May 1, 1962 J. J. HEYDON ET AL 3,032,055

LIQUID DISPENSER

Filed Sept. 22, 1958 2 Sheets-Sheet 1

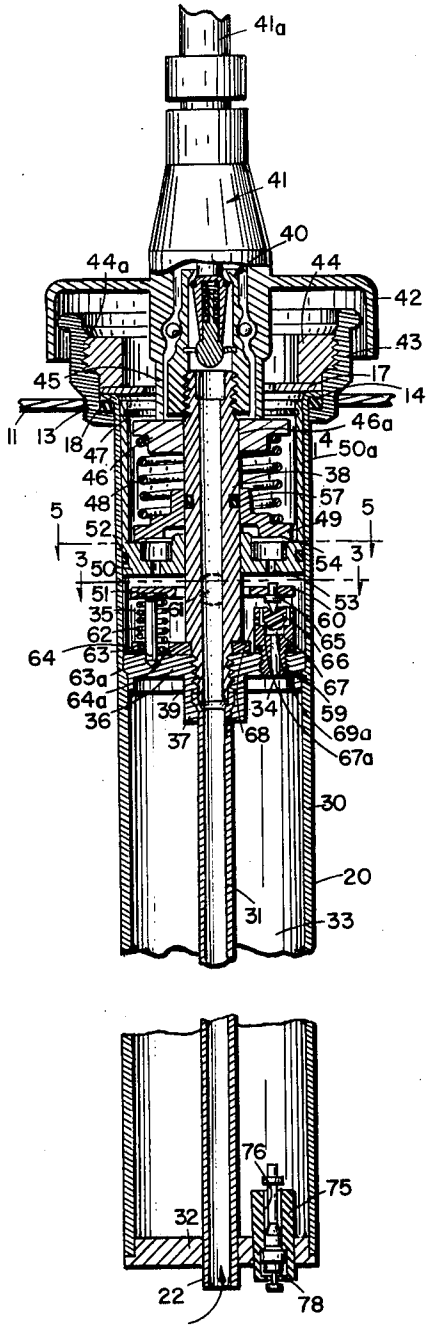


FIG. 2

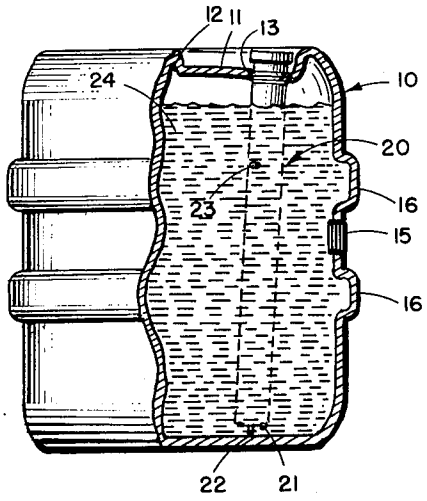


FIG. 1

INVENTORS.
JOHN J. HEYDON
WILLIAM P. TAYLOR
BY Thomas S. MacDonald
ATTORNEY

May 1, 1962 J. J. HEYDON ET AL 3,032,055

LIQUID DISPENSER

Filed Sept. 22, 1958 2 Sheets-Sheet 2

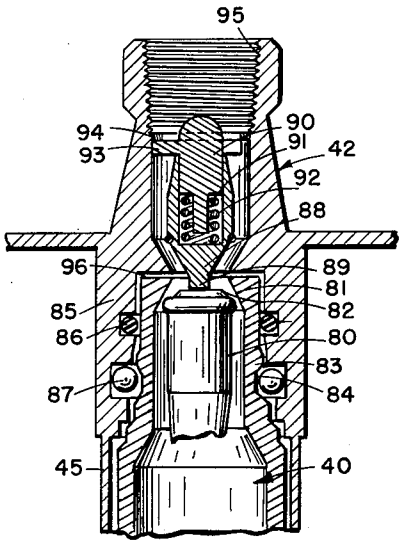


FIG. 6

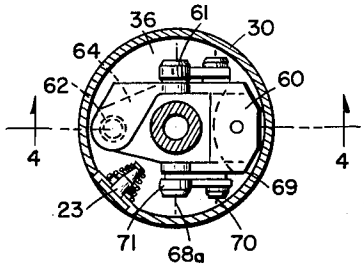


FIG. 3

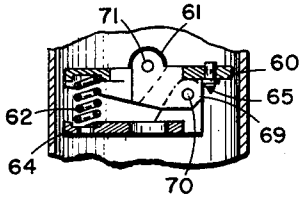


FIG. 4

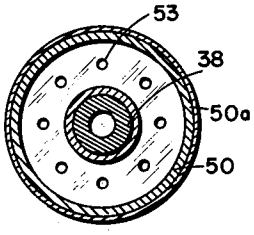


FIG. 5

INVENTORS.
JOHN J. HEYDON
WILLIAM P. TAYLOR

BY Thomas S. MacDonald

ATTORNEY

United States Patent Office 3,032,055 Patented May 1, 1962

3,032,055

LIQUID DISPENSER

John J. Heydon, 611 W. Hill Ave., Fullerton, Calif., and William P. Taylor, 648 N. Osborn, West Covina, Calif.

Filed Sept. 22, 1958, Ser. No. 762,357
12 Claims. (Cl. 137—212)

The present invention is directed to liquid-dispensing apparatus. More particularly, the present invention concerns an improved self-contained dispensing unit for the serving of carbonated beverages, such as beer or soft drinks or for the discharge of other liquids.

Heretofore the serving of carbonated beverages has been accomplished, particularly in the case of beer, by providing a keg of the beverage in conjunction with a conventional pressure cylinder containing carbon dioxide under pressure and a regulator which supplies carbon dioxide gas at a reduced pressure to force the beer from the keg. In the majority of installations a so-called tap rod is connected directly into the top of the keg, is connected to the CO_2 cylinder and to a conduit leading to the dispenser itself. A version of this prior art apparatus is seen in U.S. Letters Patent No. 2,335,595. Drawbacks to this and other prior art devices include that they will operate on only certain type kegs, they do not contain their own CO_2 supply, they can be improperly installed, and that there is no assurance of the quality of the beer dispensed due to the fact that the matter of cleanliness is left up to each individual establishment which have widely differing standards of care. From the standpoint of the ultimate user of the prior art equipment much inconvenience is caused by the necessity of handling the heavy and cumbersome CO_2 cylinders and the fragile regulators and compressed air pumps needed in the various installations. Many prospective outlets for draught beer do not have the necessary space for the auxiliaries needed in the prior art dispensing systems. The present invention solves the above difficulties by providing a dispensing apparatus which insures quality of the product from the time the beer leaves the brewery until it is dispensed into the glass at the tap. It is a device which is easy and quick to assemble, remove, clean, maintain, refill and operate in a tamperproof manner in standard kegs of varying size.

An object of this invention is to provide a self-contained liquid dispenser.

A further object of this invention is to provide a beverage dispenser within a standard beverage container adapted to provide optimum carbonization at a pressure dependent on temperature.

A still further object of this invention is to provide a self-contained dispensing unit within a beverage container such as a beer or ale keg.

An additional object of this invention is to provide a self-contained keg pressurization unit capable of venting at predetermined maximum temperatures within the keg and of regulating pressures within said keg within a predetermined temperature range.

A further object of this invention is to provide a draught beer dispensing apparatus self-contained within a beer keg which is usable with standard kegs and standard connectors leading to the bar tap.

A still further object of this invention is to provide a foolproof keg pressurization system having a simple piston and valve combination for dispensing high quality beverages at a desired carbonation level.

The above objects, as well as other objects of this invention, will be seen in the accompanying drawings in which

FIG. 1 is a partial cutaway cross-sectional view of a beverage-containing barrel having a self-contained pressurization unit therein;

FIG. 2 is a cross-sectional view of the pressurization unit taken in a plane including the major longitudinal axis of the unit;

FIG. 3 is a top plan view of the pressure valve of the unit taken on the lines 3—3 of FIG. 2;

FIG. 4 is a side view of the valve actuating mechanism and movable member taken on the lines 4—4 of FIG. 3 without the central tube being shown for reasons of clarity;

FIG. 5 is a top plan view of the lower piston valve actuating plate taken on the lines 5—5 of FIG. 2;

And FIG. 6 is a detailed cross-sectional view of the connector and keg connection used in the present invention.

The invention hereinafter described broadly comprises a pressurizing unit which is ordinarily insertable at the brewery or beverage manufacturing plant into the beverage-containing tank or keg. The unit is of cylindrical shape and has a confied source of relatively high pressure fluid in the gaseous or liquified gas state below a piston-operated demand valve which is actuatable in turn by the means coupling the unit to the actual dispensing mechanism and by changes in pressure due to demand and temperature fluctuations within the tank.

FIGURE 1 is a partial cutaway cross-sectional view of a standard stainless steel beer keg **10** having the pressurization unit **20** therein. The keg **10** contains a well **12** having a bottom wall **11** extending across a segment of the top wall of the keg. The unit **20** is insertible into a collar **43** which is part of a standard keg, upstanding from aperture **13**. A conventional bung plug **15** is provided between protective ribs **16** around the periphery of the keg. The unit **20** is submerged within a beverage **24** which is adapted to flow up through an axial bore within the unit entering such bore through open nipple **22**. A fill valve **21** for filling the gas container portion of the unit also extends from the bottom of the unit. A check valve **23** within a peripheral wall of the unit affords a means allowing access of the gas within the pressure source of the unit to the fluid containing portion within the keg **10**.

FIGURE 2 is a cross-sectional view of the pressurizing unit as mounted in the collar **43** of the beverage keg. The unit **20** has a circular lip portion **18** which is adapted to seat on a gasket **14** positioned on the bottom of collar **43**, a metal ring disc **17** is placed over the lip **18** and a nut **44** having external threads is screwed into threads **44***a* on the inner periphery of member **43**. The aperture in ring disc **17** has a minimum diameter which allows access of actuating portions **45** to disc **46** as hereinafter described. The unit **20** has an exterior cylindrical high-strength casing **30** extending from lip **18** and has a discharge tube **31** extending axially therethrough between a bottom sealing plate **32** and a transverse top plate **36**. The volume **33** between these plates and the annulus between the casing **30** and tube **31** contains a high pressure gas, typically liquified carbon dioxide or other source of confined gas inert to the fluid being dispensed. Plates **32** and **36** are normally brazed in gas sealed relation to casing **30**. An exit aperture **34** connects the source of confined high pressure gas to an upper piston and valve chamber generally designated as **35**. Sealing plate **36** has a depending collar cap portion **37** into which tube **31** is connected. The upper portion **39** of collar **37** is threaded and receives a complementary threaded portion of a hollow, upwardly extending shaft **38**. Shaft **38** has a coupling member **40** threadedly mounted on its upper end to seal off the axial passageway formed through the pressurizing unit by tube **31** and shaft **38**. This coupling member **40** is actuated by a second coupling member or connector **41** which acts to both open the valve seal at the top of the axial passageway and to actuate the hereinafter described piston mechanism insuring a prescribed beverage pressurization regard-

less of demand from the beverage dispensing tap (not shown), which is connected by suitable conduits 41*a* to coupling member 41, or of fluctuations due to temperature changes within the keg and unit.

Coupling member 41 has a peripherally depending skirt or sleeve 42 extending over collar 43 to protect the top of the pressurization unit 20 from ingress of foreign matter.

Coupling member 41 has a collar-like, depending actuating portion 45 extending therefrom and is adapted to press and push down on a spring retainer disc 46 removing it from its normal seat against a snap retaining ring 47 situated on the top inner periphery of an upward facing skirt 50*a* on a movable piston member 50. Piston member 50 is provided with an O-ring seal 52 providing for dynamic sealing of the piston with respect to the unit casing 30.

A relief poppet valve 49, forming with the piston member 50*a* valve-operating piston assembly, is dynamically sealed with respect to shaft 38 by O-ring 57, and normally is spring-loaded by a spring 48, retained by ring 46, against a ridged surface 54 on the piston 50. The lower edge of the poppet valve 49 will normally have a knife edge so as to be normally in sealing contact with surface 54. The head of piston 50 contains multiple apertures 53 which provide passageways for the released gas which, upon the attainment of an excess of pressure, lifts poppet valve 49, bleeding off excess pressure through the gap between the depressed spring retainer disc 46 and retaining ring 47. The poppet thus acts as a safety valve to prevent overpressurization within the unit 20. The spring 48 and poppet valve 49 serve a further function, namely, to provide a predetermined downward force on piston 50 in an amount which controls a demand valve 59, leading to the source of confined high pressure gas 33. This valve 59 controls the supply of gas to the chamber 35 in a predetermined pressure range. The underside of piston 50 presses against actuating rollers 61 (dotted in FIG. 2) attached to a lever portion 60 which is pivoted on a pivot plate 64 (shown in detail in FIG. 4). Lever 60 has a bottom recessed seat 51 which holds a spring 62 surrounding a pin 63 held in a recess 63*a* in sealing plate 36 and which is adapted to pass through an aperture 64*a* in plate 64. A valve seat contact 65 is provided on the opposite side of lever 60 from spring seat 51 which is adapted to put a variable force on a movable valve 66 which is adapted to seat at 67*a* on a valve seat 67 forming aperture 34. Valve 66 has a pilot portion 69*a* to guide the valve into its seat. Apertures 68 are provided above the actual seat 67*a* around the periphery of valve seat 67 to provide a flow passage for the CO_2 gas into chamber 35.

Operation of the regulator portion of the pressurization unit commences when the connector means 41 is inserted on the coupling member 40 attached to the central shaft, simultaneously opening the delivery or on-off valve within member 40 and depressing spring 48 by the action of portion 45 against the spring retaining disc 46. This moves the piston 50 downwardly with a force against the rollers 61 which tilts or pivots plate 60 forcing down spring 62 and raising contact 65 allowing ingress of gas to the middle pressure chamber 35. As shown, valve 66 has a conical portion of 60° which seats when closed on a right angle seat edge at 67*a*. When a prescribed pressure, say 14 pounds per square inch, is reached the piston assembly 50 starts to raise due to the overcoming of the particular spring force of spring 48. This relieves the force on rollers 61 which allows lever 60 to pivot clockwise under the spring action of return spring 62, pushing down contact 65 against valve 66 to prevent further ingress of gas to the middle chamber. The spring force of springs 48 and 62, the mechanical advantage of the various linkages, and particular area on the underside of valve 66 upon which the confined fluid (gasified or liquified) acts, all have values to give the predetermined pressure within the middle chamber 35. The pressure in the middle chamber 35 is communicated to the interior of the keg or container to act on the liquid therein through check valve 23 leading from that chamber through the peripheral wall of the outer shell 30. When beer or other beverage is drawn off from the dispensing unit or tap (not shown) connected to conduit 41*a*, pressure is reduced in the keg. This pressure rises to the set valve by a flow of gas from the middle chamber which is kept in a particular range by the aforesaid action of spring 48 and piston 50.

When conventional regulators are used to dispense carbonated beverages they are set to place a constant pressure on the liquid within the container. The actual pressure desired within the container, however, is dependent on temperature. When the beverage is at a higher temperature than the temperature corresponding to the pressure setting of the regulator, the resulting pressure is not sufficient to maintain the beverage at the degree of carbonization needed to give a prescribed quality but gives a flat product. Conversely, if the temperature is low, the resulting pressure is too great and results in excessive carbonization with resultant foaming and wildness. The present regulator herein described provides a proper degree of carbonization within the beer giving good quality regardless of temperature and demand fluctuations. The present device delivers approximately one-half pound per square inch or less or additional pressure per degree of temperature differential in order to keep this quality. Thus, if 12 p.s.i. gives desired quality at 38° F. the present device will place 11 p.s.i. on the beer at 36° F. and 13 p.s.i. at 40° F., etc. In the case of certain carbonated soft drinks about 50 p.s.i. is maintained on the liquid at a predetermined temperature and fluctuations made of the pressure dependent on temperature changes.

The above regulator gives the desired temperature-pressure relationship by reason of the differential piston action of the high pressure piston member or valve 66 which has an underside area acted upon by the confined fluid. This fluid, which has a vapor pressure proportional to temperature, causes the regulated pressure to be proportional to the temperature of the pressurizing fluid. The beverage surrounding wall 20 and the beverage flowing through the concentric passage 22 maintain the pressurizing medium at the same temperature as the beverage.

In the event that excess pressures are developed in the middle chamber 35 the popet valve 49 is adapted to lift off its seat on the top of piston 50 around ridge 54 to vent around the exterior periphery of disc 46 to the surrounding air.

Before the pressurization unit is actuated by the connector 41 the disc 46 acts to seal the top end of the unit from the ingress of foreign material. If unduly high pressures develop in the fluid chamber 33 before the connector 41 is connected, the excess pressure will force poppet valve 66 off its seat against the spring force 62 to chamber 35. Gas will then vent to the surrounding air when chamber 35 reaches the pressure required to unseal poppet 49. This feature insures that any beer, which has stood in the heat, i.e., in an uncooled condition and had the keg temperature raised to a prescribed degree, will have its gas source vented off preventing use of impalatable beer by the beer purveyor.

FIGURE 2 further shows means for refilling the CO_2 portion of the unit after it has been returned to the brewery and cleaned. This means comprises an insert 75 welded or brazed into the end plate 32 which insert has an internal bore 76 containing a one-way fill valve 78 of conventional construction.

FIGURE 3, taken on the line 3—3 of FIG. 2, shows in plan view the top of lever 60, rollers 61 and 71 on either side thereof and depending side portions which are pivoted on a pin 70 extending through said side portions and upstanding ears 69 on either side of pivot plate 64. Thus, members 60 and 64 have channel portions which pivot with respect to each other. It is to be noticed that centerline 68*a* between the axes of the rollers 61 and 71 is located offset from the axis of the pivot pin 70 to allow

clockwise or counterclockwise motion of pivot lever **60**.

FIGURE 4 shows a side view of the demand valve actuating means wherein the pivotal movement of lever **60** with respect to the pivot plate **64** is clearly seen.

FIGURE 5 illustrates in detail the apertures **53** formed in the piston face which connects the two volumes in the middle valve and piston chamber **35**.

FIGURE 6 is a partial cross-sectional view of the connector and coupling member of this invention in which the sealing plug valve **80** is in side view. Plug **80** has a tapered end **82** which is normally spring pressed (FIG. 2) against a sealing surface **81**. The pressure on the fluid within the keg or container into which unit **20** is mounted is communicated to plug **80** and affords a positive seal against fluid leakage. An upstanding nipple portion **83** on member **40** has a ball-receiving groove **84** on its inner periphery. Connector **42** has a main body portion **85** containing an O-ring **86** adapted to seal with nipple **83** and a series of retained locking balls **87**. The upper part of connector **42** contains a centrally spaced contactor pin **88** having an elongated head portion **89**. Pin **88** is spring floated in connector **42** by the action of a spring **92** provided in a recess **91** between pin **88** and a piston pin **90** fixed in the connector by disc **93** and snap ring **94**. When connector **42** is snapped over member **40** the head portion **89** depresses plug **80** allowing fluid to flow out of member **40** around plug **80** and pin **88**, through the connector and to the dispensing tap (not shown) which is connected by suitable conduits (not shown) to threaded portions **95** of connector **42**. When the connector **42** is not in place the top of plug **80** is normally slightly below the peripheral top edge **96** of nipple **83** in order to prevent accidental opening of the top on-off valve by depression of plug **80**.

Although the invention has been described and illustrated in detail, it is to be clearly understood that the same is by way of illustration and example only and is not to be taken by way of limitation, the spirit and scope of this invention being limited only by the terms of the appended claims.

We claim:

1. In combination, a liquid container and a pressurization unit therefor, said pressurization unit comprising an outer shell having a source of high pressure fluid therein, valve means within said shell to release a prescribed pressure of said fluid in the gaseous state externally of said shell, tube means within said shell to conduct pressurized liquid from said container up through said unit and adapted to be connected to a conduit leading to a dispensing unit, a second valve means within said tube means, and connector means to actuate said first-mentioned valve means, allowing attainment of said prescribed pressure and to actuate said second valve means allowing flow of liquid from said tube means through said connector means.

2. In combination, a liquid container and means for flowing liquid from said container, said means comprising a pressurization unit adapted to be inserted into said container, said unit including a source of confined relatively high pressure fluid, valve means leading exteriorly from said unit, regulator means in said unit insuring egress of fluid in the gaseous state from said source through said valve means in a predetermined pressure range, tube means extending from said unit when said unit is inserted into said container and a liquid flow valve within said tube means; and connector means leading to a liquid dispensing unit, said connector means having a portion adapted to open said liquid flow valve when said connector means is connected to said tube means and a portion to actuate said regulator means.

3. The invention as set out in claim 2 in which said regulator means includes a check valve leading from said source of confined fluid and a spring actuatable by said connector means.

4. The invention as set out in claim 3 including a spring-depressing disc normally sealing the top end of said unit, said disc being movable against said spring by said connector means when said connector means is connected to said tube means.

5. The invention as set out in claim 4 including a piston member actuatable by said spring and a spring-pressed pivoted valve operating lever between said piston member and said check valve adapted to actuate said check valve in response to the force transmitted by said piston member.

6. The invention as set out in claim 4 further including skirt means peripherally attached to said connector means to prevent ingress of foreign material into said pressurization unit after said connector means has moved said disc against said spring.

7. In a liquid dispensing apparatus, means for retaining the quality of the dispensed product comprising a normally sealed dispensing tank, means in said tank to pressurize liquid within said tank with a gas soluble in said liquid, means to regulate said last-mentioned means in a predetermined range upon drawing off liquid from said tank, and means including the liquid soluble gas pressurizing said liquid to adjust the pressure on said liquid downwardly or upwardly in response to a lowering or rising, respectively, of the temperature of said liquid within said tank.

8. A keg pressurization unit comprising an outer shell, means attached to said shell for detachably securing said unit within a container, a first normally sealed lower chamber within said shell for containing a source of high pressure fluid, a second chamber above said lower chamber, a one-way valve in a wall of said shell leading from said second chamber to the exterior of said shell below said means, a demand valve extending between said first and second chambers, means including a piston assembly in said second chamber normally sealing said second chamber, said piston assembly including means to open said demand valve to keep a predetermined pressure within said chamber and an actuating disc having a top surface exposed to the exterior of and at the top of said outer shell, said disc being adapted to be depressed to provide a predetermined force on said last-mentioned means to control said demand valve.

9. A pressurization unit comprising an outer shell having a one-way valve in the periphery thereof and having a source of high pressure fluid therein, first valve means within said shell to release a prescribed pressure of said fluid in the gaseous state externally of said shell through said one-way valve, hollow tube means adapted to conduct a pressurized liquid and extending up through said unit, a piston assembly within said shell for operating said first valve means, said assembly being slidably mounted on the exterior of said tube means, and a second valve means within said tube means actuatable to an open position to allow flow of pressurized liquid from said tube means.

10. A keg pressurization unit comprising a cylindrical outer shell, means attached to said shell for detachably securing said unit within a container, normally sealed lower chamber within said shell for containing a source of high pressure fluid, a second normally sealed chamber above said lower chamber adapted to contain gas at a desired pressure lower than that of said high pressure fluid, a one-way valve in a wall of said shell leading from said second chamber to the exterior of said shell below said means for releasing said gas from said second chamber exteriorly of said shell responsive to a lower pressure outside of said shell, a third chamber above said second chamber and adjacent to said means, spring means within said third chamber, a valve-operating piston assembly separating said second chamber and said third chamber, a portion of said piston assembly abutting said spring means and normally sealing said second chamber up to a maximum predetermined pressure, increase of said predetermined pressure being adapted to move said portion of said piston assembly to release pressure from said second chamber to said third chamber and to vent, said valve-

operating piston assembly being in operable juxtaposition to a demand valve extending between said first and second chambers to keep a predetermined pressure range within said second chamber, said demand valve being urged to an open position by said spring means acting on said piston assembly, and including a beverage keg and in which a central tube for removing liquid from said keg is provided through each of said chambers and in which said chambers annularly extend between the ends of said shell and the outer periphery of said tube and inner periphery of said shell.

11. A keg pressurization unit comprising a cylindrical outer shell, means attached to said shell for detachably securing said unit within a container, a normally sealed lower chamber within said shell for containing a source of high pressure fluid, a second normally sealed chamber above said lower chamber adapted to contain gas at a desired pressure lower than that of said high pressure fluid, a one-way valve in a wall of said shell leading from said second chamber to the exterior of said shell below said means for releasing said gas from said second chamber exteriorly of said shell responsive to a lower pressure outside of said shell, a third chamber above said second chamber and adjacent to said means, spring means within said third chamber, a valve-operating piston assembly separating said second chamber and said third chamber, a portion of said piston assembly abutting said spring means and normally sealing said second chamber up to a maximum predetermined pressure, increase of said predetermined pressure being adapted to move said portion of said piston assembly to release pressure from said said chamber to said third chamber and to vent, said valve-operating piston assembly being in operable juxtaposition to a demand valve extending between said first and second chambers to keep a predetermined pressure range within said second chamber, said demand valve being urged to an open position by said spring means acting on said piston assembly, and in which said piston assembly has means forming apertures therein allowing the pressure in said second chamber to act on the underside of said portion of said piston assembly.

12. A keg pressurization unit comprising a cylindrical outer shell, means attached to said shell for detachably securing said unit within a container, a normally sealed lower chamber within said shell for containing a source of high pressure fluid, a second normally sealed chamber

above said lower chamber adapted to contain gas at a desired pressure lower than that of said high pressure fluid, a one-way valve in a wall of said shell leading from said second chamber to the exterior of said shell below said means for releasing said gas from said second chamber exteriorly of said shell responsive to a lower pressure outside of said shell, a third chamber above said second chamber and adjacent to said means, spring means within said third chamber, a valve-operating piston assembly separating said second chamber and said third chamber, a portion of said piston assembly abutting said spring means and normally sealing said second chamber up to a maximum predetermined pressure, increase of said predetermined pressure being adapted to move said portion of said piston assembly to release pressure from said second chamber to said third chamber and to vent, said valve-operating piston assembly being in operable juxtaposition to a demand valve extending between said first and second chambers to keep a predetermined pressure range within said second chamber, said demand valve being urged to an open position by said spring means acting on said piston assembly, and including a movable top closure disc extending across the top inner periphery of said shell and in abutting loading relation with said spring means and further including a beverage keg and in which a central tube for removing liquid from said keg is provided through each of said chambers and extending through said disc, and a valve means provided in said tube exteriorly of said disc, said disc and said valve means being simultaneously operable by a connector telescopically inserted over the top end of said central tube to open said valve means and move said disc against said spring means.

References Cited in the file of this patent

UNITED STATES PATENTS

597,292	Lindner et al.	Jan. 11, 1898
1,363,470	Knudsen	Dec. 28, 1920
1,595,809	Nichols	Aug. 10, 1926
1,959,815	Corcoran	May 22, 1934
2,335,595	Kromer	Nov. 30, 1943
2,501,611	Nicholson	Mar. 21, 1950
2,823,048	Hansen	Feb. 11, 1958
2,864,395	Parr	Dec. 16, 1958
2,867,234	Billington	Jan. 6, 1959