United States Patent [19]

Johnston

[11] **3,836,053**

[45]* **Sept. 17, 1974**

[54] **LIQUID DISPENSING APPARATUS**

[76] Inventor: **Mack S. Johnston,** 26 Hitching Post Dr., Rolling Hills, Calif. 90274

[*] Notice: The portion of the term of this patent subsequent to Sept. 11, 1990, has been disclaimed.

[22] Filed: **Aug. 3, 1973**

[21] Appl. No.: **385,358**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 189,281, Oct. 14, 1971, Pat. No. 3,758,008.

[52] **U.S. Cl.** **222/400.7**
[51] **Int. Cl.** **B65d 83/00**
[58] **Field of Search** 137/212; 251/65; 222/400.7, 400.8

[56] **References Cited**

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Primary Examiner—Robert B. Reeves
Assistant Examiner—David A. Scherbel
Attorney, Agent, or Firm—Charles E. Wills

[57] **ABSTRACT**

Apparatus which is especially useful for dispensing beer from kegs and which includes a keg adapter and a tapper for operative engagement therewith. The keg adapter has gas and liquid passageways containing normally closed valves, which when opened, permit compressed gas to be admitted to the keg and beer to be withdrawn therefrom, said valves being biased toward the closed position by actuators which contain permanent magnets. The tapper can be connected to a source of compressed gas and to a beer faucet and contains a tap rod, which, when manually actuated, seals the tapper to the adapter and interconnects the gas source and the faucet with the interior of the keg.

34 Claims, 13 Drawing Figures

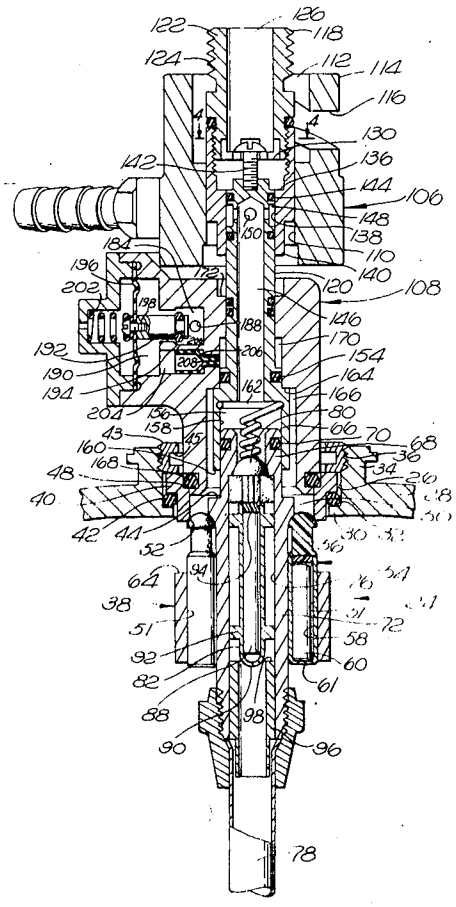


FIG. 1.

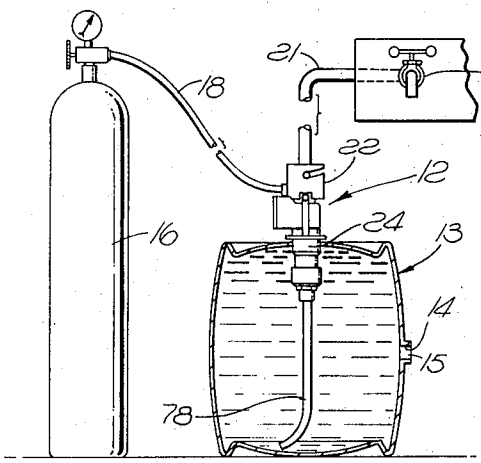
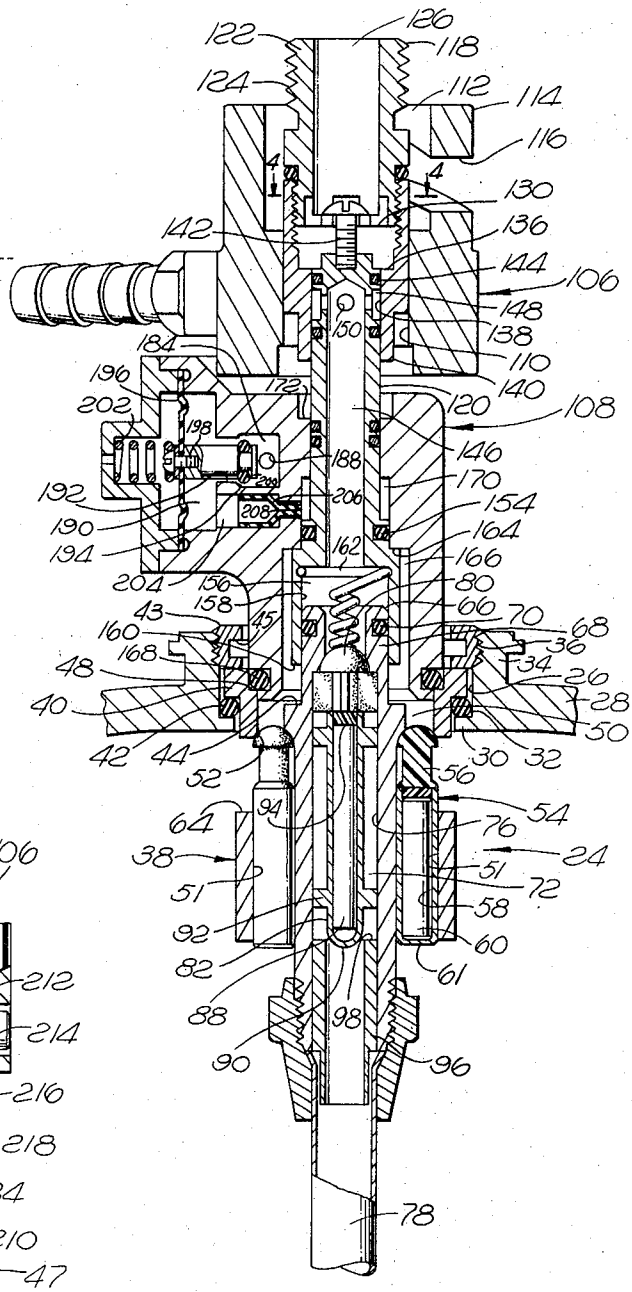


FIG. 2.



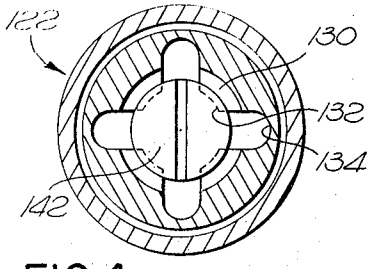


FIG. 4.

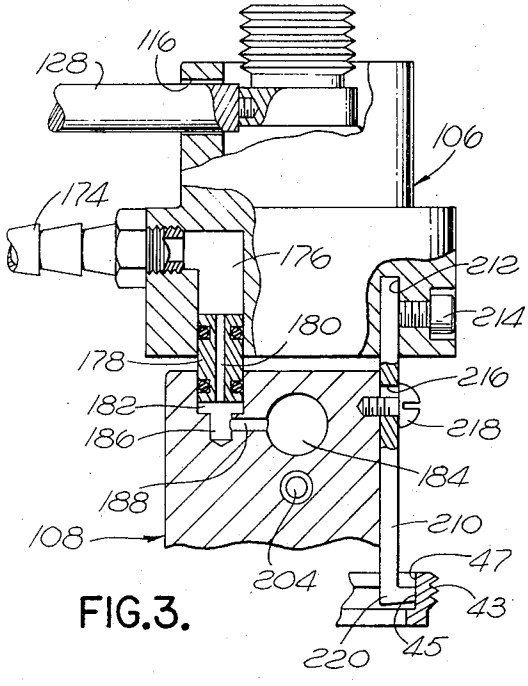
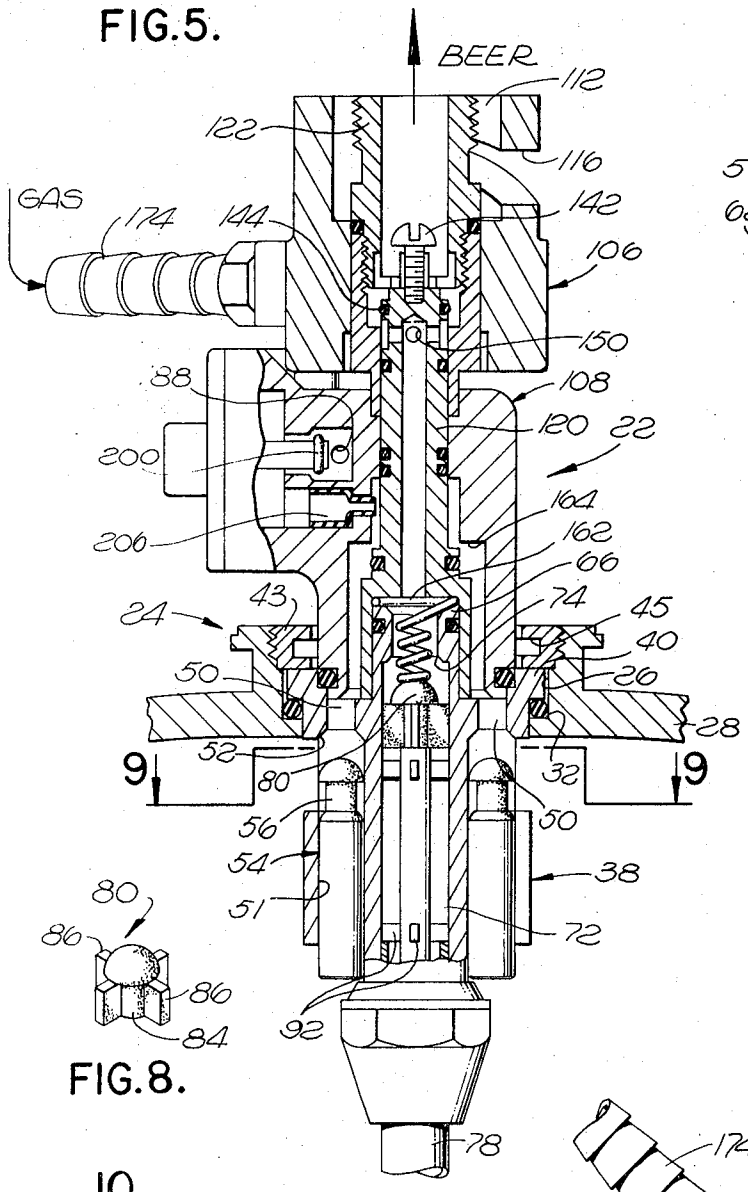


FIG. 3.

FIG.5.



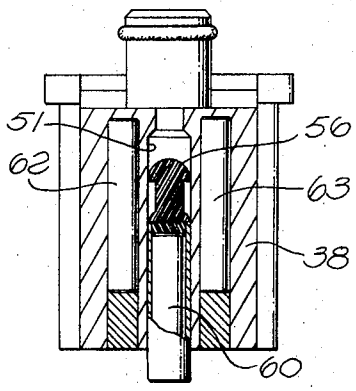


FIG.10.

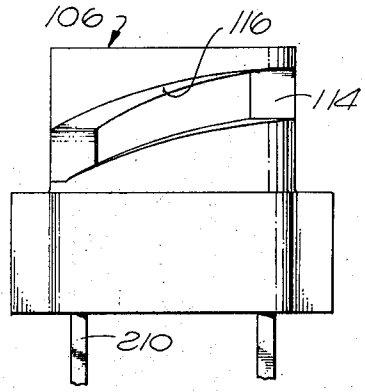


FIG.7.

FIG.8.

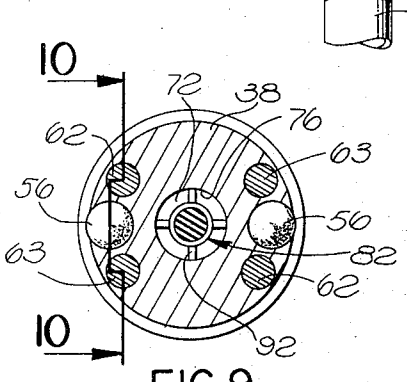


FIG.9.

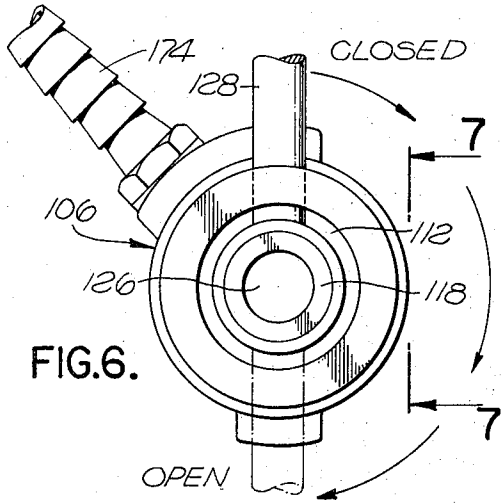


FIG.6.

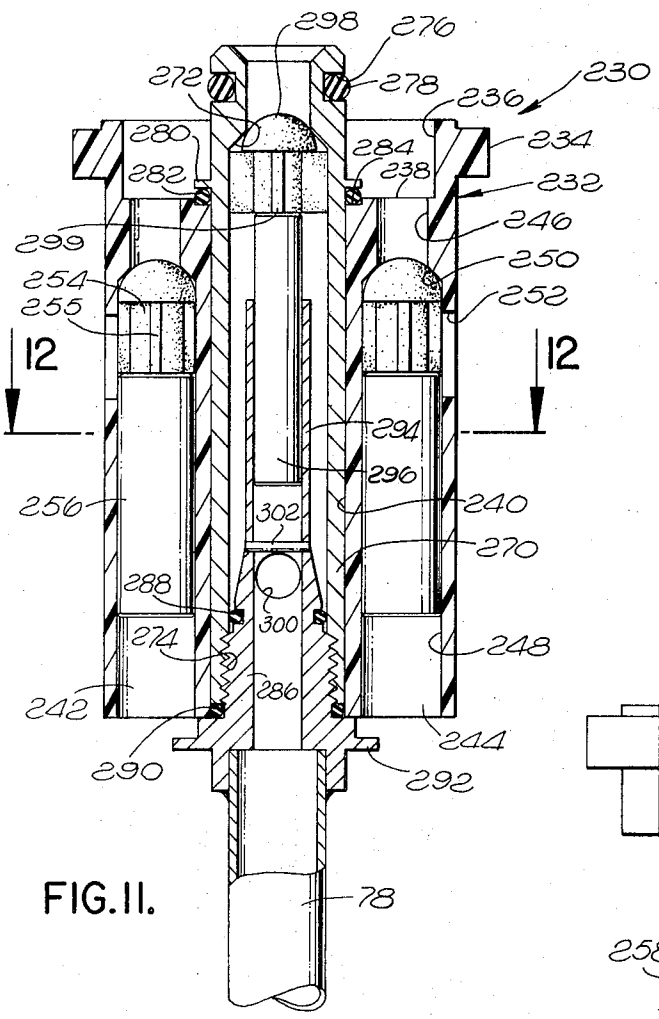


FIG. 11.

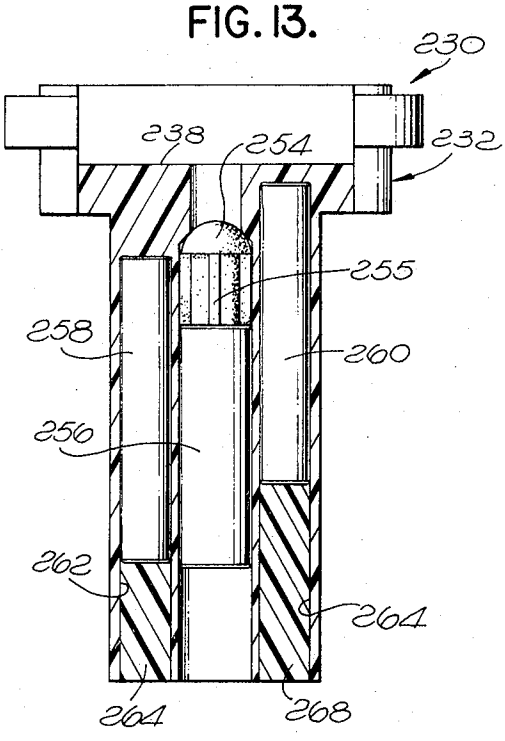


FIG. 13.

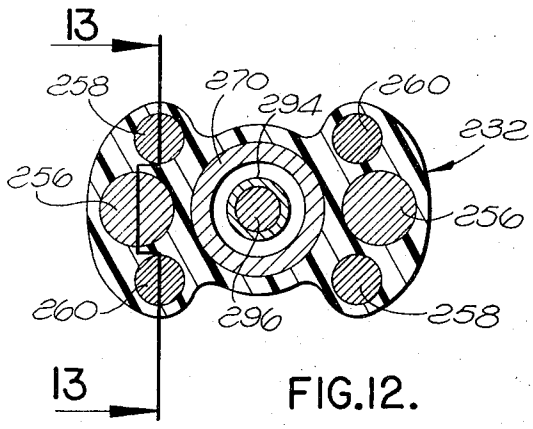


FIG. 12.

LIQUID DISPENSING APPARATUS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of application Ser. No. 189,281, filed Oct. 14, 1971, now U.S. Pat. No. 3,758,008.

BACKGROUND AND SUMMARY OF THE INVENTION

The present invention relates generally to the siphoning art, and more particularly to a novel liquid dispensing apparatus which is especially useful for drawing liquids such as beer from barrels or kegs, utilizing a gas such as air or carbon dioxide as the pressure force.

For many years, the prevailing draft system for dispensing beer from kegs required a wooden cork which sealed an opening in one end of the keg, which cork was removed by the bartender who then inserted into the opening an elongated tap rod assembly which had a siphoning device associated therewith. Means were provided to inject compressed air or carbon dioxide into the keg through the tap rod assembly, whereby the beer was driven out of the keg through the siphoning device to a spigot or faucet which controlled the flow of beer from the keg.

After all of the available beer had been withdrawn from the keg, the bartender would then remove the tap rod assembly and siphoning device from the spent keg and repeat the process with a full keg. Inasmuch as the same tap rod assembly and siphoning device were used over and over again, it was necessary for the bartender to frequently clean the unit in an effort to remove old yeast deposits and bacteria so as to avoid contaminating the beer in the fresh barrel.

Another problem with the aforementioned draft system was that the spent or empty kegs had an opening in the end thereof from which the cork had been removed, which opening permitted all kinds of foreign matter and things to enter the keg. Consequently, the cleaning of these kegs at the brewery prior to refilling was a laborious and costly process.

Being familiar with the aforementioned problems, I invented various beer tapping assemblies which included a keg adapter mounted in the keg and including a spring-biased valve which remained closed to prevent the escape of beer until a tapper was engaged with the adapter and actuated to cause a probe to unseat the aforementioned valve and permit the beer to flow therefrom under pressure from a source of compressed air or carbon dioxide which was connected to the tapper. Various forms of my aforementioned adapter and tapper assembly are described in U.S. Pat. Nos. 3,231,154; 3,353,724; 3,410,458; 3,422,448; 3,435,997; 3,438,553; 3,497,114; 3,550,818; 3,563,424; 3,567,080; 3,591,057; 3,599,843; 3,610,478, and others.

Although the various forms of keg adapters and tappers shown and described in the aforementioned patents constituted a considerable improvement over prior beer tapping devices, they were not completely satisfactory, primarily because of the problems encountered with properly washing all of the various parts and passageways contained in the keg adapter, including the various coiled springs which maintained valves and parts in closed and engaged positions.

Another problem was that the force of the water used in washing the kegs with the keg adapter in position, was usually not strong enough to compress the main coil spring which held the beer valve in the closed position, and therefore it was necessary to employ a fixture with fingers which engaged and opened the various valves against the action of the biasing springs.

Yet another problem was that the coiled spring which was used for maintaining the main valve in a closed position prior to tapping, tended to become "set" in the compressed or valve-open position, whereby in subsequent installations it failed to effectively close the main valve while the keg was being transported, with the resultant loss of beer and internal gas pressure.

A further problem with existing equipment, is that it is often difficult for a woman bartender to properly engage the tapper with the keg adapter, and subsequently actuate the probe as to tap the keg.

With the aforementioned limitations and deficiencies of prior tapping equipment in mind, and the problems which have been encountered with my own improvements as referred to above, it is an object of the present invention to provide a novel keg adapter for beer kegs and the like which contains relatively few parts, thereby appreciably facilitating the washing thereof. More particularly, it is an object to provide a keg adapter with relatively few parts and in which such parts are of a simple configuration, and which contains relatively unobstructed beer and gas passageways, whereby the adapter can be properly cleaned while attached to the keg and with a minimum of time and effort. Specifically, it is an object to provide such an adapter which includes a body made from a plastic material and which can be mass-produced at a relatively low cost.

Another object is to provide a novel keg adapter which is completely devoid of spring biased valves, thereby obviating the aforementioned problems of "set" and washing difficulties. More particularly, it is an object to provide in such an adapter, valves which are biased toward the closed position by a force or pressure source which remains substantially constant regardless of the number of times the adapter is used and reused. Specifically, it is an object of the present invention to employ valve actuators containing permanent magnets.

A further object is to provide a novel keg adapter in which the various beer and gas valves are effectively maintained in the closed position during shipping and prior to tapping, but which are easily opened by a stream of water during the cleaning operation and while the adapter is mounted in an empty keg.

Yet another object is to provide a novel tapper for use with the aforementioned keg adapter, which is simple in construction and easy to operate, whereby even the most inexperienced bartender can easily and quickly tap a keg of beer, using a minimum amount of physical force. More particularly, it is an object to provide such a novel tapper which can be installed by a simple push and twist operation, and which is forced into sealing engagement with the adapter by performing the tapping operation.

An additional object is to provide a novel tapper which prevents beer from flowing in the reverse direction from the faucet or spigot toward and out of the tapper, as when the tapper is disengaged from the keg adapter. More particularly, it is an object to provide

such a tapper with valve means which automatically close prior to the disengagement of the tapper from the adapter, whereby beer is prevented from flowing in the reverse direction from the faucet toward and out of the tapper.

Yet another object is to provide a novel tapper which requires the tap rod to be disengaged and the gas flow into the keg cut off, before the tapper can be disengaged from the keg adapter.

I have discovered that the foregoing objects and advantages are achieved by liquid dispensing apparatus which comprises a keg adapter and a tapper, the keg adapter including a housing to be mounted in an opening in a keg and containing gas and liquid passageways provided with valves yieldably biased toward the closed position by actuators which contain permanent magnets. The magnetic actuators maintain the valves in the closed position during the filling of the keg and during shipment but are easily moved to the open position by a stream of water under pressure entering the passageways, as when the keg is being washed prior to refilling. The tapper is adapted to be connected to a source of compressed gas and to a faucet for dispensing the beer, and contains gas and liquid passageways in communication therewith, said passageways being provided with valves for controlling the flow of gas and liquid therethrough. The tapper is arranged for engagement with the keg adapter, and contains a tap rod, which, when manually actuated, seals the tapper to the adapter, opens the valves in the tapper, and opens the liquid valve in the adapter, whereby gas can flow into the keg and beer can be dispensed from the faucet.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. **1** is a schemetic drawing of a liquid dispensing apparatus embodying the teachings of the present invention, shown installed in a keg of conventional construction and interconnected with a conventional source of gas pressure and with a conventional faucet or spigot;

FIG. **2** is a vertical, sectional view of the liquid dispensing apparatus with the keg adapter installed in a keg, the assembly being in the closed or untapped position;

FIG. **3** is a fragmentary, elevational view of the upper portion of the tapper, viewed generally from the left of FIG. **2** and shown partially in cross-section to illustrate the construction of the gas passageways;

FIG. **4** is an enlarged, horizontal, sectional view of the actuator for the tap rod assembly, taken generally on the line **4—4** in FIG. **2**;

FIG. **5** is a vertical, sectional view of the tapping assembly, similar to the view shown in FIG. **2,** but with the assembly in the open or tapped positioned;

FIG. **6** is a top, plan view of the tapper, with the handle thereof in the closed or untapped position;

FIG. **7** is an elevational view of the upper portion of the tapper, taken on the line **7—7** in FIG. **6**;

FIG. **8** is a perspective view of one form of a beer flow-controlling valve, removed from the assembly shown in FIG. **5**;

FIG. **9** is a horizontal, sectional view through the keg adapter, taken on the line **9—9** in FIG. **5**;

FIG. **10** is a vertical, sectional view through the keg adapter, showing the arrangement of the stationary permanent magnets, taken on the line **10—10** in FIG. **9.**

FIG. **11** is an enlarged vertical sectional view through a modified form of keg adapter which is of a simplified and streamlined construction.

FIG. **12** is a horizontal sectional view taken on the line **12—12** of FIG. **11,** and

FIG. **13** is a vertical, sectional view taken on line **13—13** of FIG. **12,** showing the staggered arrangement of the stationary, permanent magnets.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Although the liquid dispensing apparatus of the present invention can be used for siphoning various liquids from containers, it is especially suitable for use in the dispensing of draft beer, and will be so described. It is also to be understood that various types of gas pressure sources and faucets can be employed and that the keg and gas cylinder can be located under the counter in a tavern or bar, or in the basement or storage room of a restaurant.

Referring to the drawings more particularly by reference numerals, and specifically to FIG. **1,** the number **12** indicates generally a liquid dispensing apparatus constructed in accordance with the teachings of the present invention, shown installed in one form of beer keg **13** of conventional construction having a filling opening **14** closed by a bung **15,** and interconnected with a cylinder of compressed air or carbon dioxide gas **16** by a gas hose **18,** and with a faucet or spigot **20** by means of a beer hose **21.** There are two main types of beer kegs in use at the present time the "Golden Gate" and the "Peerless," which differ in the size and configuration of the tapping opening. The present invention is shown used with a "Golden Gate" keg. A related construction for use with "Peerless" kegs is shown in my co-pending application Ser. No. 390,153, filed Aug. 20, 1973.

The apparatus **12** (FIG. **2**) includes a tapper **22** which is engageable with a keg adapter **24,** the latter being mounted in an opening **26** contained in the end wall **28** of the keg **14.** The keg opening **26** contains an inwardly extending bottom flange portion **30** which provides a ledge **32,** and is surrounded by an upwardly extending flange portion **34** which contains internal threads **36.**

The keg adapter **24** (FIG. **2**) includes a cylindrical adapter housing **38** which can be made from metal or rigid plastic material and includes an outwardly extending upper flange portion **40** which bears upon an O-ring **42** supported on the aforementioned ledge **32.**

The adapter is held in position in the keg by a conventional retaining ring **43** which engages the upper face of the flange portion **40** and which contains an internal annular groove **45** with opposed slots **47.**

The upper end of the adapter housing contains an annular groove having a bottom wall **44** and an outer side wall **46,** the latter being provided with a shoulder **48.**

Extending downwardly from the bottom wall **44** of the groove and through the housing, are two diametrically opposed gas passageways **50,** each having a lower inner wall **51** and having a valve seat **52** in the upper portion thereof. Positioned in each of the gas passageways in a gas valve **54,** which, in the preferred form, comprises a separate valve member **56** made from a

tasteless and odorless resilient material such as Neoprene, and which is adapted to engage the valve seat **52,** and a valve actuator **58** comprising an elongated permanent magnet **60** enclosed within a smooth casing **61** which is in sliding engagement with the lower wall **51** of the gas passageway. I have achieved excellent results with both magnesium and plastic cases, and cases made of stainless steel are also acceptable if the metal is very thin so as not to add too much weight to the actuator. In short, it is desirable to have the valve actuator as light in weight as possible. The upper end of the casing may be closed with a Teflon insert which holds the magnet firmly in position and without causing any binding in the gas passageway.

Embedded in the housing on opposite sides of each gas passageway and spaced an equal distance therefrom are two elongated permanent magnets **62** and **63** (FIG. **9** and **10**). The magnets **62** and **63** are generally parallel with the gas passageways **50,** and the upper ends thereof (FIG. **10**) are of the same polarity and are a short distance above the upper end of the movable magnet **60** when the gas valve is in the closed position. The polarity of the upper end of the movable magnet **60** is opposite from the polarity of the upper ends of the stationary magnets **62** and **63,** whereby the upper ends of the movable magnets **60** are "attracted" to the upper ends of the stationary magnets **62** and **63.**

I have discovered that with the aforementioned arrangement, there is sufficient magnetic attraction between each movable magnet **60** and its associated stationary magnets **62** and **63** that the gas valves **54** are securely maintained in the closed position while the keg is being shipped, but they are readily moved to the open position by gas pressure during the dispensing operation.

Diametrically opposed gas vents **64** are provided in the upper portion of the adapter housing in communication with the gas passageways **50** and adjacent to the valves **56,** whereby gas can flow past the valve members **56** when they are in the open position, and into the interior of the keg **14,** as will be described more fully hereinafter.

Projecting upwardly from the center of the adapter housing **38** is a tubular bayonet portion **66** which includes an outer wall **68** provided with an external annular groove which receives an O-ring **70.**

The center of the tubular bayonet portion provides a beer passageway **72** which contains a valve seat **74** (FIG. **2**) and a lower inner wall **76,** said passageway being in communication at the lower end thereof with a siphon tube **78** of conventional construction, said tube being removably fastened to the lower end of the adapter housing **38** by a threaded fitting. As shown in FIG. **1,** the siphon tube **78** extends to adjacent the bottom wall of the keg **14,** in a conventional manner.

Slidably mounted within the beer passageway **72** is a beer valve assembly which includes a valve member **80,** preferably made from a tasteless and odorless resilient material such as Neoprene, and a valve actuator **82.** These are shown as being separate members, but it is to be understood that the valve assembly could be of unitary construction. The valve member **80** is adapted to engage the valve seat **72,** and, as shown most clearly in FIG. **8,** includes a body portion **84** and four radially extending flanges **86,** the radial dimensions of these flanges being such that the outer faces thereof are in sliding contact with the wall **76.** This prevents the valve member **80** from "tilting" and binding in the beer passageway **72** during the movement thereof relative to the valve seat **74.**

Although the aforementioned valve members **56** in the gas passageways are shown as having cylindrical body portions, I have determined that it is advantageous to use small radially extending flanges with these valve members, similar to the flanges employed with the beer passageway valve member **80.**

The valve actuator **82** includes a permanent magnet **88** which is enclosed within a casing **90,** the latter being provided with short, radially-extending flanges **92** (FIG. **9**) adjacent the top and bottom ends thereof, also for sliding engagement with the wall **76** of the beer passageway **72.** A small Teflon plug **94** may be inserted in the upper end of the casing **90,** primarily to maintain the magnet **88** in position within the casing. As mentioned above, it is preferable to have the casing made from a light weight material.

Because the valve member **80** should be yieldably biased upwardly toward the closed position, and the upper end of the valve actuator magnet **88** is above the upper ends of the stationary magnets **62** and **63,** the upper end of the movable magnet **88** is of "opposite" polarity from the polarity of the upper ends of the stationary magnets **62** and **63,** whereby the movable magnet is "repelled" in the upward direction.

It will be understood that the flanges **86** of the valve member **80** and the flanges **92** of the valve actuator **82,** provides a space between said members and the wall of the beer passageway, to permit the free flow of beer therethrough when the valve member **80** is in the open position, as will be described more fully hereinafter.

A sleeve **96** is press-fitted into the beer passageway **76** adjacent the lower end of the housing **38** (FIG. **2**) to provide a shoulder **98** which limits the downward of the valve actuator **92.**

As indicated hereinabove, and to those familiar with the beer siphoning art, the keg adapter **24** is installed in the keg **14** with the retaining ring **43** maintaining it in position, prior to the filling of the keg with beer. It is conventional to fill a keg of this type through the bung hole or opening **14** in the side wall of the keg, which opening is thereafter closed with the wooden bung or plug **15.**

As explained above, the valve actuators **58** and **82** maintain their respective valve members in the closed position, thereby preventing the beer in the keg from flowing through the gas passageways **50** and the beer passageway **76** during the filling operation. Also, the beer within the keg is under a residual or filling pressure which is normally from about 9 to about 34 pounds per square inch, and this pressure obviously aids in maintaining the aforementioned valves in the closed position.

On the other hand, when the keg **14** is empty and the beer filling bung **15** has been removed for purposes of washing out the keg with the keg adapter **24** in position, a water hose fitting (not shown) can be engaged with the flange **34** (FIG. **2**), and the water pressure will unseat the valve members **56** and **80** and permit the water to enter the interior of the keg through the beer passageway **76** and the gas passageways **50** and the vents **64.** The absence of coiled springs and similar convolutions, achieved by the use of sets of permanent magnets, results in quicker and more effective cleaning of the keg adapter. Also, as mentioned above, coiled

springs become "set" through usage and also break from fatigue failure, thereby requiring frequent replacement. Contrarywise, the permanent magnets, as valve actuators, will last as long as the keg adapter housing.

Shown in FIGS. **11, 12** and **13** is an alternative form of a keg adapter **230,** which is more economical to manufacture than the keg adapter **24,** and which has better flow characteristics through the liquid passageway.

The adapter **230** includes a housing **232** molded from a rigid plastic material, with a generally cylindrical upper portion containing an outwardly extending flange **234** at the upper end thereof to be received in the opening in the top wall of a "Golden Gate" keg, as previously described with the keg adapter **24.** There are several different plastic materials which are suitable for producing the housing **232,** but I prefer a polyterephthalate material which is resistent to caustic cleaning materials, such as Eastman Chemical Products PTMP-6 PRO.

Formed in the upper end of the housing is a large cylindrical recess **236** with a bottom wall **238.** Extending longitudinally through the housing from the wall **238,** are a central axial passageway **240** and two diametrically opposed gas passageways **242** and **244,** each gas passageway having a small upper portion **246** and a larger lower portion **248** with a valve seat **250** therebetween. A gas port **252** is in communication with each gas passageway below the valve seat **250.**

Slidably received in each of the enlarged lower portions **248** of the gas passageways in a valve assembly which includes a valve member **254** with ribs **255** and a valve actuator **256,** the latter comprising an elongated, cylindrical permanent magnet with a polished nickel-plated outer surface, whereby it has a low coefficient of friction. Each end of the valve actuator **256** is preferably beveled to reduce friction. The upper end of each permanent magnet **256** is in an abutting relationship with its respective valve member.

Embedded in the housing on opposite sides of each gas passageway and spaced an equal distance therefrom are two elongated permanent magnets **258** and **260** which are generally parallel with the gas passageways. As shown in FIG. **13,** the upper ends of the stationary magnets **258** and **260** are offset, i.e., each is a different distance below the wall **238,** with the upper ends of both stationary magnets being above the upper end of the movable valve actuator magnet **256.** The upper ends of the stationary magnets are of the same polarity, and opposite to the polarity of the upper end of the movable magnet **256,** whereby the latter is pulled upwardly . . . with the valve member **254** thereby being yieldably biased toward the closed position. I have discovered that offsetting the ends of the stationary magnets greatly increases the effectiveness of them regarding the movement of the movable magnet **256.**

The stationary magnets **258** and **260** (FIG. **13**) can be embedded and/or formed in the housing in various ways. One way is to mold cylindrical cavities **262** and **264** in the housing, with openings at the bottom of the housing, then insert the permanent magnets **258** and **260** into the cavities, and close the cavities and maintain the stationary magnets in position with plastic plugs **266** and **268** which are cemented in place or held in place with transversely extending pins (not shown).

An alternative construction comprises pouring magnetizable metal particles mixed with a binder into each of the cavities **262** and **264,** and activating the binder, thereby forming the metal mass in position. Thereafter, all of the metal masses are permanently magnetized at the same time and prior to the assembly of the movable magnets.

As shown in FIG. **11,** the central passageway **240** in the housing receives a liquid valve assembly which includes a tubular member **270** having a liquid passageway therethrough, with a valve seat **272** adjacent the upper end thereof and internal threads **274** adjacent the bottom end. An external annular groove **276** is contained in the upper end of the member and receives an O-ring **278,** similar to the O-ring **70** in the first-described construction. An external flange **280** engages an O-ring **282** which is received in an annular groove **284** formed in the wall **238.**

Extending upwardly into the lower end of the tubular member **270** is a fitting **286** with a liquid passageway therethrough, the fitting being fastened to the upper end of the siphon tube **78,** and which includes external threads for engagement with the threads **274** of the tubular member. Upper and lower O-rings **288** and **290,** respectively, are received in external grooves of the fitting to provide a liquid seal between the fitting and the tubular member. An external flange **292** below the lower end of the housing limits the downward movement of the movable magnetic actuators **256.**

Extending axially from the upper end of the fitting is a tubular portion **294** which is spaced inwardly of the inner wall of the tubular member **270** and which slidably receives an actuator **296** of a valve member **298** with ribs **299** which is adapted to engage the valve seat **272.** The valve actuator **296** is also a permanent magnet of cylindrical shape, preferably nickel-plated, with the upper end thereof having the same polarity as the upper ends of the stationary magnets **258** and **260** (FIG. **12**), whereby the movable magnet **296** is repelled in the upward direction by the two sets of stationary magnets so as to yieldably bias the liquid valve **298** to the closed position. Thus, as shown in FIG. **12,** each set of stationary magnets **258** and **260** is equi-distance from each of the gas valve magnetic actuators **256,** as well as being equi-distant from the liquid valve magnetic actuator **296.** In addition, imaginary planes passing through the axis of the spaced apart stationary magnets **258** and **260** intersect on a line which coincides with the axis of the liquid valve magnetic actuator **296.**

Opposed ports **300** adjacent the bottom of the tubular portion **294** provide for the escape of entrapped fluid below the magnetic actuator **296** when the latter moves downwardly, as for example during a washing operation, and to provide for the flow of liquid into and out of the keg through the siphon tube **78.** A transversely extending pin **302** limits the downward movement of the actuator **296.**

Turning next to a consideration of the construction of the tapper **22,** as shown in FIG. **1** it is connected through hoses **18** and **21** with the supply of gas and with the faucet, respectively, and is continuously being reused by uncoupling it from an empty keg and recoupling it to a full keg. Accordingly, as mentioned hereinabove, it is advantageous to have a tapper which is easy to use and which can be quickly engaged with the

aforementioned keg adapter, followed by a simple and easy tapping operation.

The tapper **22** (FIG. **2**) includes an upper tapper housing **106** and a lower tapper housing **108** interconnected for limited vertical relative movement. The upper housing includes a longitudinally extending tap rod assembly passageway **110** which is counter-bored at the top to provide an enlarged cavity **112** with an annular peripheral wall **114.** An axially inclined camming slot **116** (FIG. **7**) is provided in the wall **114** for a purpose to appear.

Slidably received in the passageway **110** is a tap rod assembly **118** which comprises an actuator and a tap rod **120.** The actuator **118** includes a two-piece tubular fitting **122** and **123** containing external threads **124** at the top thereof for attachment to the beer hose **21,** a central beer passageway **126,** and a handle **128** (FIGS. **3** and **6**) which is fastened to the fitting **122** and which extends through the camming slot **116,** whereby the actuator can be rotated and moved axially relative to the upper tapper housing **106** by moving the handle **128** circumferentially in the camming slot **116.**

Extending transversely within the beer passageway **126** in the fitting **122** is a wall **130** (FIGS. **2** and **4**) which contains a central opening **132** and four circumferentially spaced slots **134** to provide a support ledge for a purpose to appear, but which also provides for the passage of beer therethrough.

The lower part of the tubular fitting **123** contains a shoulder **136,** a lower inner wall **138** for slidably receiving the upper portion of the tap rod **120,** and a depending annular wall **140.**

The tap rod **120** (FIG. **2**) is cylindrical in shape with a machine screw **142** projecting from the upper end thereof, the shank of the screw extending through the opening **132** in the transversally extending wall **130,** and the head of the screw being supportable on the wall portions projecting between the aforementioned slots **134** (FIG. **4**).

An O-ring **144** is supported in an external groove adjacent the upper end of the tap rod **120,** said O-ring **144** functioning as a valve in cooperation with the shoulder **136,** as will be described more fully hereinafter.

An elongated central beer passageway **146** extends upwardly in the tap rod **120** and terminates adjacent the upper end thereof, said passageway being in communication with an external annular groove **148** through radially extending ports **150.**

The outer surface of the tap rod adjacent the lower end thereof is enlarged to provide a shoulder **152,** and immediately above said shoulder is an O-ring **154** received in an external groove, said O-ring also functioning as one part of a valve, as will be described more fully hereinafter.

The lower end of the tap rod **120** is counter-bored to provide a spring chamber **156** with an inner wall surface **158** which is adapted to be in sliding sealing engagement with the outer wall **68** of the tubular bayonet portion **66** of the keg adapter. The lower end of the tap rod **120** also includes a bottom edge **160** which is adapted to engage the bottom wall **44** of the adapter housing.

As shown in FIG. **2,** the spring chamber **156** contains a coiled spring **162** which has a free lower end adapted to engage and unseat the valve member **80.**

Turning to a consideration of the construction of the lower tapper housing **108,** the bottom portion thereof contains a chamber which receives the lower end of the tap rod **120,** and which includes an upper shoulder **164** which coacts with the O-ring **154** to provide a valve, and an inner wall surface which is spaced from the outer surface of the tap rod **120** so as to provide an annular passageway **166** therebetween.

An external annular groove with an O-ring **168** therein is provided adjacent the bottom end of the lower tapper housing, said O-ring **168** being adapted to seat on the shoulder **48** in sealing engagement therewith.

Above the aforementioned chamber and the shoulder **164** is a passageway for slidably receiving the tap rod **120,** said passageway being counter-bored adjacent the lower end to provide a chamber **170** surrounding the body of the tap rod. The passageway is also counter-bored adjacent the upper end to receive the annular wall **140** of the actuator and to provide a shoulder **172** for engagement with the bottom edge of said annular wall.

Considering next in greater detail the gas passageways in the tapper, and referring more particularly to FIG. **3,** the upper tapper housing **106** is provided with a gas hose fitting **174** which receives the hose **18,** and which is in communication with an L-shaped passageway **176,** the lower end of said passageway slidably and sealingly receiving the upper end of a nipple **178** which has a passageway **180** therethrough.

The lower end of the nipple **178** is slidably and sealingly received in a passageway **182** provided in the lower tapper housing, which passageway, in turn, is in communication with a pressure chamber **184** (FIGS. **2** and **3**) through ports **186** and **188.**

As shown in FIG. **2,** the pressure chamber **184** is adapted to be in communication with one side of a diaphragm chamber **190** through a passageway **192** of reduced diameter which provides a valve seat **194** adjacent one end thereof.

A diaphragm **196** of conventional construction extends across the aforementioned diaphragm chamber, the diaphragm supporting a valve body **198** which has an O-ring **200** received in a groove which is adjacent the free end thereof, the O-ring being adapted to engage the valve seat **194.** The valve body **198** is biased toward the open position in a conventional manner, as by a coiled spring **202.**

Also in communication with said one side of the diaphragm chamber **190** is a lower chamber **204** which receives a "duck-bill" resilient valve member **206,** the collapsible end of said duck-bill valve extending through a port **208** which is in communication with the chamber **170** surrounding the body of the tap rod.

As will be explained more fully hereinafter, there is a limited relative vertical movement between the upper and lower tapper housings **106** and **108,** respectively, to effect a tight seal between the tapper **22** and the adapter **24** and the construction for achieving this sealing relationship includes two opposed straps **210** (FIG. **3**), only one of which is shown in FIG. **3.**

The upper end of each strap **110** is secured in a recess **212** in the upper tapper housing, as by means of a machine screw **214.** The center portion of each strap contains a slot **216** which receives the shank of a machine screw **218** which is fastened to the lower tapper housing **108,** the slot being slightly larger than the diameter of the screw shank to provide for the limited relative movement referred to above. The lower end of

each strap contains a hook portion **220** which is adapted to pass through the slot **47** and be received in the groove **45** of the retaining ring **43**, thereby fastening the tapper to the keg adapter.

In use, keg adapters **24** are installed in kegs **14** of conventional construction, said adapters being maintained in position by retaining rings **43** of conventional design. As mentioned above, the present invention has been shown and described with a "Golden Gate" keg.

The kegs are filled with beer through the opening **14** in the side wall, and the opening sealed with a plug or bung **15** in a conventional manner.

As mentioned hereinabove, the valve members **56** close off the gas passageways **50** and the valve member **80** closes off the beer passageway **72**, due to the forces exerted by their respective valve actuators which contain permanent magnets. As also mentioned hereinabove, there is a filling gas pressure in the keg of from about 9 to 34 pounds per square inch, and this pressure assists in maintaining the aforementioned valves in the closed position.

To tap a full keg **14**, the keg is placed in an upright position as shown in FIG. **1** with the keg adapter **24** at the top, and the tapper **22** is pushed downwardly onto the keg adapter **24** so as to cause the hook portions **220** of the straps **210** to pass through the slots **47** in the retaining ring **43** and into the annular groove **45**, and to cause the bayonet portion **66** of the adapter to be received in the spring chamber **156** with the O-ring **20** in sealing engagement with the inner wall surface **158** . . . as shown in FIG. **2**.

The tapper **22** is then physically rotated approximately **90** degrees to move the hook portions **220**, in the groove **45** and away from the slots **47**.

If the tapper **22** had been in prior use or if the gas cylinder **16** were initially being opened, the compressed air or carbon dioxide gas will have traveled or will initially travel through the hose fitting **174**, through the passageways **176, 180, 182, 186** and **188**, and into the pressure chamber **184**.

If the gas pressure were to high, the diaphragm **196** would move outwardly, thereby causing the O-ring **200** to engage the valve seat **194** and prevent the passage of gas into the tap rod area.

If the gas pressure is within the permissible range, the gas passes through the diaphragm chamber **190**, through the lower chamber **204**, past the duck-bill valve **206** and through the port **208** into the annular chamber **170** surrounding the tap rod **120**.

In like manner, if the tapper had been in prior use dispsensing beer, the beer passageway **126** above the upper end of the tap rod **120** would contain a column of beer.

To initiate the tapping operation, the handle **128** (FIGS. **3** and **6**) is rotated in the clock wise direction approximately **180** degrees, from the closed to the open position. This causes the fittings **122** and **123** of the actuator assembly to move downwardly relative to the upper tapper housing **106** and the wall **130** moves from under the head of the screw **142**, until it engages the top of the tap rod **120**, and then forces the tap rod **120** in the downward direction until the bottom edge **160** of the spring chamber wall engages the horizontally extending wall **44** of the adapter.

This downward movement of the tap rod **120** opens the gas passageways and the beer passage as shown in FIG. **5**, and as explained below.

Thus, when the tap rod **120** moves downwardly and the O-ring **154** passes the shoulder **164**, gas flows from the chamber **170**, downwardly through the chamber **166** and into the gas passageways **50** above the valve members **56**. This gas pressure will unseat the valve members **56** against the holding force of the valve actuators, and permit the gas to flow through the vents **64** and into the interior of the keg, provided the gas pressure in the tank **16** is greater than the gas pressure in the keg. This increases the pressure on the upper surface of the liquid, and causes it to be forced upwardly in the siphon tube **78**.

Regarding the flow of beer, the initial downward movement of the tubular fittings **122** and **123** causes the O-ring **144** to pass the shoulder **136**, thereby permitting beer to reverse flow from the passageway **126**, into the annular groove **148**, through the ports **150**, and into the beer passageway **146** in the tap rod and into the spring chamber **156** above the valve member **80**.

As downward movement of the tubular fittings **122** and **123** continues, and the wall **130** thereof engages the upper end of the tap rod **120**, the tap rod is moved downwardly as previously described and the free end of the coiled spring **162** moves the valve member **80** away from its valve seat **74**, thereby permitting the beer in the siphon tube to flow upwardly through the beer passageway **72**, past the valve member **80** and into the spring chamber of **156** where it would join the beer which had reverse flow from the beer hose **21**.

Although this mixing of old beer with new beer in the tapper **22** might appear to be undesirable, it is actually advantageous because the column of existing beer between the tapper **22** and faucet **20** prevents the beer from becoming "wild," as might occur if the beer line **21** were empty and the beer gushed from the keg to the faucet when the latter were opened. Obviously, each time the faucet **20** is opened, beer flows from the keg, through the various beer passageways and the beer hose to the faucet, because of the pressure of the gas in the tap of the keg. And, each time the gas pressure in the keg drops below the gas pressure in the cylinder **16** and in the gas passageways **50**, the gas valves **54** will be forced open to provide for the flow of additional gas into the keg.

As mentioned hereinabove, there is relative movement between the upper and lower tapper housings **106** and **108**, respectively which results in a tight sealing relationship between the tapper **22** and the adapter **24**.

In describing the tapping operation, it was pointed out that the tubular fittings **122** and **123**, and the tap rod **120** were moved downwardly to interconnect the gas cylinder **16** with the gas passageways **50** and the faucet **20** with the interior of the keg **13**.

Referring to FIGS. **2** and **3** it will be noted that as the fittings **122** and **123** are moved downwardly by actuating the handle **128**, the bottom edge of the annular wall **140** of the upper tapper housing engages the shoulder **172** of the lower tapper housing, thereby forcing the lower housing downwardly and away from the upper housing. However, because the upper housing **106** is connected to the retaining ring **43** by the straps **210** (FIG. **3**), the aforesaid downward movement of the lower housing achieves two results, viz. it forces the O-

ring **168** (FIG. 5) into tight sealing engagement with the shoulder **48** at the top of the adapter **24,** and it pulls the hook portions **220** (FIG. 3) into a tight holding relationship with the groove **45** in the retaining ring **43.**

To disengage the tapper **22** from the adapter **24** with a column of beer in the various passageways, as previously described, the handle **128** is turned in the counterclockwise direction to release the pressure between the bottom edge of the annular wall **140** and the shoulder **172,** and to cause the tubular fittings **122** and **123** to be moved in the upward direction relative to the upper and lower tapper housings **106** and **108,** respectively, and relative to the tap rod **120.** As the shoulder **136** passes the O-ring **144,** beer is prevented from flowing from the passageway **146** in the tap rod and into the beer passageway **126.** And, when the O-ring **154** passes the shoulder **152,** gas is prevented from flowing from the annular chamber **170** into the chamber **166.**

When gas flow into the keg ceases and the gas pressure is equalized on the ends of the valve members **56** and valve actuators **58,** the valve member **56** are moved into the closed position due to the force of the valve actuators **58,** as previously described, thereby closing the gas passageways into the keg.

Further upward movement of the tap rod **120,** either under pressure from the column of beer in the passageway **146** or by reason of the wall **130** engaging the head of the screw **142,** causing the coiled spring **162** to move upwardly and permit the beer valve member **80** to be moved to the closed position due to the force of the valve actuator **82.**

Obviously, with the beer and gas valves in the keg adapter in the closed position, and with the gas and beer passageways in the tapper also being closed, the tapper **22** can be disengaged from the keg adapter **24** by rotating it until the hook portions **220** of the straps **210** are in alignment with the slots **47** in the retaining ring **43.** The tapper **22** can then be pulled away from the adapter **24.**

Thus it is apparent that there has been produced a novel liquid dispensing apparatus which fullfills all of the objects and advantages sought therefor.

I claim:

1. Liquid dispensing apparatus for kegs, comprising in combination:

an adapter for mounting in an opening in the wall of a keg and including a housing containing magnetic material;

a liquid passageway through said adapter housing containing an inlet and an outlet with a first valve seat therebetween, the inlet being adapted to be in communication with the interior of a keg in which the adapter may be mounted;

a first valve member associated with said first valve seat and movable between an open position and a closed position relative thereto;

means yieldably biasing the first valve member toward the closed position;

a gas passageway through said adapter housing containing an inlet and an outlet with a second valve seat therebetween,

the outlet being adapted to be in communication with the interior of a keg in which the adapter may be mounted;

a second valve member associated with said second valve seat and movable between an open position and a closed position relative thereto;

means yieldably biasing the second valve member toward the closed position;

at least one of said valve member biasing means including a permanent magnet having limited movement relative to said housing;

a tapper for sealing engagement with said adapter and including a housing;

a gas passageway through said tapper housing having an inlet and an outlet with a third valve therebetween movable between an open position and a closed position, the inlet being connectable to a source of gas under pressure, and the outlet being in communication with the inlet of the gas passageway in the adapter housing when the tapper and adapter are in sealing engagement;

a liquid passageway through said tapper housing having an inlet and an outlet with a fourth valve therebetween movable between an open position and a closed position, the inlet being in communication with the outlet of the liquid passageway in the adapter housing when the tapper and the adapter are in sealing engagement;

actuating means supported in the tapper housing and movable between an operative position and an inoperative position; and

means responsive to the movement of the actuating means from the inoperative position to the operative position for moving the first, third and fourth valves from the closed position to the open position.

2. Liquid dispensing apparatus according to claim **1** in which each of the biasing means for the first valve member and the second valve member includes a permanent magnet constructed and arranged to have limited movement relative to the adapter housing.

3. Liquid dispensing apparatus according to claim **1** in which the second valve member is movable from the closed position to the open position when the adapter and tapper are in sealing engagement with the third valve member in the open position and the gas pressure in the inlet of the gas passageway in the adapter housing exceeds by a predetermined amount the gas pressure in a keg in which the adapter is mounted.

4. Liquid dispensing apparatus according to claim **1** which further includes means responsive to the movement of the actuating means from the inoperative position to the operative position urging said tapper and adapter into said sealing engagement.

5. Liquid dispensing apparatus for kegs, comprising in combination:

an adapter for mounting in an opening in the wall of a keg and including a housing;

means for retaining the adapter in the keg opening;

liquid and gas passageways extending through the adapter housing;

liquid valve means and gas valve means associated with said liquid and gas passageways respectively, and movable between an open position and a closed position;

a tapper containing liquid and gas passageways therethrough;

liquid valve means and gas valve means associated with said liquid and gas passageways, respectively,

in the tapper and movable between an open position and a closed position;

means for interconnecting the tapper with the adapter housing with the liquid and gas passageways in the tapper in communication with the liquid and gas passageways, respectively, in the adapter housing;

an actuating member supported by the tapper and movable between an operative position and an inoperative position; and

means responsive to the movement of the actuating member from the inoperative position to the operative position for moving the liquid valve means in the adapter housing to the open position and for forcing the interconnected tapper and adapter housing into sealing engagement.

6. Liquid dispensing apparatus according to claim **5,** which further includes means responsive to the movement of the actuating member from the inoperative position to the operative position for moving the liquid valve means and the gas valve means in the tapper from the closed position to the open position.

7. Liquid dispensing apparatus according to claim **5,** in which the tapper includes an upper housing and a lower housing interconnected for limited relative movement, the upper housing being connected to said adapter retaining means and the lower housing being in engagement with the adapter housing; and in which the means for forcing together the tapper and the adapter housing in sealing relationship includes means supported on the upper tapper housing for limited movement relative to said upper tapper housing and for engagement with the lower tapper housing to move said housings apart responsive to the movement of the actuating member from the inoperative position to the operative position.

8. Liquid dispensing apparatus according to claim **5,** in which the adapter retaining means contains spaced apart recesses; the tapper includes an upper housing and a lower housing interconnected for limited relative movement; the upper tapper housing is connected to the adapter retaining means by means which include projections which are received in said spaced apart recesses; and the actuating member includes a handle which is received in a slot in the upper tapper housing.

9. An adapter for mounting in an opening in the wall of a keg, comprising:

a housing containing magnetic material;

a liquid passageway through said housing for the transfer of liquid from the inside to the outside of a keg in which the adapter may be mounted;

normally closed liquid valve means disposed in communication with said liquid passageway;

a gas passageway through said housing for the transmission of gas from the outside to the inside of a keg in which the adapter may be mounted; and

normally closed gas valve means disposed in communication with said gas passageway, at least one of said valve means including a valve member for engagement with a valve seat and a valve actuator comprising a movable permanent magnet in operative engagement with said valve member.

10. An adapter according to claim **9,** in which the liquid valve means and the gas valve means each includes a valve member for engagement with a valve seat and a valve actuator comprising a movable permanent magnet in operative engagement with the valve member.

11. An adapter according to claim **9,** in which the magnetic material in the housing includes at least one stationary permanent magnet.

12. An adapter according to claim **9,** in which the movable permanent magnet is slidably positioned in an actuator passageway.

13. An adapter according to claim **9,** in which:

the movable permanent magnet is positioned for limited longitudinal movement in an actuator passageway which has a longitudinal axis;

the magnetic material in the housing includes at least one stationary permanent magnet with a longitudinal axis; and

the axis of the actuator passageway is substantially parallel with the axis of the stationary magnet.

14. An adapter according to claim **9,** in which:

the movable permanent magnet is positioned for limited longitudinal movement in an actuator passageway which has a longitudinal axis;

the magnetic material in the housing includes two stationary permanent magnets with longitudinal axes; and

the two stationary magnets are positioned on opposite sides of and equi-distant from the axis of the actuator passageway.

15. An adapter according to claim **14,** in which the axes of the stationary magnets are substantially parallel with the axis of the actuator passageway.

16. An adapter for mounting in an opening in the wall of a keg, comprising:

a housing;

a fluid passageway through said housing for the transmission of fluid between the outside and the inside of a keg in which the adapter may be mounted;

valve means disposed in communication with said fluid passageway and movable between a closed position and an open position, including a valve actuator comprising a permanent magnet positioned for limited longitudinal movement in an actuator passageway which has a longitudinal axis;

two stationary permanent magnets with longitudinal axes positioned on opposite sides of the axis of the actuator passageway;

the two stationary magnets having adjacent ends which are adjacent to one end of the actuator magnet when the first valve means is in the closed position; and

said adjacent ends being the same distance from said one end of the actuator magnet.

17. An adapter for mounting in the wall of a keg, comprising:

a housing;

a fluid passageway through said housing for the transmission of fluid between the outside and the inside of a keg in which the adapter may be mounted;

valve means disposed in communication with said fluid passageway and movable between a closed position and an open position, including a valve actuator comprising a permanent magnet positioned for limited longitudinal movement in an actuator passageway which has a longitudinal axis;

two stationary permanent magnets with longitudinal axes positioned on opposite sides of the axis of the actuator passageway;

the two stationary magnets having adjacent ends which are adjacent to one end of the actuator magnet when the first valve means is in the closed position; and

said adjacent ends being at unequal distances from said one end of the actuator magnet.

18. An adapter for mounting in the wall of a keg, comprising:

a housing;

a fluid passageway through said housing for the transmission of fluid between the outside and the inside of a keg in which the adapter may be mounted;

valve means disposed in communication with said fluid passageway and movable between a closed position and an open position, including a valve actuator comprising a permanent magnet positioned for limited longitudinal movement in an actuator passageway which has a longitudinal axis;

two stationary permanent magnets with longitudinal axes positioned on opposite sides of the axis of the actuator passageway;

two gas passageways through said housing for the transmission of gas from the outside to the inside of a keg in which the adapter may be mounted;

gas valve means disposed in communication with each gas passageway and movable between a closed position and an open position, each of which means includes a valve actuator comprising a permanent magnet positioned for limited longitudinal movement in a separate actuator passageway which has a longitudinal axis;

the two gas valve actuator passageways being on opposite sides of the fluid valve actuator passageway; and

a set of two stationary permanent magnets with longitudinal axes positioned on opposite sides of each of the gas valve actuator passageways.

19. An adapter according to claim **18,** in which the axes of all actuator passageways and stationary magnets are substantially parallel.

20. An adapter according to claim **18,** in which the axes of each set of stationary magnets are equi-distant from the gas valve actuator passageway adjacent thereto.

21. An adapter according to claim **18,** in which the axis of each stationary magnet is equi-distant from the axis of the fluid valve actuator passageway.

22. An adapter for mounting in an opening in the wall of a keg, comprising:

a housing having an upper end;

an opening extending through the housing from said upper end;

a tubular member positioned in said opening and extending inwardly from the upper end of the housing, said tubular member containing a fluid passageway therethrough having a valve seat adjacent the upper end thereof and adjacent the upper end of the housing;

a siphon tube connected to the lower end of the tubular member through a tubular fitting, the siphon tube being in communication with said fluid passageway;

a fluid valve member including a permanent magnet mounted in said fluid passageway for limited longitudinal movement relative to said valve seat between an open position and a closed position; and

means associated with said fluid valve permanent magnet yieldably biasing the fluid valve member toward the closed position.

23. An adapter according to claim **22,** in which the fluid valve magnet is slidably received in a tubular projection which is interconnected with said fitting.

24. An adapter according to claim **23,** in which:

the tubular projection is spaced inwardly of the wall of the tubular member to provide an annular passageway therebetween; and

the tubular fitting contains a passageway interconnecting the interior thereof with said annular passageway to provide for fluid flow from the interior of said fitting to said annular passageway.

25. A tapper for interconnection with an adapter which is mounted in an opening contained in the wall of a keg, comprising:

a housing;

a gas passageway in said housing having an inlet and an outlet with a gas valve therebetween movable between a closed position and an open position, the inlet being adapted to be connected to a source of gas under pressure;

a liquid passageway in said housing having an inlet and an outlet with a liquid valve therebetween movable between an open position and a closed position, the outlet being adapted to be connected to a liquid dispensing devide;

actuating means supported by the housing and movable between an inoperative position and an operative position; and

tapping means supported in said housing and responsive to the movement of the actuating means from the inoperative to the operative position for moving said gas valve and said liquid valve from the closed to the open position,

said tapping means also being responsive to the movement of the actuating means from the operative to the inoperative position for moving said gas valve and said liquid valve from the open to the closed position.

26. a tapper according to claim **25,** in which the tapping means includes a tap rod which is mounted for longitudinal movement in a chamber contained in said housing, and the chamber contains spaced-apart internal shoulders which form a part of said gas valve and said liquid valve.

27. A tapper according to claim **25,** in which:

the tapping means includes a tap rod with a longitudinally extending chamber therein, which chamber forms a part of said liquid passageway;

the chamber is open at one end to provide the inlet to said liquid passageway; and

an outlet at the other end of the chamber terminates adjacent one of said external shoulders which forms a part of the liquid valve.

28. A tapper according to claim **25,** which further includes a safety valve in communication with the gas passageway in the housing, which safety valve is responsive to the pressure in the gas passageway to close said gas passageway when the gas pressure therein exceeds the outside air pressure by a predetermined amount.

29. A tapper according to claim **25,** in which the actuating means includes a tubular member which is rotatable and axially movable relative to said housing.

30. A tapper according to claim **25,** in which:

the tapping means includes a tap rod with a longitudinally extending chamber therein which chamber forms a part of said liquid passageway;

the chamber is open at one end of the tap rod to provide the inlet to said liquid passageway;

the actuating means includes a tubular member having inner and outer ends and being supported in the housing for limited rotational movement relative thereto, the outer end of the tubular member forming a part of the outlet of the liquid passageway; and

the inner end of the tubular member receives the other end of the tap rod.

31. A tapper according to claim **30** in which the inner end of the tubular member and said other end of the tap rod are in sliding, sealing engagement and contain interengaging means providing limited axial movement therebetween.

32. A tapper according to claim **31,** in which:

the tubular member contains an inner shoulder adjacent the inner end thereof;

the tap rod contains an externally mounted O-ring adjacent said other end which is received in the inner end of the tubular member; and

said tubular member and tap rod being mounted in the housing for limited axial movement therebetween, with said shoulder and said O-ring comprising said liquid valve in the liquid passageway.

33. A tapper according to claim **25,** in which:

the housing comprises an upper housing member and a lower housing member interconnected for limited relative movement therebetween; and

means carried by the upper housing member for engagement with the lower housing member to move said housing members apart, responsive to the movement of the actuating member from the inoperative to the operative position.

34. A tapper according to claim **33,** in which the upper housing member contains means for connecting it to the wall of a keg or the like at the opening containing an adapter, whereby when the actuator is moved from the inoperative to the operative position, the lower housing member is forced into sealing engagement with such adapter.

* * * * *