed passageway 326, which extends through the insert 320. A cruciform cross section valve guide 328 extends upward from the raised portion 324 into the passageway 326. Openings 330 are provided around the raised portion 324 through the valve sealing member 318.

As in the Figures 11-15 embodiment, the head 304 has a lever 340, mounted on exterior surface 360 of head body 362. To activate the head 304, lever 340 is extended through an opening 342 to engage a vertically disposed actuating rod 344. Cruciform cross section end 348 of the rod 344 is configured to engage the valve guide 328.

The head 304 is provided separately from the seltzer water package 300 including the insert assembly 302 and a conventional aluminum twist off or plastic snap on cap. After replacing the cap with the head 304, the user separates lever 340 from body 362 of the head 304 in the same manner as in the Figures 11-15 embodiment, to insert the lever 340 through opening 342, aperture 348 extending transversely through rod 344 and into socket 364. When the seltzer package is empty, the user may remove the head 304 for use with another seltzer package. Other than as shown and described above, the construction and operation of the Figures 12-13 embodiment is the same as the Figures 11-15 embodiment.

Figure 18 shows a filling apparatus 420 in accordance with the invention for filling the bottles 1 (Figure 1). The apparatus 420 has a rotatable frame 422, to which are mounted a plurality of filler stations, such as the stations 424A, 424B and 424C shown in Figure 18. A typical filling apparatus 420 contains from 8 to 40 of the filler stations 424A-
move the lever to the position shown in solid line in Figure 21 moves actuating rod 454 in the direction shown by arrow 456 to open the valve 4 in neck 2 of the bottle 1. Spring 458 biases the actuating rod 454 to the position shown in dotted line in Figure 21, where it will not engage the valve 4. Unlike the head 10 in Figure 1, the head 438 has a resilient seat 460 formed from polytetrafluoroethylene or other durable, resilient material lining cavity 462 to form an effective seal with the neck 2 of the bottle when the bottle is urged against the head 438 by the plate 440. The seat 460 and cavity 462 have a centrally disposed aperture 464 communicating with spout 466 so that liquid may enter the bottle through the head 438.

Linkage 442 for activating plate 440 to urge bottle 1 against the head 438 has a first lever 468 pivotally attached to the cradle 426 at 432. Slot 472 of the lever 468 is pivotally attached to pivot point 438 of bracket 434 (Figure 18). Lever 468 is angled, with a second portion 474 extending from the pivot 432. Portion 474 of the lever 468 is pivotally attached to rod 476 at 478. Rod 476 is also pivotally attached at 480 to a second angled lever 482. Lever 482 is in turn pivotally attached to the cradle 426 at 484. Portion 488 of the angled lever 482 is pivotally attached to rod 488 at 490. Rod 488 is fixedly attached to the plate 440. Linkage 444 (Figures 18 and 22) contains corresponding elements and therefore will not be described further. If desired, one or more of the members comprising the linkages 442 and 444 can be made adjustable in length to provide increased tolerance in the mechanism.

In operation, when the cradle 426 is raised to the position shown in Figures 20 and 21, lever 468, rod 476, and lever 482 pivot from force applied to the lever 468 by bracket 434, as indicated by arrows 492, 494 and 496 so that rod 488 forces plate 440 against the bottle 1. Neck 2 of the bottle 1 moves into sealing engagement with the head 438, as indicated by arrow 498. In practice, the plate 440 should apply a pressure of from about 150 to 200 psi against the bottle 1 for this purpose. A tension spring 500 can be provided connecting the pivot 484 and the lever 482 to limit the pressure to this amount.

Figure 21 shows the bottle 1 with its neck 2 in sealing engagement with the seat 460 of head 438, and the head 438 activated to open valve 4, so that the liquid 8 may enter the bottle through the head 438, valve 4 and syphon tube 5. After the bottle 1 has been inverted by moving cradle 426 to the position shown in Figures 20 and 21, fitting 502 is moved down as indicated by arrow 504 to engage the spigot 466. Fitting 502 is connected to valve 441 (Figure 18). Rod 506 is then moved upward, as indicated by arrow 508, to move the lever 450 from
the position indicated in dotted line in Figure 21 to the position there shown in solid line. Rod 454 is therefore activated to open valve 4, thus allowing the pressurized liquid 8 to enter the bottle 1. As is the position there shown in solid line. Rod 454 is therefore activated to open valve 4, thus allowing the pressurized liquid 8 to enter the bottle 1. As is conventional in syphon package filling, the fitting 502 is alternately connected by the valve 441 to receive the liquid 8 from line 443 for filling the bottle and to the exhaust line 445 for removing gas trapped in the bottle 1 above the liquid 8 through the syphon tube 5. This mode of filling is referred to in the seltzer industry as alternate fill and sniff cycles. When the bottle 1 has been filled, rod 506 is lowered so that rod 454 may move out of engagement with valve 4, allowing the valve to close. Fitting 502 is then disconnected from the spigot 466, and the cradle 426 returned to the position shown in Figure 19 for removal of the filled bottle.

Figure 22 shows the tandem linkages 442 and 444 on either side of the cradle 426. Providing the linkages 442 and 444 in tandem assures even application of force across the surface of plate 440 against the bottle 1, giving reliable operation and preventing uneven wear of the cradle assembly.

Claims

1. A filling apparatus for a syphon package, the filling apparatus having a pivotally movable cradle configured to receive a syphon package in a first orientation, a pivoting means mechanically coupled to the cradle for moving said cradle from the first orientation to a second orientation in which a top of the syphon package is directed downward, a source of liquid under pressure having a normally closed valve in a necked opening of the package and means for removing gas from the syphon package during filling of the syphon package with the liquid, characterised in that there is a permanent syphon filling head attached to said apparatus proximate to a necked opening of the syphon package when the package is loaded in said cradle, said permanent syphon filling head including means for applying a valve opening force to a valve in the necked opening of the package, a biasing means configured to be activated during the cradle pivoting to urge the syphon package and said permanent syphon filling head into engagement together, a head activating means coupled to said permanent syphon filling head to activate said valve opening force applying means for opening the valve in the neck of the syphon package, said source of liquid under pressure and said means for removing gas from the syphon package being connected to said permanent syphon filling head, said biasing means being configured to allow the syphon package and said permanent syphon filling head to move out of engagement when said movable cradle is pivoted from the second orientation to the first orientation.

2. An attachment apparatus for converting a filling apparatus configured to fill a syphon package having a head mounted on the package to a filling apparatus for filling a syphon package having a normally closed valve in a necked opening of the package and being configured for subsequent attachment of a detachable head, which comprises a cradle configured to be pivotally attached to the filling apparatus, said cradle being configured to receive the syphon package in a first orientation, a permanent syphon filling head attached to said cradle proximate to the necked opening of the syphon package when the package is loaded in said cradle, said permanent syphon filling head including means for applying a valve opening force to the valve in the necked opening of the package, said valve opening force applying means being configured to be engaged by a head activating means on the filling apparatus to activate said valve opening force applying means for opening the valve in the neck of the syphon package, said permanent syphon head being configured to be connected to a source of liquid under pressure and a means for removing gas from the syphon package during filling of the syphon package with the liquid on the filling apparatus, a biasing means actuable to urge the syphon package into engagement with said permanent syphon filling head, said cradle being configured to be engaged by a pivoting means on the filling apparatus for moving said cradle from a first orientation to a second orientation in which the necked opening of the syphon package is directed downward, said biasing means being configured to urge the syphon package against said permanent syphon filling head when said cradle is moved from the first orientation to the second orientation and to allow the syphon package to move out of engagement with said permanent syphon filling head when said movable cradle is pivoted from the second orientation to the first orientation.

3. The apparatus of either preceding claim in which said permanent syphon filling head has a seat having a layer of resilient material, said seat being configured to receive the neck of the syphon package in sealing engagement against the resilient material layer.

4. A filling apparatus for a syphon package, which comprises a cradle configured to receive a syphon package having a necked opening with a normally closed valve in the necked opening, a permanent syphon filling head attached to said apparatus proximate to a necked opening of the syphon package when the package is loaded in said cradle, said permanent syphon filling head...
having a seat with a layer of resilient material, said seat being configured to receive the neck of the syphon package in sealing engagement against the resilient material layer, said permanent system filling head having a means for applying a valve opening force to the valve in the necked opening, a biasing means actuable to urge the syphon package into engagement with said permanent syphon filling head, a head activating means coupled to said permanent syphon filling head to activate said valve opening force applying means for opening the valve in the neck of the syphon package, and a source of liquid under pressure connected to said permanent syphon filling head.

5. An attachment apparatus for converting a filling apparatus configured to fill a syphon package having a head mounted on the package to a filling apparatus for filling a syphon package having a normally closed valve in a necked opening of the package and being configured for subsequent attachment of a detachable head, which comprises a cradle configured to be attached to the filling apparatus, said cradle being configured to receive the syphon package, a permanent syphon filling head attached to said cradle proximate to the necked opening of the syphon package when the package is loaded in said cradle, said permanent syphon filling head having a means for applying a valve opening force to the valve in the necked opening, said permanent syphon filling head being configured to be engaged by a head activating means on the filling apparatus to activate said valve opening force applying means for opening the valve in the neck of the syphon package and to be connected to a source of liquid under pressure, said permanent syphon filling head having a seat with a layer of resilient material, said seat being configured to receive the neck of the syphon package in sealing engagement against the resilient material layer, and a biasing means actuable to urge the syphon package into engagement with said permanent syphon filling head.

6. The apparatus of any preceding claim in which said permanent syphon filling head is fixedly attached to said cradle.

7. The apparatus of any preceding claim in which said biasing means comprises a plate movably mounted on said cradle to engage a bottom of the syphon package, and a first linkage mechanically connected to urge said plate against the bottom of the syphon package.

8. The apparatus of claim 7 in which said biasing means includes a second linkage mechanically connected to urge said plate against the bottom of the syphon package in tandem with said first linkage.

9. The apparatus of claim 7 or 8 in which said first linkage is configured to supply up to a predetermined amount of biasing force to the syphon package.

10. A process for filling a syphon package having a necked opening and a normally closed valve in the necked opening with a liquid, which comprises positioning said syphon package proximate to a head configured to engage the necked opening, the head including a means for applying a valve opening force to the valve in the necked opening, urging the syphon package into engagement with the head, activating the valve opening force applying means to open the valve, supplying the liquid through the head, the valve and the syphon of the package to the syphon package, periodically removing gas through the syphon of the syphon package, the valve and the head, closing the valve, and allowing the filled syphon package to move out of engagement with the head.
FIG._5.
### Documents Considered to Be Relevant

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of Document with Indication, Where Appropriate, of Relevant Passages</th>
<th>Relevant to Claim</th>
<th>Classification of the Application (Int. Cl. 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>DE-C- 56 881 (BONWICK FOREIGN AND COLONIAL PATENT SYPHON STOPPER SYNDICATE LTD) * Page 4, column 2, lines 4-27; figures 1,2,6,7,27 *</td>
<td>1,2,4-6,10</td>
<td>B 67 C 3/06</td>
</tr>
<tr>
<td>A</td>
<td>GB-A- 26 490 (MARKS)(A.D. 1913) * Page 2, lines 4-36; figures 1,2,4 *</td>
<td>1,2,4-6,10</td>
<td>B 67 C 3/24</td>
</tr>
<tr>
<td>A</td>
<td>DE-C- 46 601 (AVEDYK &amp; HALOT)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>DE-C- 187 933 (HENRICH)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Technical Fields Searched (Int. Cl. 4)**

- B 67 D
- B 67 C

---

The present search report has been drawn up for all claims.

<table>
<thead>
<tr>
<th>Place of Search</th>
<th>Date of Completion of the Search</th>
<th>Examiner</th>
</tr>
</thead>
<tbody>
<tr>
<td>THE HAGUE</td>
<td>06-09-1988</td>
<td>DEUTSCH J.P.M.</td>
</tr>
</tbody>
</table>

**Category of Cited Documents**

- **T**: theory or principle underlying the invention
- **E**: earlier patent document, but published on, or after the filing date
- **D**: document cited in the application
- **L**: document cited for other reasons
- **&**: member of the same patent family, corresponding document

**Categories**

- **X**: particularly relevant if taken alone
- **Y**: particularly relevant if combined with another document of the same category
- **A**: technological background
- **D**: non-written disclosure
- **F**: intermediate document