

J. B. WILSON
DISPENSING CONTAINER HAVING A GAS
PRESSURE CONTAINER THEREIN

6 Sheets-Sheet 1

Filed July 5, 1962

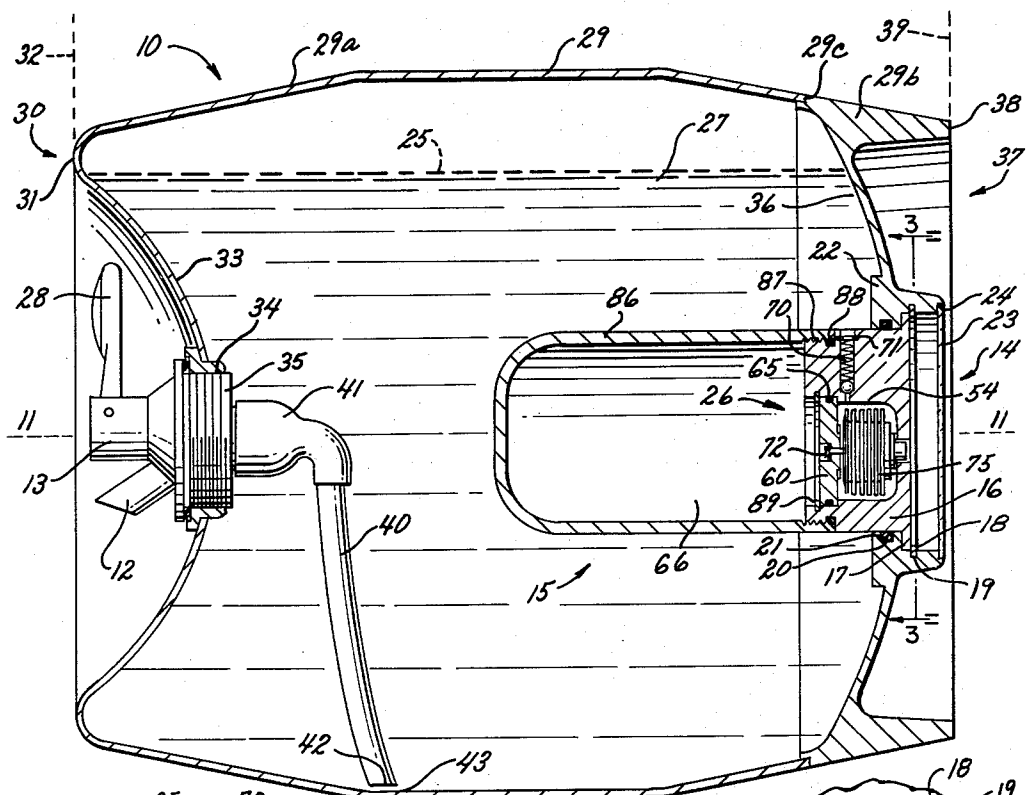


FIG. 1

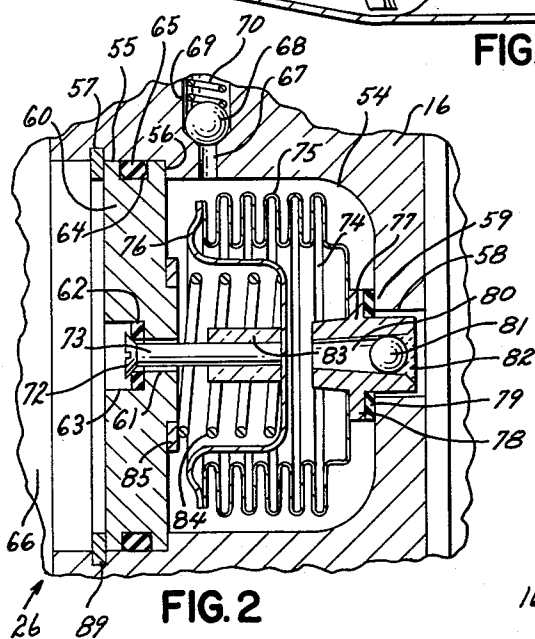


FIG. 2

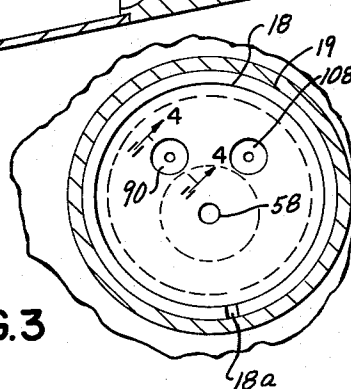


FIG.3

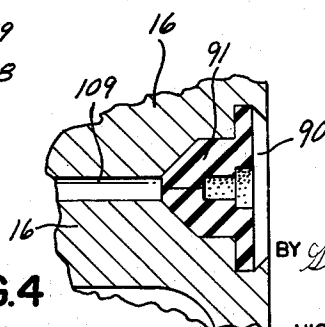


FIG.4

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March 29, 1966

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DISPENSING CONTAINER HAVING A GAS
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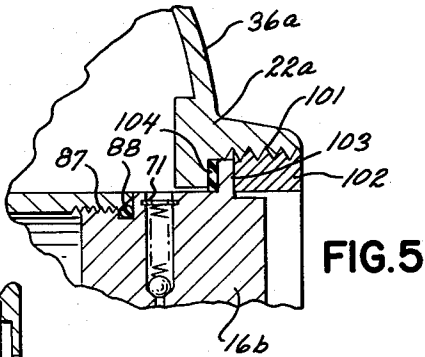


FIG. 5

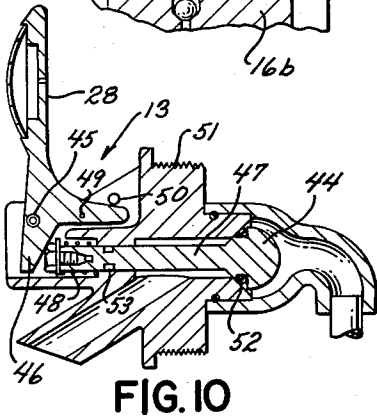


FIG. 10

FIG. 6

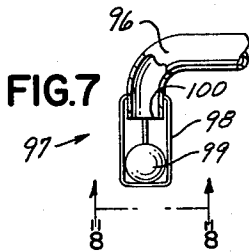
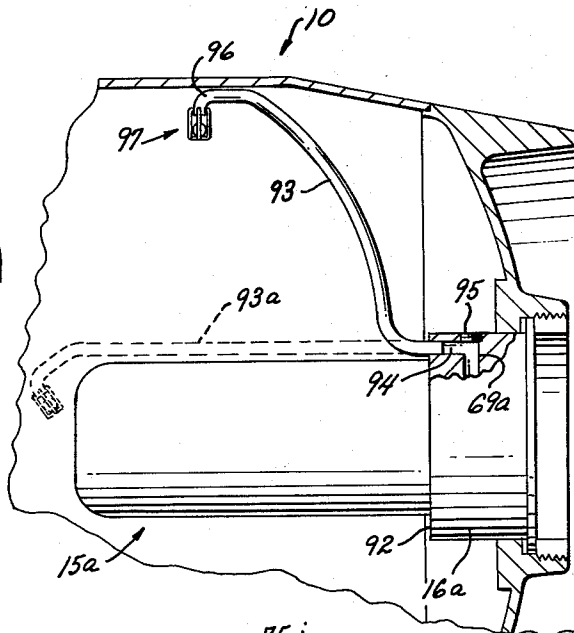


FIG. 7

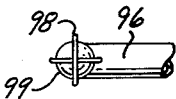


FIG. 8

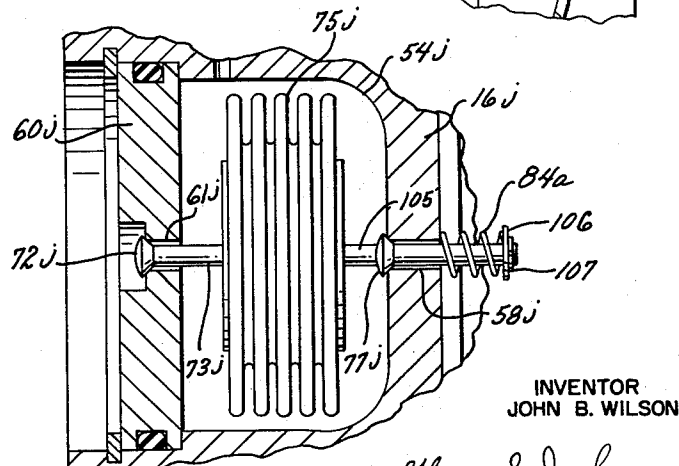


FIG. 9

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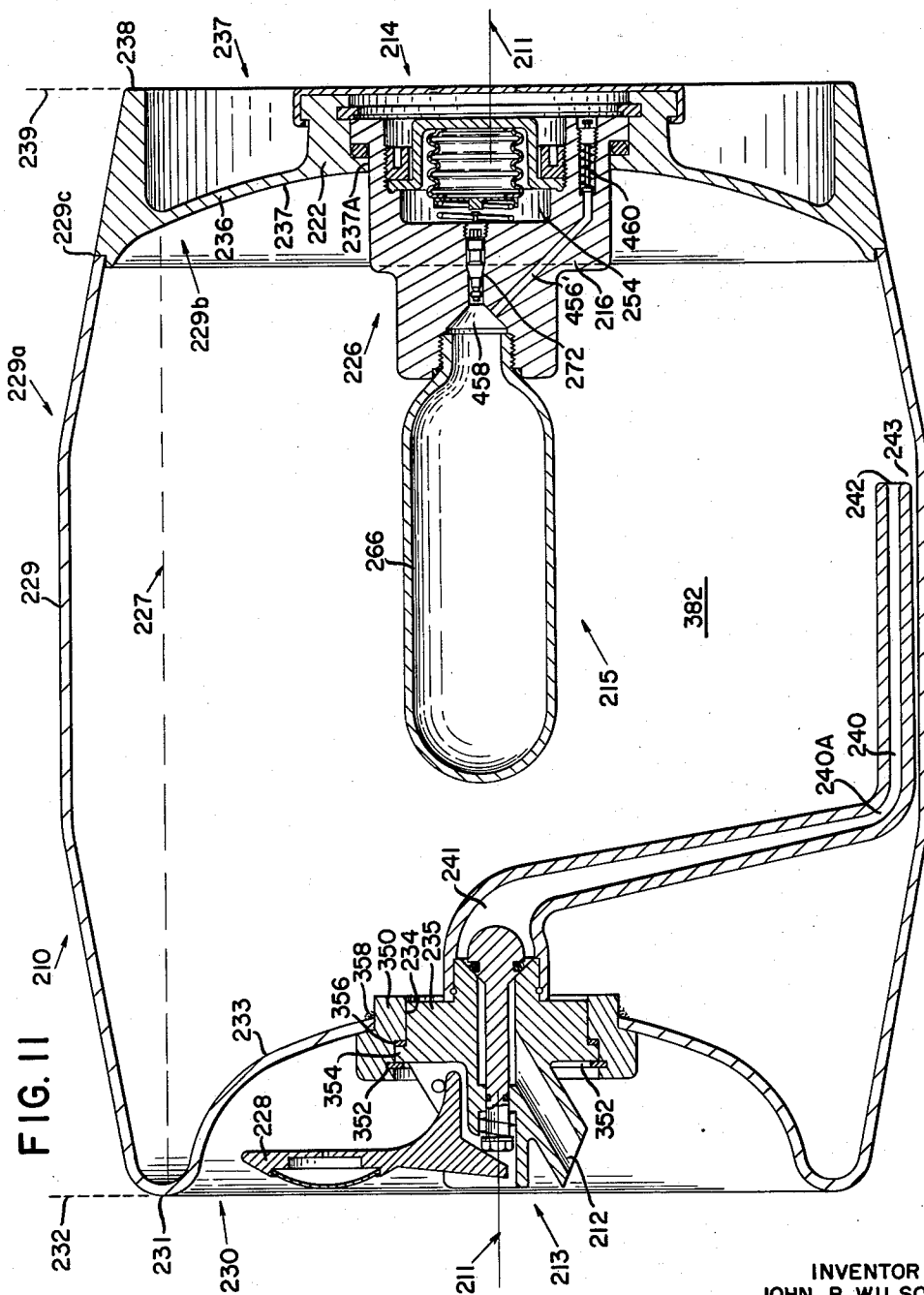
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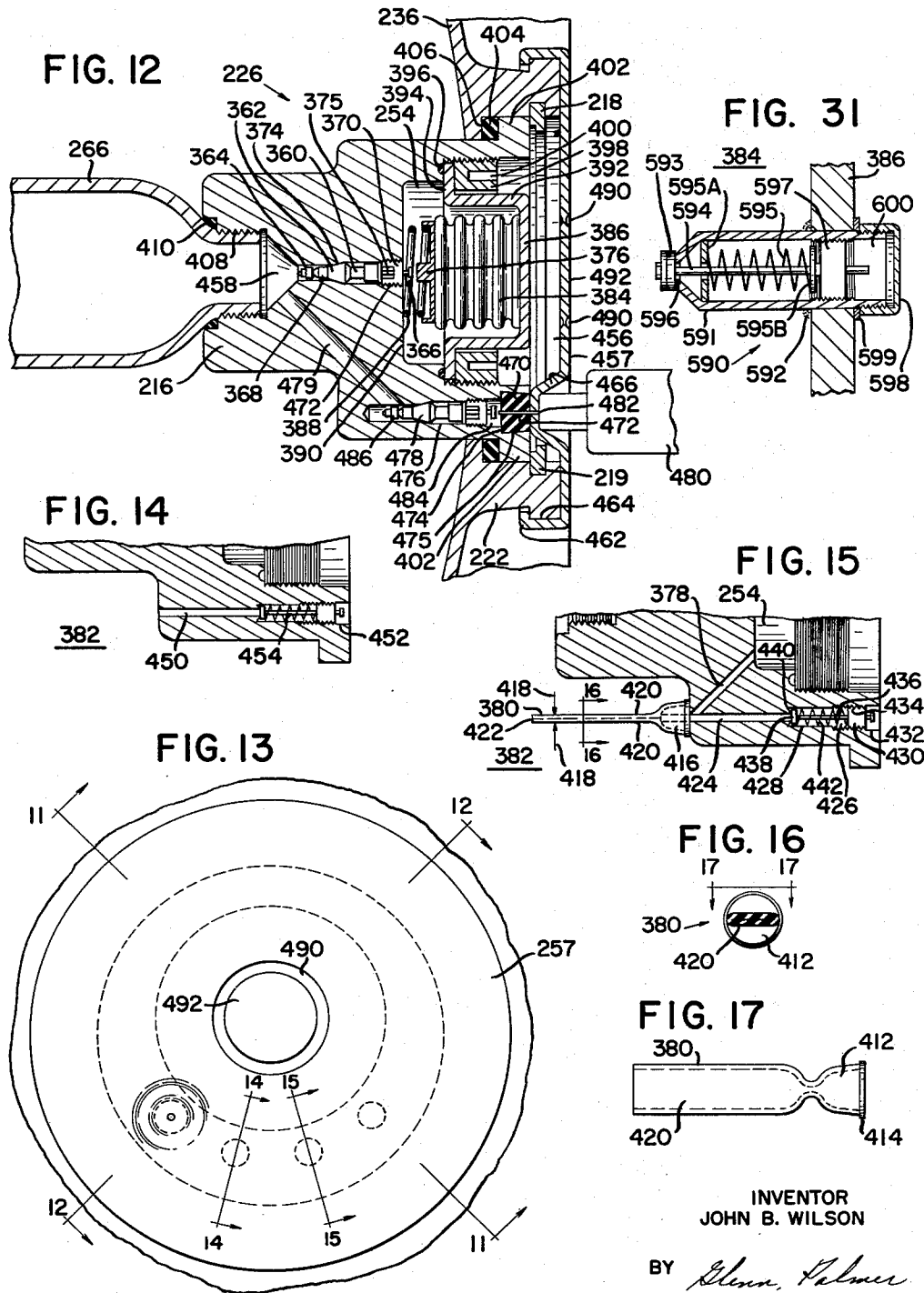
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6 Sheets-Sheet 4



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PRESSURE CONTAINER THEREIN

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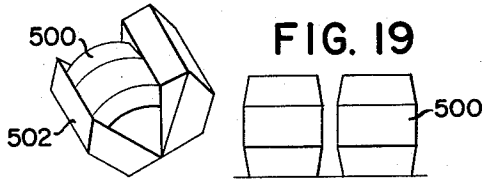


FIG. 18
FIG. 21

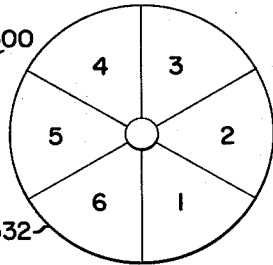
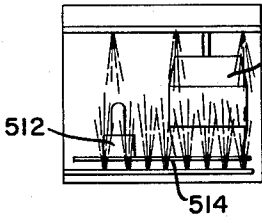


FIG. 22

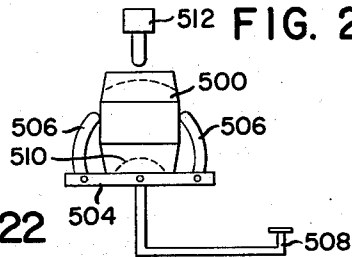


FIG. 20

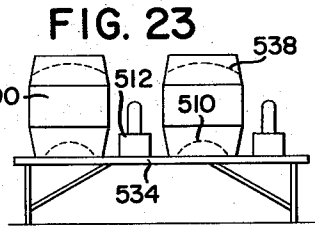


FIG. 23

FIG. 24

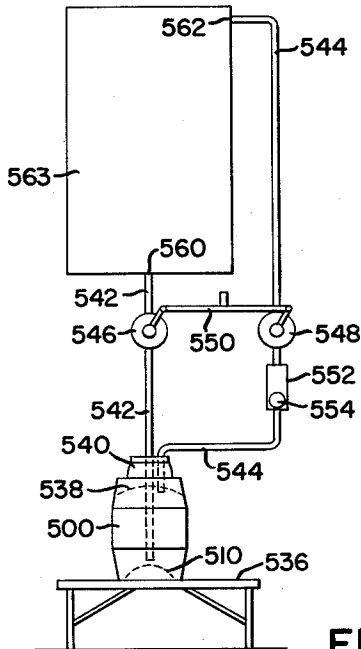


FIG. 25

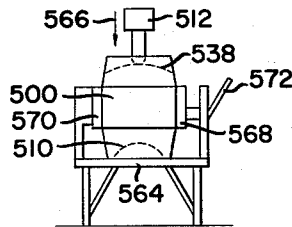


FIG. 26

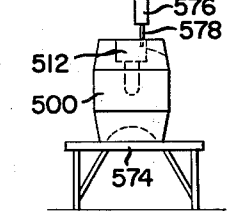


FIG. 27

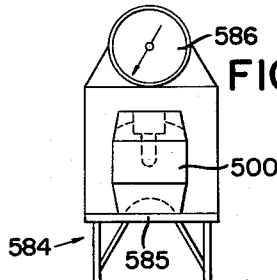


FIG. 28

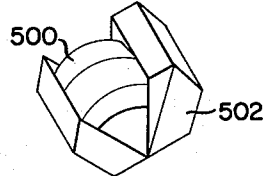


FIG. 29

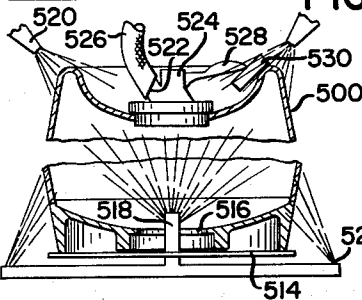
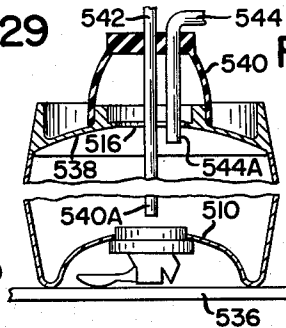


FIG. 30



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DISPENSING CONTAINER HAVING A GAS PRESSURE CONTAINER THEREIN

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Filed July 5, 1962, Ser. No. 208,682
18 Claims. (Cl. 222-396)

This application is a continuation-in-part of applicant's copending applications, Serial No. 850,929, filed November 4, 1959, for Dispensing of gas Charged Liquids, now U.S. Patent No. 3,080,093, and Serial No. 32,984, filed May 31, 1960, for Gas Charged Liquid Storing and Dispensing container, now abandoned.

This invention relates to a container of any desired shape, such as a keg-like metallic container for beer and other gas propelled liquids or beverages, such as soft drinks, milk, orange juice and the like. Any desired soluble or insoluble propelling gas may be used. The container may be of a size to be placed in the usual bottle compartment of a domestic refrigerator. The container may be of any desired size.

The container is adapted to be used in horizontal position, with a faucet at the front for easy dispensing of the beer and the like.

The container also may be of a shape that leads itself to quick and sanitary washing and filling operations at the brewery. The front faucet and faucet wall are countersunk so the keg may stand temporarily on the rim of the faucet end for filling operations. A bung end wall is also countersunk. However, the inner surface of the bung end wall is so shaped that wash water, rinse water, and the like, efficiently drain out of the end bung hole while the container temporarily stands on the rim of the bung end wall for washing and draining. The faucet and faucet feed tube can also be efficiently washed and drained while the container is in the position with the bung end down.

Substantially all of the filling and sanitizing operations, such as brewery operations, may be efficiently and sanitariously performed while the container stands either on the countersunk faucet end or the countersunk bung end, and the relationship between these countersunk ends greatly enhances the ease, efficiency, and sanitary character of the filling and sanitizing operations.

The beer or other beverage is fed efficiently into the bung hole for filling purposes while the container stands on its countersunk faucet end.

A carbonating and/or propellant container may be located in the dispensing container. It may be efficiently insertable through the bung in the dispensing container while the dispensing container stands temporarily on its countersunk faucet end, and the carbonating and/or propellant container may be charged while the keg-like container stands on its faucet end. It may be made as a fixed part of the bung end casting when desired.

Upon return from the consumer, the container may be disassembled, washed, and drained while standing on the proper one of these countersunk ends.

During transportation between the brewery and the consumer, the countersunk ends protect the vulnerable parts of the container and permit easy and efficient loading on the conveying truck or the like. The dispensing

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container lends itself to packaging in an insulating carrying case for this purpose.

Draft beer may be supplied in these containers.

The invention is adaptable to a gas charged liquid storing and dispensing container into which the liquid and a charging gas container may be inserted together with automatic controls for properly charging the liquid. The charging gas container and controls are easily inserted in and removed from the dispensing container.

In particular, the invention may be used in connection with a compact container for beer and the like which holds several servings of beer. Such a container may be placed in a domestic refrigerator. The container may be used for dispensing the beer while the container is in the refrigerator, or the container may be removed from the refrigerator and the beer may be dispensed from the container in the living room, patio, or any other desired place to which the container may be carried for more convenient use.

The container is provided with a gas charging container and automatic controls which maintain the beer properly charged with CO₂. The beer may be dispensed from the container in palatable condition with proper compensation for variations in temperature, level of the beer in the container, and other variables which otherwise would adversely affect the palatability of the beer.

The beer dispensing container, the charging gas container, and the automatic controls produce a unitary package which is admirably suitable for cleaning, filling, and storing at the brewery, and is also similarly suitable for satisfactory refrigeration, storing, and dispensing of the beer at the place of use, such as at the home of the user.

The adaptability of the container for these purposes becomes more apparent in the disclosure of details which follows.

Carbonated beverages and the like, such as beer, are carbonated so that CO₂, or similar gas, is absorbed in the beverage. It is preferred, in connection with beer, to maintain a definite volume ratio of CO₂ absorbed in the beer. This ratio is generally accepted to be approximately 2½ volumes of CO₂ gas absorbed in one volume of beer. To maintain this ratio absorbed in the beer at varying temperatures, it is desirable to maintain certain temperature-pressure conditions within the beer container. Such conditions are in the order of 8 p.s.i.g. (pounds per square inch gauge above atmospheric pressure) at 32° F., 17½ p.s.i.g. at 50° F., and other pressure-temperature conditions at other temperatures which are well known in the industry and follow a well known ratio curve.

When beer is periodically withdrawn from a closed container, the volume of the beer in the lower part of the container decreases and the volume of free CO₂ gas above the beer in the container increases. Hence, when beer is periodically withdrawn from a closed container, the beer gradually becomes flatter because some of the CO₂ originally absorbed in the beer is taken out of absorption from the beer to fill the periodically increased volume of free gas above the beer in the container. Also, if the temperature of the beer in the container is varied by taking the container out of the refrigerator for a substantial length of time, such as for use at a party or the like, a large amount of the CO₂ is released from absorption in the beer to produce a higher pressure in the free gas

above the beer because of the pressure-temperature absorption characteristics of the beer, and this produces a flatter beer. This additionally produces "flat" beer as the CO₂ goes out of solution into the gradually enlarged gas space above the beer, unless additional CO₂ is introduced into the container as the beer is withdrawn.

Attempts have been made to provide means for the necessary addition of CO₂ to overcome this gradual flattening of the beer and have included attempts to provide temperature compensation which is also required for satisfactory results. However, such previous attempts have resulted in unsatisfactory and/or complicated constructions.

Accordingly, it is an object of this invention to provide an improved dispensing container having one or more of the features herein disclosed.

Another object of this invention is to provide a novel method of merchandising a beverage or the like and having one or more of the features herein disclosed.

Another object of this invention is to provide a novel method of filling and charging a container with a gas charged beverage and the like.

According to another of the objects of this invention, a relatively simple container for beer or the like is provided, which may be stored in a domestic refrigerator or the like at the desired temperatures. Several servings of the beverage may be withdrawn automatically at the ideal or desired liquid-absorbed gas ratio, with or without compensation for temperature variations. Such temperature variations are produced either by variations in refrigerator temperatures or because the container is removed temporarily from the refrigerator for dispensing purposes and the like.

Another object of this invention is to provide a dispensing container for gas charged liquids which is adapted to be placed in a domestic refrigerator and in which a gas supply container is incorporated with a relatively simple automatic gas control for the automatic transfer of gas from the gas container to the liquid container. Proper compensation may also be provided for upward and downward temperature changes within the container.

Another object is to provide a container according to the next preceding object in which a temperature-pressure responsive control actuates a gas control valve between the gas container and the liquid container.

Another object of this invention is to provide a liquid container according to either of the two next preceding objects in which the control actuates a pressure relief valve for relief of excessive pressures in the liquid container.

Another object of this invention is to provide a container from which the gas supply parts may be easily removed or inserted for sterilization purposes and the like.

Other objects are apparent from this description and/or the accompanying drawings, in which:

FIGURE 1 is a diagrammatic, generally vertical cross section of a typical container embodying this invention.

FIGURE 2 is an enlarged cross section of a portion of FIGURE 1.

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

FIGURE 4 is a cross section of a gas injecting valve for the gas container, taken along the line 4—4 of FIGURE 3.

FIGURE 5 is a cross section of another embodiment of the attaching means for the gas container and control therefor.

FIGURE 6 is a vertical cross section of a portion of an embodiment somewhat similar to FIGURE 1 in which a liquid level check valve is provided in connection with the pressure relief means.

FIGURE 7 is an enlarged cross section of a portion of FIGURE 6.

FIGURE 8 is an upward view taken along the line 8—8 of FIGURE 7.

FIGURE 9 is a diagrammatic cross section of another embodiment of a gas supply and relief construction applicable to a container of this invention.

FIGURE 10 is a cross section of the liquid dispensing valve.

FIGURE 11 is a longitudinal cross section of another embodiment of this invention, taken along line 11—11 of FIGURE 13.

FIGURE 12 is an enlarged cross section of a portion of the embodiment of FIGURE 11 and taken along plane 12—12 of FIGURE 13.

FIGURE 13 is a front view from the right side of FIGURE 12.

FIGURE 14 is a cross section along line 14—14 of FIGURE 13.

FIGURE 15 is a cross section along line 15—15 of FIGURE 13.

FIGURE 16 is a cross section of a check valve taken along line 16—16 of FIGURE 15.

FIGURE 17 is a view of the check valve taken from the line 17—17 of FIGURE 16.

FIGURE 18 is a diagrammatic view showing the unpacking of a dispensing container which has been returned from a user for processing at the brewery.

FIGURE 19 is a diagrammatic representation of unpacked, returned containers ready for processing at the brewery.

FIGURE 20 is a diagrammatic view showing the removal of the gas charging container from the dispensing container.

FIGURE 21 is a diagrammatic representation of one of the cleaning steps applied to one of the charging gas containers and one of the dispensing containers in a multiple compartment washer or cleaner of a rotary type, having a series of washing, rinsing, and draining stations, such as diagrammatically indicated in FIGURE 22.

FIGURE 22 is a diagrammatic representation of a series of steps produced in a rotary, multiple compartment washer.

FIGURE 23 is a diagrammatic representation of the charging gas containers and the dispensing containers in draining and drying positions after the cleaning operations of FIGURE 22.

FIGURE 24 is a diagrammatic representation of a filling operation for introducing a charged beverage, such as beer, into the dispensing container.

FIGURE 25 is a diagrammatic representation of the insertion of the charging gas container into the dispensing container after the dispensing container has been filled with the beverage in FIGURE 24.

FIGURE 26 is a diagrammatic representation of the introduction of charging gas into the charging gas container after the operation shown in FIGURE 25.

FIGURE 27 is a diagrammatic representation of a weighing operation which may be performed before and after the operation of FIGURE 26.

FIGURE 28 is a diagrammatic representation of a packaging operation for transportation of the filled dispensing container to a customer.

FIGURE 29 is a diagrammatic cross-sectional view of a portion of the cleaning operation of operations performed in FIGURES 21 and 22.

FIGURE 30 is a diagrammatic cross section showing a portion of the filling operation of FIGURE 24.

FIGURE 31 is a cross section of a calibration construction for a portion of FIGURES 11—17.

FIGURE 32 is a diagrammatic cross section of another embodiment somewhat similar to the embodiment of FIGURES 11—17.

FIGURE 33 is an enlarged view of a portion of FIGURE 32.

FIGURE 34 shows a calibration construction similar to that of FIGURE 31 applied to the structure of FIGURE 32.

FIGURE 35 is another cover embodiment for FIGURE 32.

For the sake of brevity, the invention is generally described herein as applied to the dispensing of beer. However, it is to be understood that the invention is equally applicable to liquids other than beer and to absorb gases in such liquids which may be CO₂ or other gases. Hence, the specific description herein of beer is intended to be in the nature of an example not only of beer but also of such other gas-charged liquids as carbonated beverages and the like.

The container preferably is of a size to be stored in the usual bottle compartment of a domestic refrigerator. It may be made of aluminum and may be keg-like in appearance. Preferably, it is of a size to contain several servings of beer, and it may be placed in the refrigerator and may be periodically removed from the refrigerator for convenience in serving at other places than at the location of the refrigerator.

Previous constructions of containers for refrigerators of this nature are subject to the objection that the beer in the container gradually becomes flatter and flatter as it is periodically withdrawn from the container. Also, such constructions are objectionable because the beer automatically varies the volumetric ratio of the CO₂ which is in solution in the beer in response to variations in temperature of the beer.

Means are provided in the container of this invention to prevent such flattening of the beer either because of the gradual withdrawal of the beer from the container or because of the variation of temperature of the beer in the container caused by the removal of the container from the refrigerator for any reason.

The dispensing valve is guarded by a guard rim. To this end, the container may have a guard rim forming means at one end lying substantially within a plane which may be transverse to the longitudinal axis of the container, and the dispensing valve may have an actuating handle which opens the valve only by outward movement of the handle, and the handle does not open the valve by inward movement of the handle, the handle being inward of said plane and protectively surrounded by said guard rim forming means to prevent accidental opening of the valve. This valve construction is also useful because the container may stand on that end while being filled with beer at the brewery.

One embodiment of a gas-charged liquid storing and dispensing container embodying this invention is shown in vertical cross section in FIGURE 1 and is generally indicated by the arrow 10. It may be keg-shaped and its outer wall may be made of aluminum-containing material, such as commercial aluminum or suitable aluminum alloys thereof.

For brevity, this description will, at times, use such words as "vertical," "horizontal," etc., but it is to be understood that such words are used for brevity and convenience, and that the parts so described may have different positions either temporarily or permanently, as is obvious. Under certain conditions, the container need not be keg-shaped.

The container 10 may be circular in transverse cross section and may be of a size to be placed in the usual bottle compartment of a domestic refrigerator. It is usually placed in this compartment with its longitudinal axis 11—11 in a horizontal position, as shown in FIGURE 1.

A spout, or valve discharge outlet 12, is downwardly directed with a clearance to accommodate a receiver, to discharge the liquid, such as beer, into said receiver, such as a glass or other receptacle for drinking purposes.

For example, and not by way of limitation, the receptacle 10 may be 10 inches in maximum diameter, and 12 inches maximum length. It may have 700 cubic inches internal capacity.

The beer, or other liquid, is introduced through the opening 14.

To fill the container, the container 10 may be placed temporarily with its axis 11—11 in vertical position, and with the discharge valve 13 at the bottom. For example, 520 cubic inches of beer, or more, are introduced into the container through the opening 14. Immediately thereafter, a charging gas container 15 is placed within the dispensing container 10 at the opening 14 and is quickly secured at the opening 14 to seal and cover the same. This seal may be produced by the end wall 16, and flange 17, which are held tightly in place by a snap ring 18 which is inserted in the groove 19. The ring 18 is split at 18a, FIGURE 3, for insertion and removal, as is well known. A suitable flexible O-seal ring 20 has previously been inserted in the groove 21 in the end wall enlargement 22 of the container 10, to produce a seal at that location.

If desired, a suitable cardboard or laminated medallion 23 of ornamental nature may be placed in the grooved opening 24 of the end wall 22.

The beer filling operation is performed at the brewery, and the container is then ordinarily stored and refrigerated at the brewery ready for delivery to a customer. When the refrigerated container, with the beer and charging-gas container 15 in it, is delivered to the customer, it is placed in the usual bottle compartment of the domestic refrigerator with the axis 11—11 in horizontal position, as shown in FIGURE 1.

The beer (the word beer is used as an example of gas-charged liquids or beverages) initially may completely fill the container, and when partly used, may be at a level, such as indicated by the line 25. The beer and all of the container and its parts are maintained continuously at a refrigerated temperature, such as between 32° F. and 50° F., depending on the automatic setting of the refrigerator. This ordinarily continuous refrigerated condition may be varied, however, by the removal of the container 10 from the refrigerator temporarily for serving purposes, or the setting of the refrigerator temperature may be varied or maintained at various temperatures by the wide temperature range of the automatic control of the refrigerator.

The charging gas container 15 is insertable into and removable from the enclosing space of the container 10 and carries valve means 26 for automatically introducing charging gas from the charging gas container 15 into contact with the liquid or beer 27 in response to the varying pressure and temperature conditions within the space of the container 10 produced by the refrigerator temperature, by temperatures outside of the refrigerator when the container 10 is removed from the refrigerator, or by the gradual withdrawal of beer from the container. The specific construction of such valve means 26 is more fully elsewhere described.

When the user desires to dispense beer from the container 10, the valve handle 28 is moved outward, i.e., to the left in FIGURE 1, and this opens the valve 13 and delivers beer through the refrigerated spout or outlet 12 into a glass or other receptacle.

When the glass is filled, the handle 28 is released and is closed in a manner more fully herein described.

The container 10 has an outside wall structure forming the enclosing space of the container, and, if desired, this wall may be keg-shaped, as shown in the drawings and has a cylindrical, closed perimeter, side wall 29, which has its longitudinal axis 11—11 in normally horizontal position within the refrigerator. The side wall 29 has a first end 30 with a closed perimeter guard rim 31 at such first end 30 which lies substantially in an end plane 32 transverse to the longitudinal axis 11—11. A first end wall 33 joins and closes the side wall 29 at the said rim 31. The first end wall 33 is inwardly concave and lies inside or slopes inwardly from the end plane 32 to form a recess in the container end and has a valve-receiving

threaded opening 34 which receives the externally threaded end or inlet 35 of the valve 13.

A second end wall 36 closes the other or second end 37 of the side wall 29. Another rim structure 38, likewise circular or of closed perimeter construction, lies in a plane 39, which is substantially transverse to the axis 11—11, and the wall 36 preferably is inside of the plane 39. The wall 36 has the circular enlargement 22, which has the container-receiving second opening 14, which is constructed to receive the charging gas container 15 in a manner elsewhere described.

To provide easily understood claim language for some of the foregoing descriptions, the words "cylinder-like side wall," or the like, are used herein to describe a side wall, such as the side wall 29a, 29 and 29c, of FIGURE 1, or its equivalent, which may be, but need not be, a true geometric cylinder. Likewise, the words "ring-like guard rim," or the like, are used to describe the rims 31 and 38 of FIGURE 1, which may be, but need not be, a true geometric circular rim.

The discharge or dispensing valve 13 is secured in the valve-receiving opening 34 and lies entirely inside of the plane 32. The actuating handle 28 opens the valve 13 only by outward (leftward in FIGURE 1) movement of the handle. The valve 13 has the liquid or beer outlet spout 13 outside and the inlet 35 inside of the end wall 33. A liquid conduit 40 is inside of the container 10 and has its outlet 41 connected to valve inlet 35 of the valve 13. The conduit 40 has its inlet 42 extending near a low position 43 of the side wall 29 within the container 10 while the container is in normal position in the refrigerator said low position or portion 43 being low with respect to the main portion of the enclosing space enclosed by the side wall of the container 10. For example, the liquid conduit 40 may have an internal diameter of $\frac{1}{8}$ inch more or less, depending upon the rate of flow desired at the outlet spout 12. The conduit 40 may be of any suitable material, but such conduit 40 and its outlet 41 may be constructed of any suitable plastic material such as nylon (Du Pont "Zytel" No. 31, for example.)

The valve 13 has a semi-spherical valve head 44 which opens rightward in FIGURE 10 with a quick action due to the sudden release of high static beer pressure when the top of handle 28 is pulled with a strong enough pull to produce the initial opening of the valve. The handle 28 is fulcrumed at 45 so the lever 46 pushes against the stem 47 against the action of compression spring 48. The valve head 44 yields suddenly and the strong pull on handle 28 is sufficient to produce the first slight movement which moves the head 44 quickly to fully open position, practically with a snap action. Release of the handle closes the valve 13 through the action of spring 48.

The handle 28 has an opening 49 for the reception of a seal wire, which also passes through a stationary part of the valve so the customer may be assured he receives a full container of beer. An opening 50 is provided in the stationary part of the valve for the reception of a padlock to prevent unauthorized opening of the valve. The valve is threaded at 51 for the insertion into the opening 34 of the wall 33, FIGURE 1. The valve 13 has an O-ring 52 of rubber-like material and stem packing 53.

The valve 13, conduit construction 40, etc., may be inserted and removed as a unit through the opening 34.

The side wall 29 may be made of two pieces 29a and 29b which may be welded together at the seam 29c, all of these parts of the outside wall preferably being made of aluminum, or aluminum-containing material such as suitable aluminum alloys.

The charging gas container 15 is insertable through the opening 14 and has means for introducing the charging gas in regulated quantities into contact with the liquid 27 in the gas-charged liquid storing and dispensing container 10. Such means introduces the charg-

ing gas automatically in response to temperature conditions, pressure conditions, and/or combined pressure and temperature conditions in said dispensing container 10. Means are also provided to relieve excessive pressures in said dispensing container 10, and, if desired, such means are provided to relieve excessive charging gas pressures from above said liquid in said dispensing container, as is more fully elsewhere described.

The charging gas container 15 is provided with a solid, relatively massive, end wall 16 which has a cavity 54 with an opening 55 and a shoulder 56 and groove 57 at one end. The cavity 54 has another opening 58 with a flange or shoulder 59.

A disk 60 is placed in opening 55. The disk 60 has a valve-receiving opening 61 with a valve seat 62 and a larger opening 63. The disk 60 also has a groove 64 which receives flexible O-ring 65 to produce a tight gas seal at this point. The openings 61 and 63 produce a gas passageway from the high pressure space 66 of the container 15 into the cavity 54 of the end wall 16.

The cavity 54 is an intermediate chamber which receives high pressure gas, such as CO₂, from the high pressure chamber 66 under regulated conditions and in regulated quantities. Such gas from the cavity 54 is discharged into the liquid 27 in the container 10 through the passageway 67 and spring-pressed check valve 68 in the passageway 69. The spring 70 is retained in the passageway 69 by means of a snap ring 71.

A valve 72 is opened and closed in response to temperature and/or pressure conditions in the liquid storing and dispensing container 10. To this end the valve 72 is mounted on a stem 73 which is actuated by a control fluid expandable container or capsule 74 with a flexible wall or bellows 75. The capsule 74 may be in the form of a bellows 75 which is attached at one end to the firm cup 76 and at the other end to the excess pressure relief valve 77 which is mounted in the passageway 58 and which has a flange 78 with a sealing ring 79. The valve 77 has a passageway 80 connected to the interior of the capsule 74 which is sealed by a ball 81 which may be secured or soldered at 82, after the capsule has been charged with proper actuating fluid which is responsive to temperature and pressure.

The cup 76 may be secured to the stem 73 by any attaching cylinder means 83. A compression spring 84 engages the cup 76 at one end and the disk 60 at the other end where it engages the ring or washer 85.

The capsule 74 may be charged with a fluid which has a pressure-temperature curve which has the substantially same ratio as that of the properly charged liquid or beer 27 within the container 10. Such fluid in the capsule 74 may be a fluid which is mainly isobutane and which, if desired, may have a slight amount of acetone added thereto. The charge in the capsule 74 is regulated to produce the pressure and temperature responsive conditions of actuation of the valve 72 in the manner herein described.

In the case of a container as here described, which may contain beer, the gas-charging container 15 may contain CO₂ gas with an initial pressure in the neighborhood of 600 p.s.i.g., more or less. The capsule 74 actuates the valve 72 in response to pressure conditions and temperature conditions within the container 10 automatically to maintain a pressure of 8 p.s.i.g. when the temperature is 32° F. in the beer 27 more or less, and a pressure of 17½ p.s.i.g. in the beer 27 when the temperature of the beer is 50° F. and other pressures in response to other temperatures according to the well-known curve to maintain the volume ratio of 2½ to 1 of the CO₂ absorbed in the beer, as herein elsewhere described.

If excessive pressures are produced in the cavity 54, for any reason, such as slow leakage past the valve 72, then such excessive pressure in cavity 54 collapses the bellows 75, so that the relief valve 77 is pulled leftward

away from its seat, and a relief passage is produced by the opening of the seal 79 away from the flange 59.

It is to be noted that the entire valve means 26 indicated in FIGURE 1 is insertable and removable as a unit with the gas-charging container 15 into and from the container 10 through the opening 14. It is also to be noted that the valve construction 26 may be opened for inspection or for sterilization in a relatively simple manner. To this end, the cylindrical cup cylinder 86 of the container 15, FIGURE 1, may be unthreaded at 87 from the end wall 16, where they were united to compress the flexible O-ring 88. Removal of the cylinder 86 exposes the disk 60 for manipulation. The split snap ring 89 may then be removed from the groove 57 in the end wall 16, which permits the disk 60 to be removed from the cavity 54, carrying with it the valve 72, capsule 74, and relief valve 77, so that the same may be cleaned or repaired as desired. The valve 68 and spring 70 may be removed by manipulation of the snap ring 71.

Likewise, the entire charging container 15 may be removed as a unit by manipulation of the split snap ring 18, which may be removed from the groove 19, thus allowing the entire charging gas container 15 structure to be removed through the opening 14.

A charging construction 90, FIGURE 4, may be provided in the wall 16, which has a needle-receiving resilient valve 91, of well-known construction, so that a CO₂ charging needle may be inserted and may be used to insert CO₂ under pressure through the passageway 109 into the space 66 of the container 15. An excess pressure relief valve 108 of any well-known construction may also extend through the wall 16 to the interior space 66. The valve 108 may be provided with a passageway similar to 109 and which may occupy space similar to the space occupied by the valve 91, except that valve 108 is an outward exhaust valve of the well-known pressure-responsive type to relieve excess pressure from the space 66.

FIGURE 6 shows means to relieve excess charging pressures from above the level of the liquid or beer in the dispensing container.

The container 10 of FIGURE 6 may be substantially the same as the container of FIGURE 1, except that the charging gas container 15a is slightly inwardly offset from the wall 16a to provide a flanged wall 92. A semi-flexible conduit 93 is connected at one end through the passage 94 with the modified passageway 69a which may be closed by the cap 95. The passageway 69a may be somewhat similar to the passageway 69 of FIGURES 1 and 2. It may include or need not have the check valve 68. The passageway 93 is semi-flexible, so that it maintains the position shown in full lines in FIGURE 6 for normal operation, but which may be flexibly bent down to the dotted line position 93a during insertion and/or removal of the charging container 15a from the container 10. The upper end 96 of the conduit 93 is provided with a liquid-level responsive valve 97. Such liquid-level valve may be of any well known "snorkle" type, and may, for example, include a wire cage 98 within which is placed a hollow float-ball 99, of a character such that it remains in a lower position as long as the beer level is below the opening 100 at upper end 96 of the passageway 93. However, if the beer level is above such opening 100, then the ball 99 rises and closes the opening 100 and prevents liquid from being forced downward through the passage or conduit 93. If the check valve 69 of FIGURES 1 and 2 is omitted from the passage 69a, then any excess pressure above the beer may be relieved by allowing the gas to flow downwardly into the cavity 54 and out through passageway 58, if such excess pressure is sufficient to collapse capsule 74.

If desired, an additional float, not shown, may be attached to the lower part or to the bottom of cage 98. If this is done, the conduit 93 may be made somewhat more flexible, and such additional float will help maintain the inlet 100 above the beer level, as long as the keg is not

overfilled with beer. If the keg is overfilled with beer, then the float ball 99 will close the opening 100.

Instead of the snap-ring construction for inserting and removing the gas-charging container 15 or 15a as shown in FIGURE 1, the threaded ring construction shown in FIGURE 5 may be used. To this end, the end wall 16b, of FIGURE 5, may be similar to the end wall 16 of FIGURES 1 and 2. The end wall 36a and the enlargement 22a may be substantially similar to that shown in FIGURE 1, except that the enlargement 22a is threaded at 101 to receive the threaded ring 102. The wall 16b has a flange 103 which bears against the seal ring 104. FIGURE 5 also shows the threaded construction 87 and O-ring 88 and snap ring 71 of FIGURE 1, in a slightly enlarged 15 manner.

FIGURE 9 shows a construction in which the regulating compression spring 84a is placed outside of the wall 16j. The disk 60j may be substantially the same as the disk 60 and is provided with passageway 61j, etc., and valve 72j to close the cavity 54j. The capsule or bellows 75j may be connected to the stem 73j at one end and to a stem 105 at the other end where a relief valve 77j opens and closes the relief passageway 58j. The spring 84a bears against the wall 16j at one end and against any enlargement such as a washer 106 held by a nut or the like 107 on the stem 105. The bellows 75j may be charged with the same type of fluid as bellows 75 and the remainder of the structure may be of substantially the same action as previously described constructions of FIGURES 1, 2 and 6, which have reference numerals similar to those of FIGURE 9 without the letter "j." The numbers with reference numerals ending in "j" of FIGURE 9 operate substantially as the member without the "j."

In the embodiment of FIGURES 11 through 17, a gas-charged liquid and dispensing container 210 may be substantially keg-like in shape if desired, and similar to the container 10 elsewhere described. It may be circular in transverse cross section and may be of a size to be placed in the usual bottle compartment of a domestic refrigerator. It also is usually placed in this compartment with its longitudinal axis 211—211 in a horizontal position, as shown in FIGURE 11. A spout or valve discharge outlet 212 is downwardly directed to discharge the liquid, such as beer, into a glass or other receptacle. For example, and not by way of limitation, the receptacle 210 may be from 9 inches to 10 inches in maximum diameter, and from 11¾ inches to 12 inches in maximum length, and it may have approximately 700 cubic inches, more or less, internal capacity, as desired.

For the sake of brevity, and wherever possible, reference numerals similar to the reference numerals of FIGURES 1 through 10 are used in connection with FIGURES 11 through 17 to indicate similar elements, but in FIGURES 11 through 17, 200 has been added to the numerals of FIGURES 1 through 10, it being understood that, in general, the same description applies to elements similarly so designated, and hence the description given in connection with FIGURES 1 through 10 is not always repeated in connection with FIGURES 11 through 17, except insofar as it is deemed necessary or expedient further to disclose the differences or similarities in the embodiment of FIGURES 11 through 17. Reference numerals 350 and higher in these FIGURES 11 through 17 have no connection with the reference numerals of FIGURES 1—10.

In FIGURES 11, etc., opening 214, discharge valve 213, and charging gas container 215, may be generally the same as similar members 14, 13, and 15, of FIGURES 1—10, with certain variations. For example, the valve 213 may be held in the unthreaded ring 350 by means of a split ring 352, which holds the flange 354 against an O-ring 356, so that the valve 13 is held in sealed condition. Otherwise, the valve detailed may be substantially the same as in the embodiments of FIGURES 1 through 10.

The charging gas container 215, is insertable into and removable from the enclosing space of the container 210 and includes valve-carrying means 226 for automatically introducing charging gas from the charging gas container 215 into contact with the liquid or beer 227 in response to varying pressure and/or temperature conditions within the space of the container 210 in a manner somewhat similar to that of container 19.

When the user desires to dispense beer, the valve handle 228 is moved outward, that is, to the left in FIGURE 11, and this opens the valve 213 for dispensing the beer.

The container 210 has a cylindraceous, closed perimeter, side wall 229 which has its longitudinal axis 211—211 in normally horizontal position within the refrigerator. The side wall 229 has a first end 230 which lies substantially in an end plane 232, which is transverse to the longitudinal axis 211—211. A first end wall 233 is countersunk, and joins and closes the side wall 229 at the rim 231. The first end wall 233 is inwardly concave and lies inside the end plane 232 and has a valve receiving unthreaded first or valve opening 234 which receives the unthreaded end 235 of the valve 213.

A second end wall 236 closes the other end or second end 237 of the side wall 229. Another rim structure 238, likewise circular or of closed perimeter construction, lies in a plane 239 which is substantially transverse to the axis 211—211, and the end wall 236 preferably is inside of the plane 239. The wall 236 has a circular enlargement 222 which has the gas charging container receiving second opening or bung 214 which is constructed to receive the charging gas container 215 in a manner elsewhere described. The inner surface 237 of the wall 236 slopes smoothly toward the edge 237A of the bung opening 214, so that all liquids tend to drain through the opening 214, when such opening is uncovered and the container 210 is standing with its axis 211—211 in vertical position, with the opening 214 downward.

A discharge liquid conduit 240 is inside the container 210 and has its outlet 241 connected to the valve inlet. The conduit 240 has its inlet 242 extending near a low position 243 within the container 210 while such container is in normal position in the refrigerator. The conduit 240 may be approximately .09 inch in internal diameter near its inlet 242 and may continue with this diameter approximately to the point 240A, from which point it may taper outwardly in internal diameter to the point 241, where it enters the valve structure. Preferably the conduit 240, 240A is shaped so it drains downwardly and does not trap any liquid while the container 210 is in vertical position, with the bung 214 downward.

The valve 213, conduit construction 240, etc., may be inserted and removed as a unit through the opening 234 by insertion and removal of the split ring 352, as is obvious.

The ring 350 may be welded at 353 to the end wall 233 before the end wall 236 has been placed on the end of side wall 229 and secured thereto at the seam 229c.

The container 210 may be made of two pieces 229a and 229b which may be welded together at the seam 229c, all of these parts being preferably made of aluminum, or aluminum containing material such as any of the suitable aluminum alloys. The weld at the seam 229c may be hidden or finished and polished, as is obvious, to produce a substantially smooth outer surface along the seam 229c.

The charging gas container 215 is insertable through the opening 214 and has means for introducing the charging gas in regulated quantities into contact with the liquid 227 in the gas-charged liquid-storing and dispensing container 210. Such means introduces the charging gas automatically in response to temperature conditions, pressure conditions, and/or combined pressure and temperature conditions in said dispensing container 210. Means are also provided to relieve excessive pressure in the dispensing container 210 and elsewhere.

The charging gas container 215 is provided with a solid relatively massive end wall or piece 216 which has an intermediate or expansion cavity 254. A high pressure chamber or metal bottle 266 discharges high pressure gas, such as CO₂, through a valve construction 272 which, for convenience, is herein referred to include a "tire type" valve core which is referred to by this name, because such valve cores are on the market and are commonly used in tire valves of the automotive and other tire constructions. This type of valve core has a core casing 360, FIGURE 12, a resilient rubber-like sealing cone 362, a leftwardly movable valve 364, which is attached to and moved by the valve stem 366. The valve 364 seats against the valve seat 368, so that it is of a container pressure retaining type or construction, to check or retain the gas in the high pressure chamber 266. A thin, threaded, stem carrying wall 370 is threaded into threaded opening 372 and pushes against casing 360 and the resilient cone 362 to seal the cone 362 against the cone-shaped passageway 374 to prevent escape of gas from the container 266 to the cavity 254 except through the gas passage, not shown, in the valve casing 360. A spring, not shown, in the casing 360, biases the valve 364 and the stem 366 rightward to hold the valve 364 on the seat 360 at all times except when the head of the stem 366 is pushed leftward by the pusher 376. This pushing action opens the valve 364 leftward and allows the gas under pressure to flow rightward through the valve core casing 360 and through the opening 375 into the intermediate pressure chamber 254. The tire type valve core is of well known construction and may be purchased on the market, and the passageway 374 may be bored with proper cone shape to receive seal 362 and threaded at 372 to receive the threaded wall 370 so that the valve may operate substantially in the same manner as it does in a tire valve of well known construction.

A stem-actuating anvil or pusher 376 is adapted to push the head of the stem 366 leftward when the pressure in the chamber 254 falls below 12 p.s.i.g. (pounds per square inch gauge above atmospheric pressure). This opens the valve 364 and allows high pressure gas from chamber 266 to flow into the chamber 254 until the pressure in chamber 254 reaches some predetermined maximum pressure, such as 14 p.s.i.g. In this manner the pressure in chamber 254 is maintained between predetermined pressure limits, such as 12—14 p.s.i.g. The charging gas, such as CO₂ in pressure chamber 254 is then discharged from the pressure chamber 254, FIGURE 15, through passageway 378 and check valve 380 into the beverage chamber 382. In this manner, the needed CO₂ is provided for the beer chamber 382 as the beer is withdrawn from the chamber 382 through the faucet 212.

The pressure chamber 254 allows the gas, discharged from the expansion valve 360, to expand without frost formation. If the gas from the expansion valve 360 were expanded directly into the beer, frost would be formed at CO₂ outlet 375, which would interfere with the control of the expansion valve.

The valve stem 366 may be actuated in response solely to pressure conditions, or to combined pressure and temperature conditions, as desired. For example, a collapsible bellows chamber 384 may be secured to and be supported on the stationary wall 386 at one end, and may carry the anvil or pusher 376 at the other end. The bellows chamber 384 may be filled with a suitable amount of a fluid which is responsive substantially to pressure alone, or which is responsive to the pressure-temperature curve, elsewhere described. For example, the chamber 384 may be filled with isobutane with or without a small amount of acetone, or any other suitable gaseous substance to be properly responsive to the desired pressure and/or temperature conditions, as elsewhere described. A spring 388 may be secured to the end of bellows 384 and may be interposed between the bellows 384 and the stationary wall 390. The spring 388 may be a compression spring of the correct strength so that it may combine with the forces

produced within the bellows 384, so the action of the anvil or pusher 376 maintains the pressure and temperature limits desired within the intermediate chamber 254.

If desired, the actuation of valve stem 366 may be made substantially responsive to pressure in intermediate chamber 254 and not to the usual minor temperature changes. For example, the bellows 384 may be filled with air substantially at atmospheric pressure. The bellows may be inherently spring biased to move the pusher 376 leftward against the rightward push of spring 388. The forces of the bellows and spring 388 are so balanced that the pusher 376 is correctly actuated to maintain the desired pressure in chamber 254. If necessary, spring may be placed inside the bellows 384 to provide the desired leftward bias. Calibration may be accomplished by selecting a spring 388 and/or a spring within the bellows of correct tension to produce the desired pressures in chamber 254.

The wall 386 may be carried by a cup-shaped member 392, which has a flange 394 which is pressed against a seal ring 396 by a nut 398 having tool receiving openings 400.

The massive wall 216, which may be made of metal or of plastic material, is provided with a flange 402 which seats against the O-ring 404, which in turn seats against the inward flange 406 of the wall 236. A suitable split ring 218 is fitted in the groove 219 after the flange 402 has been pushed inward by a proper tool with sufficient force to permit the split ring 218 to be placed in the groove 219.

The CO₂ bottle 266 may be welded to or in threaded engagement at 408 with the wall 216. If the threaded engagement is used, a suitable flexible seal ring 420 may be provided properly to seal the bottle 266 to the wall 216 against gas leakage.

The check valve 380, FIGURES 15-17, may be of any suitable construction. For example, it may be a flat flexible rubber gum-like tube which is molded or formed in such a manner that it has a cup 412 with a rim to fit over a mound-like exhaust piece 416 where the tube 380 may be secured by suitable adhesive or the like. The construction is such that the pressure in the beer chamber 382 acts against the sides 420 of the tube 380, as indicated by the arrows 418, which thus prevents any backward flow of beer from the compartment 382 into the intermediate chamber 254. However, when the pressure in chamber 254 is higher than that in the beer chamber 382, then the CO₂ flows from the chamber 254 through the passageway 378 and leftward in FIGURE 15 between the sides 420 of the check valve 380 and out the end 422 of the check valve 380. Any other type of check valve may be used in lieu of the check valve indicated, such as illustrated in FIGURES 1, 2 and 5.

A pressure relief construction may be provided to permit discharge into the atmosphere or atmosphere-like space 456 from the intermediate chamber 254 when an undesirably high pressure is produced in the chamber 254. For this purpose an outward check valve construction is provided which is responsive to some predetermined pressure, such as 25 p.s.i.g. and discharges into the atmosphere or space 456 at this pressure. For this purpose, a passageway 424, FIGURE 15, is connected with the passage 378 and leads to an outwardly discharging check valve 426. Conveniently this check valve 426 may be called a "tire-type" valve core, since it is somewhat similar to valve 360, but the same acts as a check valve in the reverse or outward direction and is of the container pressure relieving construction. This type of valve core is generally not used in a tire, but since it has somewhat the same type of construction as the true tire type valve, it also will be referred to as being of the "tire type." For example, the passageway 424 may be enlarged at 428, threaded at 434 and further enlarged at 432. A thin threaded wall 430 engages the threaded portion 434 and loosely carries the valve stem 436. The valve stem 436 carries a valve 438 which seats against

the cone-shaped end wall 440 of the passageway 428. A compression spring 442 pushes the valve 438 against the seat 440 and is so calibrated that the valve 438 opens and relieves the pressure when the pressure in chamber 254 rises to 25 p.s.i.g. Any excess gas is discharged through the opening 432 into the atmosphere or into space 456.

A similar valve construction is provided to relieve any excess pressure in the beer chamber 382. Such construction is shown in FIGURE 14 where a passageway 450 extends from the beer chamber 382 to the discharge opening 452. A valve construction similar to valve 426 of FIGURE 15 may be provided, but the same may be calibrated to discharge outwardly into the atmosphere whenever the pressure in beer chamber 382 rises above 80 pounds p.s.i.g. Such valve construction is indicated at 454 and may be substantially identical with that disclosed in connection with valve 426, FIGURE 15, and hence its description is not repeated.

A similar relief valve may be provided to discharge into the atmosphere or space 456 whenever the pressure in the high pressure CO₂ chamber or bottle 266 rises above a safe limit. For example, the relief valve may discharge into the atmosphere whenever the pressure in the bottle 266 rises above 1200 p.s.i.g. To this end, a passageway 456', FIGURE 11, may lead from the cone-shaped cavity 458, which is connected with the bottle 266. The passageway 456' may lead to a pressure-relief valve 460, which relief valve 460 may be substantially identical in operation and construction with the relief valve 426 of FIGURE 15 heretofore described, except that it is calibrated to discharge outwardly into the atmosphere at 1200 p.s.i.g.

If desired, a protective medallion or cap 457 may be placed over the opening 214, to prevent tampering by unauthorized persons. This medallion or cap 457 may be of sufficiently strong metallic or plastic material, so that the same may be flanged at 462 around the outward flange 464 in FIGURE 12.

This medallion 457 may be constructed, so that the CO₂ bottle may be charged while the medallion 457 is in place.

The medallion 457 encloses an atmosphere-like space 456 which receives the relief pressure CO₂. The medallion has a weakened disk 492 which blows out substantially at atmospheric pressure if any of the valves 426, 454 or 460 discharge excess CO₂ into atmosphere-like space 456. However, the weakening of the disk 492 may be omitted if the medallion is made otherwise sufficiently rupturable.

The medallion 457 may be dimpled or depressed inwardly at 466, FIGURE 12, to rest on the outer surface of the flange 402 where an opening 475 is provided and is filled with a resilient rubber-like plug 470 having a passageway 472. The plug is seated against or locked between flange 474 and cone shaped wall 475 and is connected with a passageway 484 which is shaped to receive a valve construction 478 substantially identical in construction with the valve 360 heretofore described and which connects with a passageway 479 which discharges into the cone shaped cavity 458 and bottle 266.

A CO₂ charging nozzle 480, FIGURE 12, has a needle 482 which passes through the passageway 472 in the rubber-like plug 470, and discharges CO₂ into the space 484 to the right of valve construction 478. The pressure of the CO₂ in the charging nozzle 480 (which is fed from a high pressure CO₂ cylinder or bottle of the usual type) is sufficiently high, and above the pressure desired in bottle 266, such as 850 p.s.i.g. at 70° F., so that such pressure opens the valve 486 by pressure action and causes CO₂ to be discharged into the passageway 479 and into the bottle 266 properly to fill the bottle 266 with the desired quantity of CO₂.

Preferably the bottle 266, for the sizes herein given, is not over two inches external diameter and cannot con-

tain more than four fluid ounces of CO₂ at 850 p.s.i.g. at 70° F. It should withstand an internal 3,000 p.s.i.g. pressure test and an ultimate strength of not less than 6,000 p.s.i.g.

The construction of the rubber-like plug 470 is such that the needle 482 may be inserted therein for charging the bottle 266. However, the plug 470 tends to seal under outward pressure, so that it does not permit outward discharge of CO₂ from the bottle 266. This check valve action of plug 470 is produced by pressure action which squeezes the passageway 472 into closed position, but permits the needle 482 to be pushed through the passageway 472. This action is produced because of the inward taper of opening 475.

The medallion 457 may be punched with a weakening circular score 490 which is sufficiently thin so the disk 492 inside the score 490 will be blown out completely or partly substantially at atmospheric pressure if any of the relief valves 438, 454, 460 permit any fluid or CO₂ to be discharged into the atmosphere-like space 456 inside the medallion 457. The slight opening where the CO₂ needle is inserted through the medallion 457, is covered by the rubber-like plug 470 to a sufficient extent so that there will not be sufficient leakage of CO₂ through opening from behind the medallion if there is any CO₂ discharged through relief valves 438, 454 and 460. Therefore the disk 492 will be at least partly blown out at the circular score 490 whenever there is CO₂ discharged through the relief valve. When the container is returned to the brewery, it will be shown by inspection that the disk 492 is blown out at the score 490 and that some of the relief valves 428, 454 and 460 should be investigated to find out which one has been leaking and has caused the blowing out of the disk 492. Proper repairs may then be made.

If desired, the valves 428, 454, 460 and 486 may be placed above the axis 211—211 instead of below such axis or at any other rotational relationship.

The settings of the expansion valve 364 and of the relief valves 438, 454, 460 may be calibrated in an effective manner.

For example, the expansion valve 364 opens only when the pusher 376 actuates the stem 366. The pressure maintained by valve 364 in intermediate pressure chamber 254 may be calibrated by selection of the strength of spring 388, the pressure of the gas in bellows 384, and/or the compression of the seal 396 by the turning of the nut 398. Also some calibration may be obtained by the degree of turning of the thin wall 370 in threaded opening 472 to vary the compression of the cone shaped rubber-like member 374. These various methods of calibration may be used independently of each other or they may be used cooperatively. The turning of nut 398 to vary the compression of seal 396 beyond the sealing pressure required by the seal 396 and thereby vary the distance of pusher 376 from stem 366 permits a final calibration without disassembling the members surrounding the intermediate pressure chamber 254.

FIGURE 31 shows another structure for calibrating the operating pressures maintained in the intermediate pressure chamber 254 of FIGURE 12, by the expansion valve 362 without disassembling the members surrounding the intermediate pressure chamber 254. The gas pressure in the bellows 384 may be calibrated after the various parts are assembled to vary the pressure in chamber 254 at which the pusher 376 engages the stem 366 of the expansion valve 362. The check valve construction 590 may be secured to the wall 386 inside the bellows 384 (FIGURE 12) so gas may be added to or removed from the bellows 384 to calibrate the action of the bellows on the expansion valve stem 366. This in turn calibrates the pressure to be maintained in the intermediate chamber 254.

The check valve 590, FIGURE 31, may be of any construction suitable for the addition of gas to or removal of gas from the bellows 384 of FIGURE 12. For example,

the cylindrical drum 591 may be welded or otherwise secured to wall 386 at 592. The valve 593 is threadedly carried by stem 594 which is rightwardly actuated by the spring 595 against the orifice 596. The stem 594 passes freely through a narrow bridge 597 threadedly held in drum 591.

The spring 595 bears at one end against a stationary wall or washer 595A which is secured to drum 591. The spring 595 bears at the other end against a washer 595B which is threadedly secured to the stem 594.

A sealing cap 598 threadedly engages the drum 591. The end of cap 598 hermetically seals against the flexible washer 599 to prevent gradual leakage of gas from bellows 384 after calibration.

Gas may be added to bellows 384 by placing the end of a pressure gas tube over the end 600 of drum 591 after removal of cap 598 to inject the desired amount of gas in the bellows 384. Gas may be removed from the bellows by pushing leftward the end of stem 594. These operations may be similar to the usual inflation and deflation of a tire or the like.

The relief valves 428, 454, and 460 may be calibrated by regulating the degree of turning of the thin wall 430, for example, within the threaded opening 434, FIGURE 15. This regulates the compression on spring 442 and thereby regulates the relief pressure at which valve 438 opens. Similar calibrations may be produced by the turning of the corresponding thin walls of relief valves 454 and 460 to calibrate the relief pressure at which these valves open.

If desired, unitary relief valve structures corresponding to relief valves 428, 454 and 460 may be provided with their own outer drums provided with conical rubber-like sealing members similar to the conical member 362 of valve 364. This permits the unitary relief valves to be calibrated for varying relief pressures before installation in wall 216.

Therefore the settings or calibrations of the operating pressures of valves 364, 438, 454 and 460 may all be performed after these valves have been assembled on the massive wall 216. These calibrations do not interfere with each other and do not disturb the settings of other valves.

FIGURES 18 through 30 show various steps which are taken at the brewery in order to clean and refill the dispensing container for reuse in a domestic refrigerator and the like.

The counter-sunk faucet wall such as 233 in FIGURE 11, the counter-sunk bung wall 236 of FIGURE 11, for example, and the downward drain to the bung hole, such as the inner surface 237 and discharge rim 237A of FIGURE 11 are helpful in the cleaning and refilling operations at the brewery. The usefulness of the constructions at the ends of the keglike container becomes apparent from an inspection of the steps disclosed in FIGURES 18 through 30.

Preferably the containers, which are indicated by the reference numeral 500 and are emblematic of the dispensing containers 10 or 210 may be transported in an insulating carrying case 502. When such carrying cases 502 and containers 500 are returned to the brewery in empty condition, the containers 500 are removed from the opened insulating carrying cases 502 as indicated in FIGURES 18 and 19.

FIGURE 20 shows a table or station 504 on which a container 500 may be clamped by the clamps 506 which are opened and closed by pedal 508. The valve end 510, which is counter-sunk as indicated by the dotted line, permits the container 500 to be placed vertically on the valve end 510 (valve end 30 of FIGURE 1 or 230 of FIGURE 11) without disturbing the valve. Thereafter the gas charging container 512 (15 of FIGURE 1 or 215 of FIGURE 11) may be removed by any suitable tools from the bung end (37 of FIGURE 1 or 237 of FIGURE 11). Thereafter a plurality of dispensing containers 500

with the removed gas charging containers 512 may be placed in any suitable washing and rinsing apparatus, such as shown in FIGURES 21 and 22, which is capable of cleaning the inside and outside of the container 500, and the outside of the container 512. FIGURE 21 shows the containers 500 and 512 being sprayed with water, with or without detergent, while the containers 500 and 512 rest on a suitable perforated rack 514. If desired, the washing operation may be performed in a multiple compartment washer in which compartments are rotated at intervals, to various positions, so that a container 500 and container 512 may first be placed in a loading and unloading station 1 of FIGURE 22. Thereafter these containers may progress to stations 2, 3, 4, 5, 6 and back to 1 during which time they are suitably washed and cleaned. For example, they are loaded and unloaded in station 1, FIGURE 22. Thereafter they rotate one step and are pre-rinsed with clean water in station 2. They are washed in 180° water with light acid solution in stations 3 and 4 and then are rinsed in clear cold water in stations 5 and 6 and then partly drained and unloaded in station 1. Any other apparatus and sequence of cleaning steps may be used. Suitable intervals of time elapse in each of the stations 1-6 as the inside rack carries them from one station to another where they are sprayed by suitable nozzles both downwardly, sidewise, and upwardly. Suitable washing machines are now on the market which provide automatic rotation from station to station, and automatic spraying of other types of containers with rinse water or wash water, as desired. Such washing machines may be used to perform the operations of FIGURES 21 and 22 of this application.

FIGURE 29 shows how a container 500 may be placed on the rack 514 of a washing machine, such as shown in FIGURES 21 and 22, with the bung opening 516 in a downward position. Suitable nozzles such as nozzle 518 sprays upwardly into the bung 516 while nozzles 520 spray the sides and top if desired. The spout 522 (corresponding to spouts 12 of FIGURES 1 or 212 of FIGURE 11) of the faucet 524 may have a hose 526 attached thereto through which suitable wash water and rinse water are forced down the spout 522 to clean out the valve and the feed tube. For this purpose, the faucet handle 528 may be held in open position by means of a suitable holding member 530, or rubber-like spacer, which holds the valve 524 open during all of these operations to permit the water to circulate freely through the valve from hose 526 for cleaning the insides of valves 12 or 212 and tubes 40 or 240 of FIGURES 1 and 11. After the washing operations in the washer 532 or the like, the containers 500 and 512 may stand on a draining and storage platform 534 of FIGURE 23, with a suitable draining rack, not shown. The containers 500 may stand sequentially on both the valve end 510 and the bung end 538 thoroughly to drain all parts of the container 500 both inside and outside of the container.

Thereafter the containers 500 may be filled with a beverage, such as beer or the like, at the station or bench 536 of FIGURE 24. For example, the container 500 may stand with the valve end 510 in down position, and the bung end 538 in the up position.

FIGURE 30 shows in large scale part of the apparatus shown in FIGURE 24. A flexible inverted cup 540 is placed over and seals the bung 516. The cup 540 is connected to a beverage inlet pipe 542 which is suitably movable and/or flexible. The cup 540 is also connected to a flexible air relief pipe 544. When the cup is firmly over the bung hole 516, the pipe 540 may extend to a relatively low level 540A, of FIGURE 30, while the air relief pipe 544 extends down to the higher level 544A, which is the desired level of the beer at full condition. The pipes 542 and 544 are connected to the valves 546 and 548, FIGURE 24, which may be simultaneously opened and closed by any suitable actuating means either

combined or separate, such as by the common handle 550. A suitable transparent gauge 552 may be placed in the air relief line 544 with a suitable indicator 554 in the gauge 552. The indicator 554 is adapted to show whether air (or CO₂) or liquid is rising in the pipe 544, and indicates when the receptacle 500 has been filled to the desired level at the inlet 544A of air relief line 544. For example, the indicator 554 may be a light, hollow ball which is differently responsive to air or CO₂ flow and liquid flow. The upper parts of the pipes 542 and 544 are connected respectively to the lower part 560 and the upper part 562 of a beer vat 563 or other large quantity container which may be used to fill the receptacles 500 as they are placed on the station 536 for filling purposes. The valves 546 and 548 are closed after the container 500 has been properly filled with beer. These valves 546 and 548 are maintained closed until the cup 540 has been properly placed over another unfilled container 500. By the construction of FIGURE 24, a conservation of the CO₂ in the beer is possible because of the return air or CO₂ pipe 544.

After the container 500 has been filled on the station 536 of FIGURE 24, the container may be placed on station 564, FIGURE 25, with the valve end 510 downward and with the bung end 538 upward, at which time a gas-dispensing container 512 may be inserted in the bung and secured therein as shown in the FIGURES 1, 11, etc., and as indicated by the arrow 566 of FIGURE 25. If desired, suitable clamps 568 and 570 may be provided for holding the receptacle 500 firmly in a manner somewhat similar to that shown in FIGURE 20. In FIGURE 25, if desired, the clamp 568 may be movable into clamping position or unclamping position by a handle 572 (or pedal, if desired) or the like to aid in securing the gas-charging receptacle 512 within the receptacle 500.

Thereafter the receptacle 500, with the inserted gas-charging receptacle 512 therein may be moved to the station 574 of FIGURE 26. However, if desired the receptacles 500 and 512 may first be weighed at station 585. At the station 574 the CO₂ nozzle 576, with the needle 578, is inserted in a manner similar to that illustrated in FIGURE 12, and the control valve 580 is opened to permit CO₂ from a suitable CO₂ drum, not shown, to flow through the needle 578 into the high-pressure chamber of the container 512, corresponding to 15 and 215 of FIGURES 1 and 11. If desired, a suitable gauge 582 may be provided to show the gradual increase of pressure as the receptacle or container 512 is filled, and to indicate when valve 580 should be closed.

If desired, one or two weighing stations 584 may be provided, as shown in FIGURE 27, which have weighing platforms 585 and a suitable weight indicating dial 586. The container 500 may be weighed both before and after the CO₂ is added, as in FIGURE 26, so that the difference in the two weights of the container 500 will indicate the weight of the CO₂ that was added at station of FIGURE 26. (If desired, the beer weight in a container 500 may be similarly determined.) Thereafter, the filled and charged container 500 may be packaged in an insulating case 502, as indicated in FIGURE 28, for delivery to the consumer.

It is thus to be seen that the various containers which are diagrammatically indicated by the numeral 500 and which are emblematic of containers 10 and 210, have shapes that aid in the washing and filling and charging operations at the brewery. The countersunk valve end and the countersunk bung end, with the downwardly draining inner surface of the bung end toward the bung hole all aid in efficient washing, rinsing, filling, and charging operations at the brewery.

Other fluid products may require different gases for preservation and dispensing. For example, when milk is desired to be stored in a container of this kind, the same may be charged with nitrogen instead of CO₂, and this

maintains the milk in good condition for an unusually long time, if properly refrigerated.

Instead of the wire in opening 49, FIGURE 10, a spout cover may be provided which must be destroyed to remove it. This provides ease of operation both in packaging and consumer use. This also keeps the spout clean.

Instead of the spring pressed check valve 68 in passageway 69 of FIGURE 2, a rubber check valve may be used instead, such as disclosed in FIGURES 15-17 and 32.

Instead of the relief valve 460 of FIGURE 11, a frangible disc type may be used which ruptures at pressures above its rating and provides a non-reseating relief.

FIGURES 32 and 33 are diagrammatic cross sections of another embodiment.

FIGURE 32 shows valves and controls somewhat similar to those disclosed in FIGURES 11-17.

To avoid repetition of description, elements in FIGURE 32 which are somewhat similar in construction and function to elements shown in FIGURES 11-17 have been marked with reference numerals in which 400 has been added to the reference numerals of FIGURES 11-17.

Additionally, the valve constructions 838, 886, 764, 860, and 854 in FIGURE 32 have all been shown in the one plane of FIGURE 32. It is to be understood, however, that these valves may be distributed circumferentially in various planes around the longitudinal central axis 800 of FIGURE 32 in a manner similar to the distribution of corresponding valves in FIGURES 11-17, with the valves 838, 886, etc., being at any desired radial distances from the axis 800.

The valves 838, 886, 764, 860 and 854 of FIGURE 32 may be substantially identical in structure and function respectively with the valves 428, 478, 364, 460 and 454 of FIGURES 11-17.

In FIGURE 32 the bottle or propellant gas container 666, corresponding to 266 in FIGURES 11-17, is made integral with the massive wall construction 626, which corresponds with the wall construction 226 of FIGURES 11-17. By the integral construction of members 626 and 666 of FIGURE 32, no threading or telescoping is required, such as that shown at 408 in FIGURE 12.

Also, in FIGURE 32 the wall 626 has applied thereto a disc shaped dust cover 857 which has a flange 857' which surrounds the flange 802. This dust cover or medallion 857 may be made of material substantially the same as the material of disc or medallion 457 of FIGURE 12 and may be provided with a rupture disc 892, FIGURE 33, which is adapted to rupture if any excessive pressures are released by any of the valves 838, 860 and 854. In FIGURE 32 the cover is applied to the wall structure 626 instead of to the liquid container end wall 236, as is done in FIGURE 12.

The cover 857 of FIGURE 32 is held down, along with the flange 802 of wall 626 by the split ring 618. The flange 802 engages the seal ring 804 and provides an effective seal.

The cover 857 may be provided with a gas charging dimple 866, with an opening 872 to receive a gas charging needle, such as shown in FIGURE 12. The dimple 866 rests on the end of one or more rubber-like plugs 870, 870' which have central openings, not shown, to receive the charging needle in a manner similar to plug 470 and charging needle 482 of FIGURE 12.

An additional cover over flange 864 of FIGURE 32, corresponding to flange 464 of FIGURE 12, may be provided or omitted, as desired.

The valve 764 may be operated by a button 776 of FIGURE 32 in the same manner that valve 362 is operated by button 376 of FIGURE 12. The button 776 may be operated by a bellows and spring (not shown in FIGURE 32 but shown in FIGURE 12) or the button 776 may be operated by a flexible wall or diaphragm 902, FIGURE 32, which may be held between the flange 794

and the shoulder 903, while being pressed together by threaded ring 798, which flange shoulder and ring correspond to flange 394, unnumbered shoulder and ring 398 of FIGURE 12.

The diaphragm 902 may be connected to oppositely directed cups 904 and 906. The cup 904 holds or is integral with the button 776 and the cup 906 receives one end of the compression spring 908, while the other end of the spring 908 may be received by the end wall of the cup 786.

The space 910 may contain air substantially at atmospheric pressure, and the spring 908 may be calibrated with the diaphragm 902 automatically to maintain a propellant gas pressure of 12-14 p.s.i. in chamber 654. This, in turn, maintains a pressure of 12-14 p.s.i. in the liquid or beverage chamber 782 through the passageway 778 and 824 and check valve 820. This action may be substantially non-thermostatic.

However, the space 910 may alternatively be filled with a saturated gas for thermostatic and pressure control. The pressure in space 910 may be calibrated by the use of a valve similar to that shown in FIGURE 31, which may be applied to wall 786, as elsewhere described.

If a thermostatic regulation is desired, a bellows regulator for FIGURE 32, corresponding to 384 of FIGURE 12, with a calibrator of FIGURE 31, may be filled with a saturated gas of the type elsewhere described.

The valve 838 may be a low pressure relief valve, set to open at 25-30 p.s.i. The valve 886 may be a charging valve tested to 3000 p.s.i. tested capacity. The valve 764 may be set to be opened by button 776 at the pressure stated and may be tested at 3000 p.s.i. capacity. The valve 860 may be a high relief valve or rupture disc, not shown, calibrated to open or rupture at 1200-1500 p.s.i. The valve 854 may be an intermediate pressure relief set to open at 80-90 p.s.i., if desired.

The propellant gas container 666, when used to contain CO₂ for propelling beer and the like, may have a total capacity of 4 fluid ounces. The actual fill of CO₂ may be 1.92 fluid ounces with a required fill of 1.24 fluid ounces.

The thin rupture disc 892 may be made to rupture at any desired pressure. For example, it may rupture at 25-30 p.s.i. or higher. The opening 872 may also be formed so it provides pressure relief for any of the valves, since the cover 857 may bow outwardly sufficiently to provide a gas escape at the opening 872. The rubber-like plug construction 870, 870' may be retained in place by a cone-shaped sidewall, as at 475 in FIGURE 12, if desired; or by the dimple 866.

The structure of FIGURES 32 and 33 may be used in combination with any liquid dispenser. It can be used in combination with any liquid dispenser disclosed in this application.

If desired, a valve construction similar in construction and function to the valve construction in FIGURE 31 may be added to the wall 786 of FIGURE 32, as shown in FIGURE 34. Such valve, for example, may extend inside or outside the spring 908 and may be of a size not to interfere with the operation of the spring 908 or the flexible wall 902. Such valve may be used to calibrate the pressure in spaces 910 and 654 after the construction of FIGURE 32 has been assembled. If desired, the casing 591 of FIGURE 31 may be countersunk so space 600 is countersunk in wall 786 and may be covered by cover 857 or 892 and the cap 598 may be omitted, or may be formed as an internal cap 598A, as shown in FIGURE 34, which may be internally threaded in casing 591 and sealed to a shoulder at the bottom of an internal thread in casing 591.

In the interest of sanitation and corrosion prevention, it is desirable that beer, water, etc., be excluded from all spaces under the protective cap 857 of FIGURE 32. To this end, as shown in FIGURE 35, an adhesively secured disk or cover 857B of a sealable, flexible, impervious film

or lamination may be sealed to the upper surface 626A of the massive wall construction 626 of FIGURES 32 and 35 after the bottle or propellant gas container 666 has been provided with the various valve members and other structures carried by the massive wall construction 626.

The disk 857B may be heat sealable, if desired, and may be heat sealed to the surface 626A. By way of example, the disk 857B may be made of a lamination FC20 Reyseal, manufactured by the Reynolds Metals Company of Richmond, Virginia, U.S.A. This material, FC20 Reyseal, is specified as follows: .001 polypropylene—11 lbs. microcrystalline wax—8.5 T7 tissue—1.5 adhesive (lbs.)—0.004 aluminum foil—17 lbs. microcrystalline wax—8.5 T7 tissue. The polypropylene film is an extensible material which stretches without breaking when deformed by the application of the cover cap 857A, thereby maintaining continuity to exclude foreign matters from the upper cavities and working parts of the regulator. The adhesion of the Reyseal to the regulator surface 626A is intended to be sufficient to prevent contamination and at the same time to be weak enough to allow for the escape of gas at pressures above 15 p.s.i.g. in the event of leakage or relief valve operation.

The cap or medallion 857A of FIGURE 35 may be provided with a gas charging dimple 866A with an opening 872A substantially similar to the dimple 866 and opening 872 of FIGURE 32. The dimple 866A may produce a corresponding dimple 866B in the disk 857B. The medallions 857 and 857A may be made of metal or plastic so they can be flanged or spun around the edge flange 802 as indicated at 857'.

The cap 857A may also be provided with a conical flange 857C which may press down on the disk lamination 857B and produce a downward indentation or dimple 857D in disk 857B.

Alternatively, the under side of the cap 857, FIGURE 32, may be covered on the under side with a pressure sensitive adhesive, which may be caused to adhere to the massive body 626 in a manner similar to the adhesion of the disk 857B.

A storage and dispensing container of superior construction, a superior method of merchandising and/or filling and/or charging the same are thus provided.

The features of disk 857B and the features of adhering the cap 857 to the massive body are applicable to all of the embodiments disclosed in this application.

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 claims which follow.

What is claimed is:

1. A dispensing container comprising: a cylinder-like side wall of said container, with said container having a longitudinal axis normally horizontal when said container is stored in a refrigerator and having a first end ring-like guard rim, said rim lying substantially in a first end plane transverse to said longitudinal axis, said side wall having a low portion when said container is in normal position in said refrigerator, said low portion being low with respect to the main portion of said side wall; a first end wall joining and closing said side wall at said rim, said first end wall sloping inwardly from said first end plane to form a recess in the container end and having a liquid dispensing valve receiving first opening; a liquid dispensing valve secured in said first opening and lying entirely inside said plane, said valve having an actuating handle opening said valve by outward movement of said handle from said container, and not by inward movement of said handle, said handle lying entirely within said end plane, said valve having a liquid valve outlet outside and a liquid inlet inside said first end wall; a liquid dispensing conduit inside said container and having its outlet connected to said inlet of said valve, said conduit having its inlet extending near said low portion of said container while in normal

position in said refrigerator; a liquid spout connected to said valve outlet, located inside said first end plane and directed downwardly when said container is in normal position in said refrigerator; with a clearance to accommodate a receiver about said spout a second end wall closing the other end of said side wall and having a second opening; a propellant gas container insertable into and removable from said dispensing container through said second opening; means to admit or release propellant gas from said gas container to produce a propelling action on liquid contained in said dispensing container and closing means for said second opening.

2. A dispensing container according to claim 1 in which said walls form a liquid containing space and in which said propellant gas container is removably inserted in said liquid containing space and has a high pressure chamber connected to a gas container end wall which has a flange sealed by a flexible seal to the rim of said second opening; said gas container end wall having a massive body containing an intermediate pressure chamber connected to said high pressure chamber by an expansion valve in said massive body responsive to pressure in said intermediate pressure chamber; said intermediate chamber discharging into said liquid containing space by a check valve; pressure relief valves in said massive body relieving excessive pressures respectively in said high pressure chamber in said intermediate pressure chamber and in said liquid space; and a propellant valve in said massive body discharging into said high pressure chamber and having expandable and contractible means to receive a charging needle to charge said high pressure chamber with high pressure gas and to close after withdrawal of said needle.

3. A dispensing container according to claim 1 in which said second end wall is countersunk and is located inside a second end closed perimeter guard rim lying substantially in a second end plane transverse to said longitudinal axis and the interior surface of said second wall and said liquid dispensing conduit are formed to drain substantially completely into said second opening when said dispensing container is placed in vertical position with said second opening downward and with said propellant gas container removed from said dispensing container.

4. A dispensing container according to claim 1 in which said propellant gas container has a high pressure chamber, an intermediate expansion chamber and an expansion valve between said high pressure chamber and said intermediate chamber, and in which means are provided to actuate said expansion valve in response to conditions in said intermediate expansion chamber.

5. A dispensing container comprising: an outside wall structure forming the enclosing space of said container; a liquid dispensing valve for said container having an inlet flow connection extending near a low position within said enclosing space, said valve being rigidly countersunk in said outside wall and having an operating handle countersunk in said outside wall structure and opening said valve by outward motion of said handle, said handle being countersunk sufficiently to prevent accidental opening of said valve; a propellant gas container within said enclosing space and having an end wall; valve means carried in said end wall for automatically introducing propellant gas from said propellant gas container into contact with said liquid in response to pressure conditions within said space, and second valve means carried in said end wall for permitting the introduction of said propellant into said propellant gas container.

6. A dispensing container comprising: a cylinder-like side wall having a longitudinal axis normally horizontal when said container is stored in a refrigerator and used for dispensing its contents while said container is in said refrigerator; a front wall joining and closing the front end of said side wall, said front wall having a liquid dispensing valve with a spout outside said front wall and a liquid

intake inside said front wall; a rear wall joining and closing the rear end of said side wall, said rear wall having a bung opening; and a propellant gas container removably inserted in said dispensing container and sealed to said bung opening and having an end wall, said end wall having valve means therein for discharging gas directly into the liquid space of said dispensing container, said end wall well having other valve means therein for permitting the introduction of said propellant into said gas container, said end wall being removably attached to said rear wall of said dispensing container, said gas container having another end wall entirely within said dispensing container.

7. A dispensing device comprising: a liquid container having a longitudinal axis normally horizontal when said container is stored in a refrigerator and used for dispensing its contents while said container is in said refrigerator, and having a countersunk wall containing and protecting a rigidly held wall surrounded liquid dispensing faucet with a wall surrounded operating handle which is only outwardly movable to open said faucet, said liquid container having an opening for receiving a removable propellant gas container and substantially draining said liquid container when said gas container is removed from said opening; a propellant gas container removably inserted in said liquid container through said opening and having an end wall sealed to the rim of said opening; a valve means carried by said end wall for permitting the introduction of said propellant into said gas container; and a pressure relief valve carried by said end wall and having a discharge outlet in said end wall, said propellant gas container discharging gas into the liquid space of said liquid container, said end wall of said propellant gas container being removably secured to the rim of said opening of said liquid container, said gas container having another end wall entirely within said liquid container.

8. A dispensing device comprising: a relatively long liquid container having a liquid dispensing faucet at one end, a liquid containing space and an opening at the other end to receive a propellant gas container; a propellant gas container having a propellant gas high pressure chamber and being inserted in said liquid container through said opening and having an end wall sealed to the rim of said opening, said end wall having an intermediate pressure chamber connected to said high pressure chamber by an expansion valve and to said liquid containing space by a check valve; a valve means in said end wall permitting the introduction of said propellant into said gas container; and a pressure relief valve in said end wall relieving an excessive pressure within said device.

9. A device according to claim 8 in which said pressure relief valve relieves excessive pressure within said high pressure chamber, and in which another relief valve in said end wall relieves excessive pressure within said intermediate chamber, and in which another relief valve in said end wall relieves excessive pressure in said liquid containing space.

10. A device according to claim 9 in which said expansion valve is of the flexible wall controlled type, and in which all of said relief valves have calibrating means adjustable through openings in said end wall.

11. A device according to claim 9 in which said expansion valve and all of said relief valves have calibrating means adjustable through openings in said end wall.

12. A dispensing device comprising: a liquid container having a wall structure with a liquid dispensing faucet at one end, encompasses a liquid containing space, and having an opening at the other end to receive a propellant gas container; a propellant gas container removably inserted in said liquid containing space and having a high pressure chamber connected to a gas container end wall which has a flange sealed by a flexible seal to the rim of said opening; said end wall having a massive body containing an intermediate pressure chamber connected to said high pressure chamber by an expansion valve in said massive body responsive to pressure in said inter-

mediate pressure chamber; said intermediate chamber discharging into said liquid containing space by a check valve; pressure relief valves in said massive body relieving excessive pressures respectively in said high pressure chamber, in said intermediate pressure chamber and in said liquid space; and a propellant valve in said massive body discharging into said high pressure chamber and having means to receive a charging needle.

13. A device according to claim 12 in which a cover is secured to said device to prevent tampering with said relief valves, and in which said cover is fracturable by the pressure of gas discharged by one of said relief valves.

14. A dispensing container comprising: a cylinder-like side wall of said container, with said container having a longitudinal axis normally horizontal when said container is stored in a refrigerator and having a first end ring-like guard rim, said rim lying substantially in a first end plane transverse to said longitudinal axis, said side wall having a low portion when said container is in normal position in said refrigerator, said low portion being low with respect to the main part of said side wall; a first end wall joining and closing said side wall at said rim, said first end wall sloping inwardly from said first end plane to form a recess in the container end and having a liquid dispensing valve receiving first opening; a liquid dispensing valve secured in said first opening and lying entirely inside said plane, said valve having an actuating handle opening said valve by outward movement of said handle from said container, and not by inward movement of said handle, said handle lying entirely within said end plane, said valve having a liquid valve outlet outside and a liquid inlet inside said first end wall; a liquid dispensing conduit inside said container and having its outlet connected to said inlet of said valve, said conduit having its inlet extending near said low portion of said container while in normal position in said refrigerator; a liquid spout connected to said valve outlet, located inside said first end plane and directed downwardly when said container is in normal position in said refrigerator with a clearance to accommodate a receiver about said spout; and means for introducing into said dispensing container liquid to be dispensed through said liquid spout and propellant gas to propel said liquid through said liquid spout, said last named means including a propellant gas container removably secured in an opening in the end of said casing wall, said gas container having a first end wall entirely inside said casing wall and having a second end wall at said opening and having a gas filling valve for said gas container in said second end wall.

15. A dispensing device according to claim 12 in which a flexible and impervious film is adhesively secured to said massive body as a protective cover for said pressure relief valves; and a protective cover over said film.

16. A dispensing device comprising: a liquid container having a liquid dispensing faucet and a liquid containing space; and a propellant gas container removable from and insertable in said liquid container and having a high pressure chamber having an end wall that is removably attached to the outer wall of said liquid container, said gas container end wall having valve means therein for discharging propellant gas from said high pressure chamber into said liquid containing space, said gas container end wall having another valve means therein for permitting the introduction of said propellant into said high pressure chamber and wherein said another valve means of said gas container end wall has resilient means therein to receive and seal around a propellant charging needle before said needle can introduce said propellant into said high pressure chamber, said gas container having another end wall entirely within said liquid container.

17. A dispensing device as set forth in claim 16 wherein said other valve means is a one way valve means.

18. A dispensing device as set forth in claim 16 wherein said other valve means is of the automotive tire type

having a stem actuatable by said charging needle to open said other valve means.

References Cited by the Examiner

UNITED STATES PATENTS

1,824,134	1/1932	Waite	141—329 X
2,009,467	7/1935	Amsdell	222—399 X
2,501,611	3/1950	Nicholson	222—399 X
2,514,773	7/1950	Kromer	222—399 X
2,593,165	4/1952	Metzger	222—399 X

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2,660,343	11/1953	Charpiat	222—399 X
2,812,109	11/1957	Wentz	222—399 X
2,848,168	8/1958	Matthews	236—50
3,024,800	3/1962	Lewis	222—399 X
3,127,059	3/1964	Lawrence et al.	222—399 X