

Feb. 8, 1966

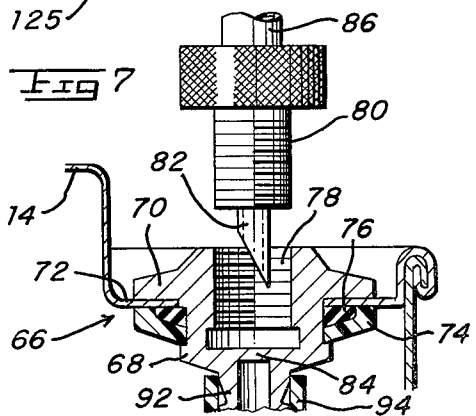
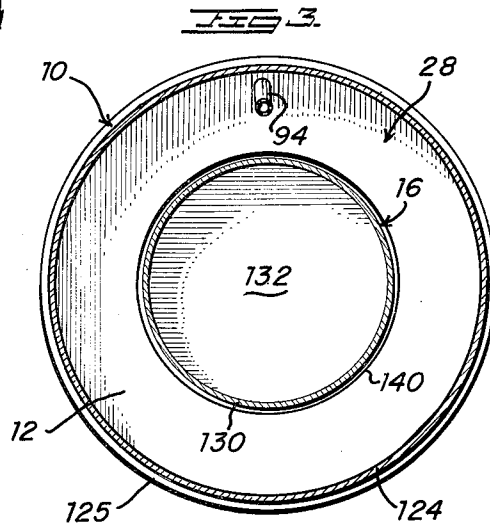
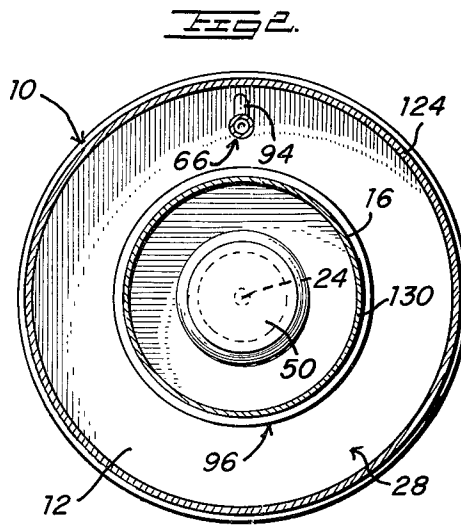
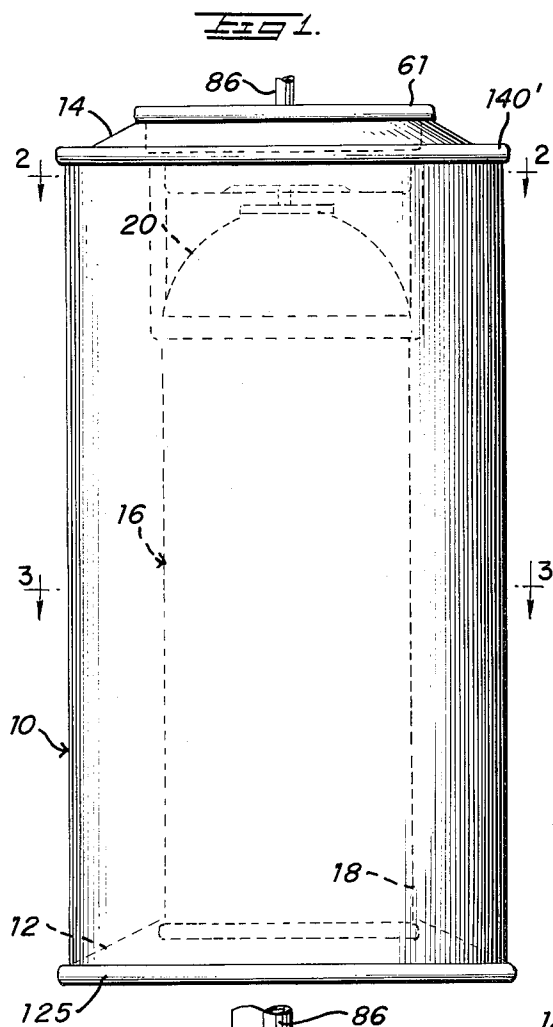
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3,233,780

GAS CHARGED LIQUID CONTAINER CONSTRUCTION AND METHOD

Filed Nov. 22, 1963

3 Sheets-Sheet 1



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GAS CHARGED LIQUID CONTAINER CONSTRUCTION AND METHOD

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FIG 4

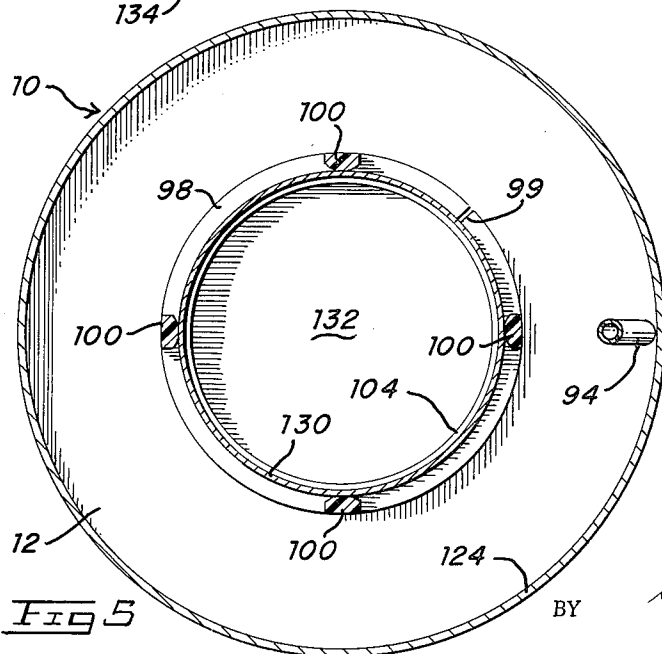
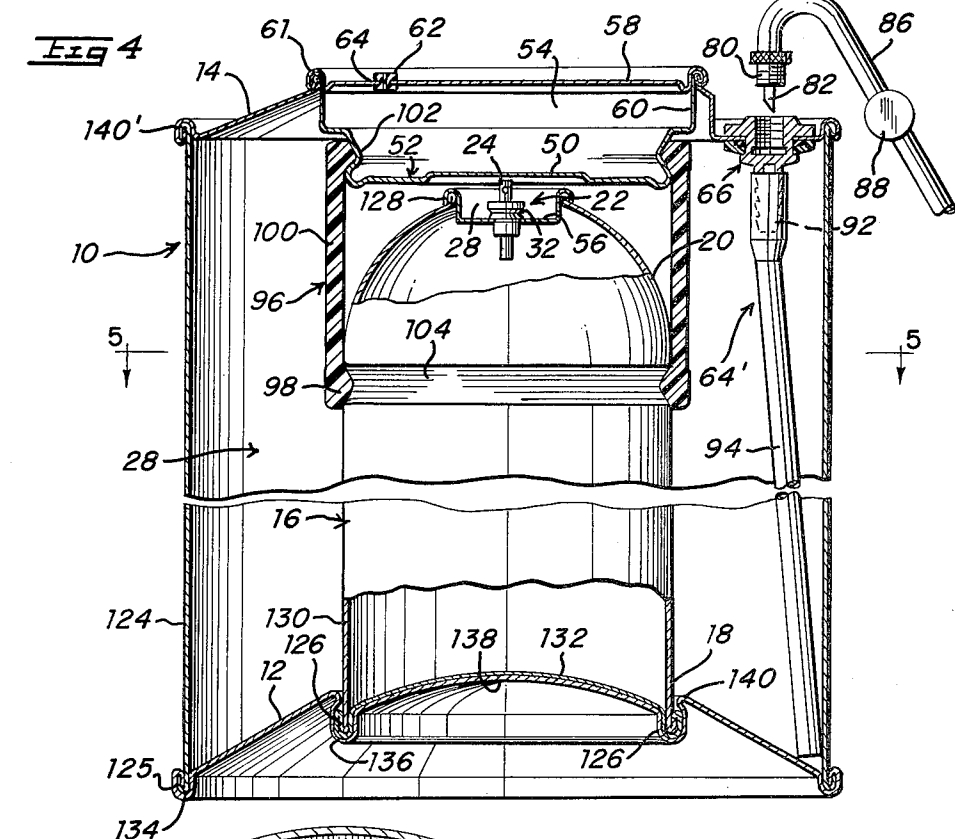
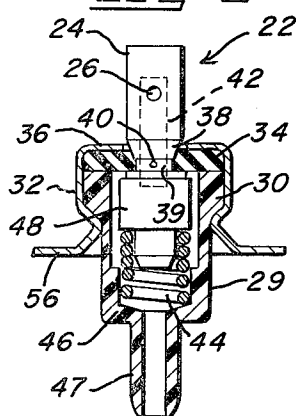


FIG 6



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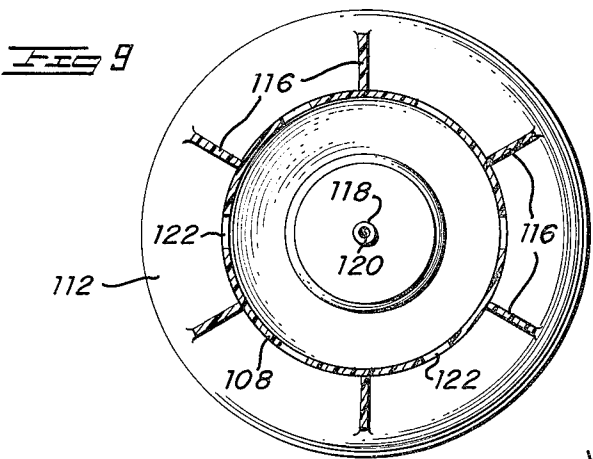
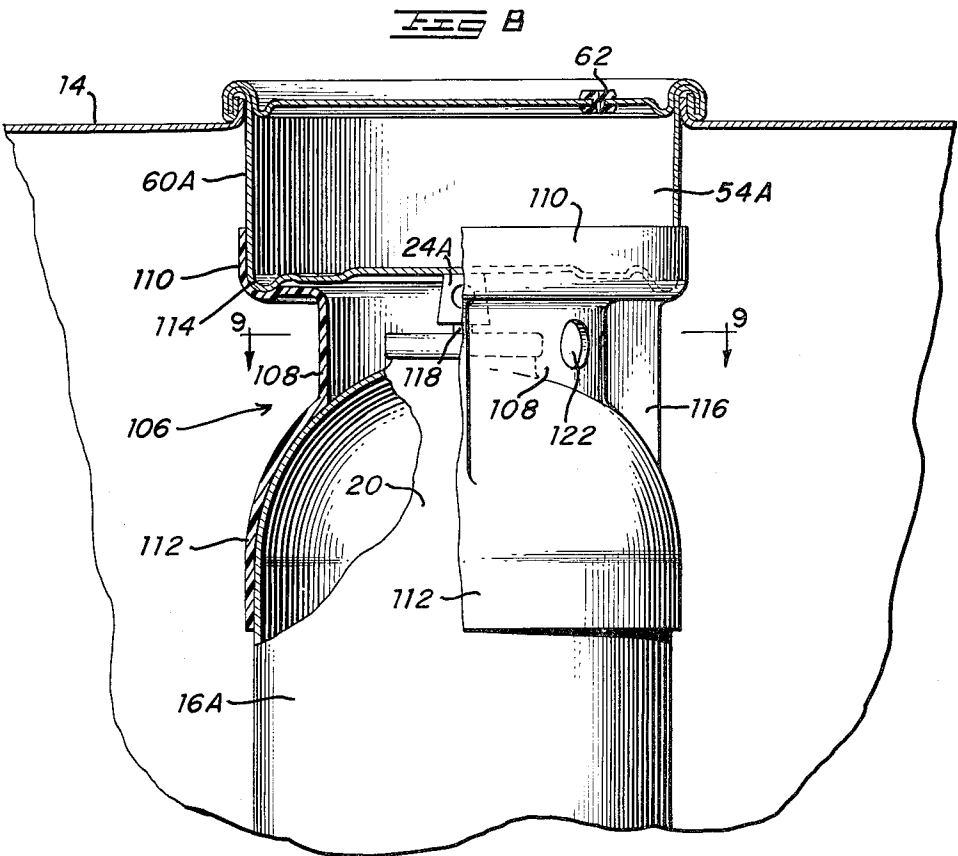
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GAS CHARGED LIQUID CONTAINER CONSTRUCTION AND METHOD

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3 Sheets-Sheet 3



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GAS CHARGED LIQUID CONTAINER CONSTRUCTION AND METHOD

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9 Claims. (Cl. 222—52)

This invention relates to a gas charged liquid container construction and method.

The liquid container of this invention may be of a size to contain sufficient liquid or beverages to provide several servings at various times, and yet be small enough to be stored in a refrigerator of the domestic type, is desired.

This container may be provided with a gas receptacle having a bottom which may be secured to or supported by the bottom portion of the liquid container and with the gas receptacle top extending upwardly adjacent the top portion of the liquid container. The top of the gas receptacle may be provided with a gas pop-off valve with a valve actuator to operate such valve.

The top portion of the liquid container may be provided with a fluid expansion capsule which may have a portion engaging such valve actuator in response to the charging gas pressure effective on the liquid in the liquid container, automatically to maintain a desired charging gas pressure effective on such liquid as the liquid is drawn at various times from the container.

The construction and method may be such that the components of the entire container construction may be economically made and the assembly of the entire container construction may be coordinated with the liquid filling operation so economically that the filled container may be distributed on the basis that the emptied container may be thrown away and need not be returned for refilling.

This invention is applicable for use in connection with gas charged liquids of any type, such as beer and other beverages which may be charged with gas, such as CO₂ and the like. The construction and method of assembling and filling the same are such that the discharged liquid may be dispensed from the container at separate intervals of time without danger of the gas charged liquid becoming "flat."

Other features of this invention are apparent from this description, the appended claimed subject matter, and/or the accompanying drawings in which:

FIGURE 1 is a side elevation of the complete container, taken from the left side of FIGURE 4.

FIGURE 2 is a cross section taken generally along the line 2—2 of FIGURE 1.

FIGURE 3 is a cross section taken along the line 3—3 of FIGURE 1.

FIGURE 4 is a vertical cross section of the container shown in FIGURE 1, on an enlarged scale.

FIGURE 5 is a horizontal cross section along line 5—5 of FIGURE 4.

FIGURE 6 is a diagrammatic cross section of a pop-off valve which may be used on the gas container.

FIGURE 7 is a diagrammatic view of the liquid draw off means for the liquid container.

FIGURE 8 is a vertical cross section of a portion of another embodiment of this invention.

FIGURE 9 is a cross section along the line 9—9 of FIGURE 8.

A gas charged liquid container construction of this invention may include a liquid container 10, having a bottom portion 12 and a top portion 14. This container 10 may contain any desired gas charged liquid or beverage, such as beer and other beverages and the like which may be charged with a charging gas such as CO₂ and the like.

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A gas receptacle 16 may be placed in the liquid container 10. The gas receptacle bottom 18 may be supported by or secured on the bottom portion 12 of the liquid container 10. The top 20 of the gas receptacle 16 may extend upwardly adjacent the top portion 14 of the liquid container 10.

A pop-off valve 22 may be secured to the gas receptacle top and may have a gas pop-off valve actuator 24. Any suitable pop-off valve construction may be used, which, for example, may be of the type shown in FIGURE 6. The construction may be such that when the actuator 24 is actuated, such as by being pressed down from its normal position shown in FIGURE 6, gas from the container 16 is discharged through the discharge opening or orifice 26 into the space 28 which is within the liquid container 10 and outside the gas receptacle 16. The gas discharge from the orifice 26 may be into the space above the liquid level in the container 10.

A suitable pop-off valve 22 may be as shown in FIGURE 6, in which a cylindraceous valve body 29 has an enlarged rim 30 around which the upward tube portion 32 is formed to hold a flexible gasket 34 by means of the inward lip 36. The gasket 34 surrounds the inwardly tapered portion 38 and cylindrical portion 39 of the actuator 24. The cylindrical portion 39 has a small radial opening which connects with the vertical central passageway 42 which is connected with the radial opening 26. A compression spring 44 abuts the shoulder 46 which is produced by the gas inlet tube 47 and the cylindrical block 48 which is sealed to the lower end of the actuator 24.

When the actuator 24 is pushed down from its normal sealed position it bends down the gasket 34 and uncovers the restricted opening 40 to allow a jet of gas, such as CO₂ to flow from the interior of gas receptacle, through opening 40, central passageway 42 and discharge opening 26 into the liquid and gas space 28.

The actuator 24 may be pushed down by the downward movement of the control portion 50 of the relatively large bottom diaphragm 52 which is the expansion responsive portion of the fluid expansion capsule 54 which is secured to the top portion 14 of the liquid container 10.

The tube portion 32 is a central part of a cup 56 which is secured to the top 20 of the gas receptacle 16 and secures the pop-off valve 22 to the top 20 of the gas receptacle 16.

The fluid expansion capsule 54 has a cover 58 which seals the side wall 60 of the capsule 54. The cover 58 and the side wall 60 of the capsule 54 may be secured to the top portion 14 of the liquid container 10 by a bead construction 61.

The capsule 54 is filled with expansible fluid, such as a gas under proper superatmospheric pressure. This causes the central portion 50 of diaphragm 52 to be pushed down to open the pop-off valve a sufficient time to discharge the required amount of charging gas from gas receptacle 16 into space 28 automatically to maintain the desired charging gas pressure effective on the liquid in the space 28 of the liquid container 10 as the liquid is drawn from the liquid container 10.

The capsule 54 may be filled with gas under pressure by inserting the gas through the self sealing flexible valve 62. This valve may be a rubber plug secured in the smaller opening 64 in the cover 58. A hollow charging needle may be inserted through a self sealing passageway in the plug 62 which needle can then charge the capsule 54 to the proper pressure properly to open the actuator 24 to maintain the desired charging gas pressure effective on the liquid in the space 28.

The horizontal bottom diaphragm 52 of the capsule 54 is made with a relatively large area, and with its central portion 50 forming the expansion responsive portion. This

central portion 50 has a relatively large vertical travel in response to a relatively small variation in the charging gas pressure in space 28. This makes it sensitive to small pressure variations and will accurately contact actuator 24 to maintain the desired pressure in space 28 independently of manufacturing tolerance variations.

A liquid draw off means 64' may be carried or supported by the liquid container 10, such as by being secured to the top portion or cover 14 of the container 10. The means 64' may include a discharge connector 66 including a plastic tube structure 68 having a flange 70 which rests on an indented flat wall 72 of top portion 14. The flange 70 may be held in place by a plastic snap ring 74 and a flexible rubber or rubber-like O-ring 76.

The tube structure 68 may have a threaded opening 78 to receive the threaded connector 80 which may have a cutting or rupturing member 82 to rupture the integral rupture seal 84 which may be integral with the tube structure 68. The connector 80 may be secured to the liquid discharge tube or spigot 86 which may include the manually operable control valve 88.

The discharge connector 66 may have a barbed tubular extension 92 over which the plastic tube 94 may be secured and which may extend substantially to the bottom of space 28. The tube 92 can empty substantially the entire liquid contents of receptacle 10.

A bracing member 96 may be made of plastic material and may be connected to the gas receptacle top 20 and to the top portion of the liquid container 10 through the medium of the capsule side wall 60 and top portion 14 of the liquid container. This bracing member 96 tends to hold the actuator 24 of receptacle and the central portion 50 of the capsule 54 in aligned condition. This bracing member may include rings 98 which may be split at 99, if desired, and a plurality of struts 100 joining the two rings 98.

The side wall 60 may have an annular trough 102, and the top 20 may have an annular trough 104 to receive the rings 98.

The embodiment of FIGURES 8 and 9 may be provided with a different type of bracing member 106. The remainder of the embodiment may be substantially the same as shown in FIGURES 1-7 and is not further described except to state that the capsule 54A may be substantially the same and may operate the same as the capsule 54. However, the side wall 60A may be cylindrical and need not be provided with the trough 102. The gas receptacle 16A of the embodiment of FIGURES 8 and 9 may be substantially the same and may operate the same as the gas receptacle 16 of FIGURES 1-7 except that it need not be provided with the trough 104 of receptacle 16.

The bracing member 106 of FIGURES 8 and 9 may be made from plastic material. It may have a cylindraceous neck 108 and upper and lower bells 110 and 112 respectively. The bell 110 receives the lower periphery 114 of the capsule 54A. The bell 112 fits over the bell shaped top 20 of the receptacle 16A.

A plurality of vertical radial fins 116 may be provided mainly to add strength to the bracing member.

The pop-off valve of the embodiment of FIGURES 8 and 9 may be identical with that of FIGURES 1-7. However, a slightly different actuator 24A has been illustrated which has a frusto-conical head and a narrow neck 118 with a passageway 120 which corresponds to passageway 42 of FIGURE 6.

The neck 108 may be provided with openings 122.

Method of manufacture and or filling of the liquid container

The entire container construction may, if desired, be manufactured and filled with liquid or beverage by a novel method which may be practiced in the same establishment or in two or more establishments.

For example, the components may be manufactured and partially assembled by a container manufacturer and

this partially assembled product may be simultaneously filled with liquid and completely assembled at a brewery or other gas charged beverage or other gas charged liquid supplier. However, the method of manufacture of the components, the method of assembly of such components, and the method of filling with liquid may be so coordinated that a very desirable, economical and efficient gas charged liquid container is produced. It can be produced with the convenience of permitting the emptied container to be thrown away, or the like, without the necessity of returning it for refill at the brewery or other filling establishment.

The description of the method involved is given in connection with the embodiment of FIGURES 1-7, but is equally applicable to the embodiment of FIGURES 8 and 9 without specifically applying such description to such embodiment.

The liquid container 10 may have a side wall 124 made of suitable metal, such as of a suitable aluminum alloy with the usual side seam, not shown. It also may be made of spirally wound laminated strip material as now being practiced. Such wall is made of sufficient strength and is so assembled with its bottom and top walls 12 and 14 to withstand the pressures involved with this type of construction. For example, the cylindrical wall 124 may be approximately 11 inches long and 6½ inches internal diameter. The side wall 124 may be secured to the bottom portion 12 by a suitable bead construction 125.

The gas receptacle 16 may be approximately 10 inches in height from the seam construction 126 to the seam construction 128. The side wall 130 may be made of metal, such as of a suitable aluminum alloy and is made of sufficient strength and is so assembled with its bottom wall 132 and the cup 56 to withstand the pressures involved with its construction. The wall 132 may be approximately 3½ inches internal diameter.

When the container construction is to contain beer, for example, the charging gas pressure effective on the beverage or beer may be 10 p.s.i.g. (pounds per square inch gauge) when refrigerated at 35° F. The gas pressure of the CO₂ or the like in the gas receptacle 16 may be approximately 115 p.s.i.g. when refrigerated at 70° F.

The largest internal diameter of the capsule 54 may be approximately 4 inches and the quantity of fluid that is inserted into such capsule, such as air or CO₂, is sufficient to produce a slightly higher pressure than that of the gas pressure effective on the beverage. For example, the gas pressure in the capsule may be 12 p.s.i.g. when refrigerated to 35° F.

The side wall 124 may be assembled with the bottom portion or wall 12 with a suitable seam 134 by the container manufacturer or at the brewery. The bottom wall 12 may be formed with a seam receiving undulation 136 to receive the seam 126 of the receptacle 16. The wall 12 may also be formed with a dome portion 138 to receive the dome shaped bottom 132 of the receptacle 16.

The gas receptacle 16 may be charged with CO₂ or the like through the pop-off valve or through a charging valve, not shown, similar to valve 62. The receptacle 16 may be charged with gas while the receptacle 16 is still outside the container 10 or it may be charged after it is inserted in the container 10.

The charged or uncharged receptacle 16 may be secured in the undulation 136 by inserting the seam 126 in the undulation 136 and by pressing the undulation 136 tightly around the seam 126 below the rim 140 as desired, or by any other method. Because of the simple method of assembly and filling with liquid, the seam 126 is tightly fitted in the undulation 136, and will prevent the bottom 12 from being collapsed outwardly by the charging pressure.

The container 10 may be constructed of steel, aluminum, plastic, paper. It may be a container of sufficient size to contain the volume of liquid product to be merchandised, plus a volume equal to the volume of the gas

receptacle 16. The receptacle 16 holds a gas (CO₂) of sufficient quantity to dispense the liquid product at the same terminus pressure, when the container is nearly empty, as at initial pressure, when the container 10 is substantially full.

The receptacle 16 may be a "bomb" type receptacle which is rigidly secured to the bottom 12 of outer liquid product container 10 and to the hollow container or capsule 54, which is affixed to top 14 of outer product container 10. The "bomb" receptacle 16 has a standard "bomb" pressure valve 22. The hollow container or capsule 54, which is affixed to the "bomb" 16 has a bottom 52 that is flexible and a top 58 which is fitted with an air fill valve 62. The top 14 of product container 10 has a discharge connector 66, FIGURE 7, on one side to which a plastic draw tube 94 is attached on the inside. The connector 66 is threaded on the outside at 78 so spigot 86 can be attached, which at time of attachment breaks the diaphragm 84.

The outer liquid container 10 is made by standard methods. The charging gas receptacle or "bomb" 16 is also made by standard methods. The air activator container or capsule 54 may be made by standard methods but of special profile. The pop off valve 22 is made by standard methods. Assembly of the gas receptacle or "bomb" 16 to the air activator or capsule 54 may be done on special machinery. The gas receptacle or "bomb" 16 is charged with CO₂ prior to affixing to activator capsule 54. The outer liquid container 10 with bottom 12 and top 14 affixed thereto is shipped to point of fill, such as at a brewery. The "bomb" 16-air capsule 54 assembled unit is also shipped to the brewery or point of fill as integrated unit.

The product or liquid, such as beer, is introduced into outer container 10, using standard racking. The "bomb" 16-air capsule 54 unit is inserted into opening at 61 and is liquid tight sealed to the container top 14 and pressure attached or squeezed at 136, 126 to the container bottom 12. A measured amount of air is injected into the air capsule 54 through the self-sealing plug 62. This filled and completed assembly is shipped to distribution points.

The consumer purchases the filled and completed assembly just described. It may be supplied with a spigot 86, or spigots may be made available for sale as separate items. Many inexpensive and deluxe spigots may be offered. The consumer attaches the spigot 86 to discharge connector 66, FIGURE 7, which breaks the diaphragm seal 84. From this point as product is dispensed through spigot 86 under control of valve 88, the air capsule 54 reacts to the differential pressure in the container 10 and keeps liquid product under uniform head gas pressure until the liquid product has been completely dispensed.

When the liquid product is consumed, the entire container assembly may be thrown away. If customer is using a deluxe or custom spigot, this is detached and cleaned for subsequent use.

For economy, it is advantageous if both the top and bottom ends 14 and 12 of the liquid container 10 are held together through the center by the medium of the gas "bomb" 16 capsule 54 assembly which is attached securely to the bottom 12 and top 14. This permits thinner gauge ends 12 and 14 for any given pressure without danger of outward collapse of the ends 12 and 14.

The embodiment of FIGURES 8 and 9 provides a bracing member 106 which may be easily fitted with the bell 112 to and over the top 20 of the gas receptacle 16A. Also the bell 110 may be secured to the capsule 54A before the gas receptacle 16A and capsule 54A are inserted into the cover 14 of the liquid container, not shown in FIGURES 8 and 9 but similar to container 10 of FIGURES 1-7. Thereafter, the capsule 54A is attached to the cover 14, and the bottom of receptacle 16A is attached to the bottom of the liquid container as

shown and described in connection with the lower part of FIGURE 4.

It is thus to be seen that a new, useful and unobvious gas charged liquid container construction and method of manufacture and of filling the same have been provided.

While the form of the invention now preferred has been disclosed as required by statute, other forms may be used, all coming within the scope of the claimed subject matter which follows.

What is claimed is:

1. In combination: a gas charged liquid container having a side wall portion, a bottom portion and a top portion; a gas receptacle in said liquid container having a gas receptacle bottom supported by said bottom portion of said liquid container and having a gas receptacle top extending upwardly adjacent said top portion of said liquid container; a gas pop-off valve secured to said gas receptacle top and having a gas pop-off valve actuator; a fluid expansion capsule secured to said top portion of said liquid container with an expansion responsive portion to actuate said pop-off valve actuator in response to the charging gas pressure effective on the liquid in said container automatically to maintain a desired charging gas pressure effective on said liquid in said liquid container as liquid is drawn from said liquid container; and a liquid draw-off means for said liquid container.

2. In combination: a gas charged liquid container having a side wall portion, a bottom portion and a top portion; a gas receptacle in said liquid container having a gas receptacle bottom supported by said bottom portion of said liquid container and having a gas receptacle top extending upwardly adjacent said top portion of said liquid container; a gas pop-off valve secured to said gas receptacle top and having a gas pop-off valve actuator; a fluid expansion capsule secured to said top portion of said liquid container with an expansion responsive portion to actuate said pop-off valve actuator in response to the charging gas pressure effective on the liquid in said container automatically to maintain a desired charging gas pressure effective on said liquid in said liquid container as liquid is drawn from said liquid container; and a liquid draw-off means for said liquid container, said combination having a bracing member connected to said gas receptacle top and to said top portion of said liquid container.

3. A combination according to claim 2 having said bracing member connected to said top portion of said container through the medium of said capsule.

4. A combination according to claim 1 with said capsule having a relatively large horizontal area bottom diaphragm with its central portion forming said expansion responsive portion, said central portion having a relatively large vertical travel in response to a relatively small variation in charging gas pressure effective on said liquid in said container said capsule having an upper capsule wall exposed outside said top portion of said container, and a charging valve on said upper capsule wall, said valve being accessible outside said capsule and said container to charge said capsule with gas at the proper pressure to maintain the desired gas pressure effective on the liquid in said container.

5. A combination according to claim 1 having a self sealing expansible fluid charging valve on said capsule accessible outside said capsule and said container to charge said capsule with gas at the proper pressure to maintain the desired gas pressure effective on liquid in said container.

6. A combination according to claim 1 having said liquid draw-off means carried by said top portion of said liquid container with a rupture seal on said draw-off means, said draw-off means having a rupture means to rupture said seal.

7. In combination: a gas charged liquid container having a side wall portion, a bottom portion and a top por-

tion; a gas receptacle in said liquid container having a gas receptacle bottom supported by said bottom portion of said liquid container and having a gas receptacle top extending upwardly adjacent said top portion of said liquid container; a gas pop-off valve secured to said gas receptacle and having a gas pop-off valve actuator; a pressure responsive capsule supported in said liquid container with a pressure responsive portion to actuate said pop-off valve actuator in response to the charging gas pressure effective on the liquid in said container automatically to maintain a desired charging gas pressure effective on said liquid as said liquid is drawn from said liquid container said capsule having an upper capsule wall exposed outside said top portion of said container, and a charging valve on said upper capsule wall, said valve being accessible outside said capsule and said container to charge said capsule with gas at the proper pressure to maintain the desired gas pressure effective on the liquid in said container; and a liquid draw-off means for said liquid container.

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8. A combination according to claim 7 with said pop-off valve secured to said gas receptacle top.

9. A combination according to claim 7 with said capsule supported adjacent said top portion of said liquid container.

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