United States Patent

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[33] **Switzerland**
[31] **10609/67;**
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[54] **DEVICE FOR DISPENSING CARBONATED BEVERAGES**
21 Claims, 8 Drawing Figs.

[52] **U.S. Cl.** **222/399,** 222/1
[51] **Int. Cl.** **B65d 83/00**
[50] **Field of Search** 222/399, 397, 1

[56] **References Cited**
UNITED STATES PATENTS

3,315,844	4/1967	Klasson et al.	222/399X
3,372,838	3/1968	Smith et al.	222/399X
3,403,820	10/1968	Landis et al.	222/399X

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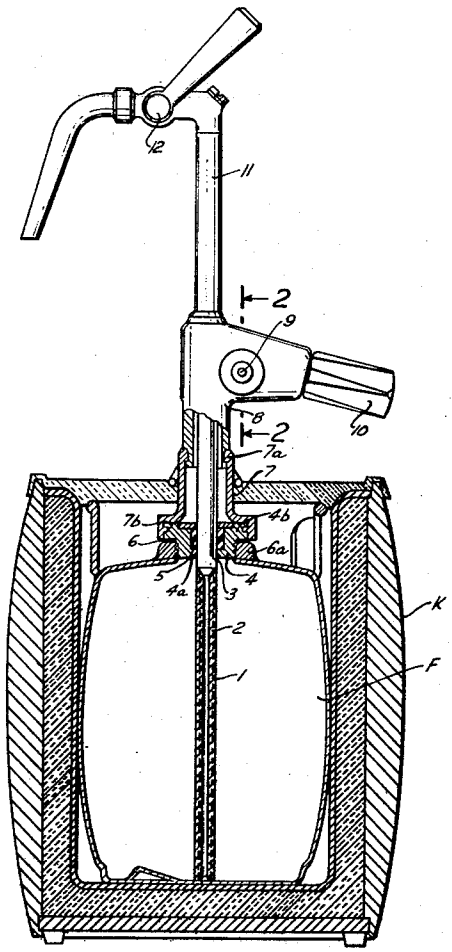
ABSTRACT: A tapping installation suitable for use in the household for dispensing carbonated beverages comprising an arrangement for broaching and tapping a container in which the beverage is disposed. The arrangement comprises a built-in valve having a valve body in which a pressure-reducing valve is disposed. Means are mounted in the valve body which are adapted to receive a carbonic acid gas capsule which is arranged in front of the valve. The arrangement further comprises a tapping cock and an immersion pipe for insertion into the container. The immersion pipe is adapted to cooperate with a packing ring seal provided in a closure of the container when the immersion pipe is inserted into the container through this seal.



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SHEET 1 OF 5

FIG. 1

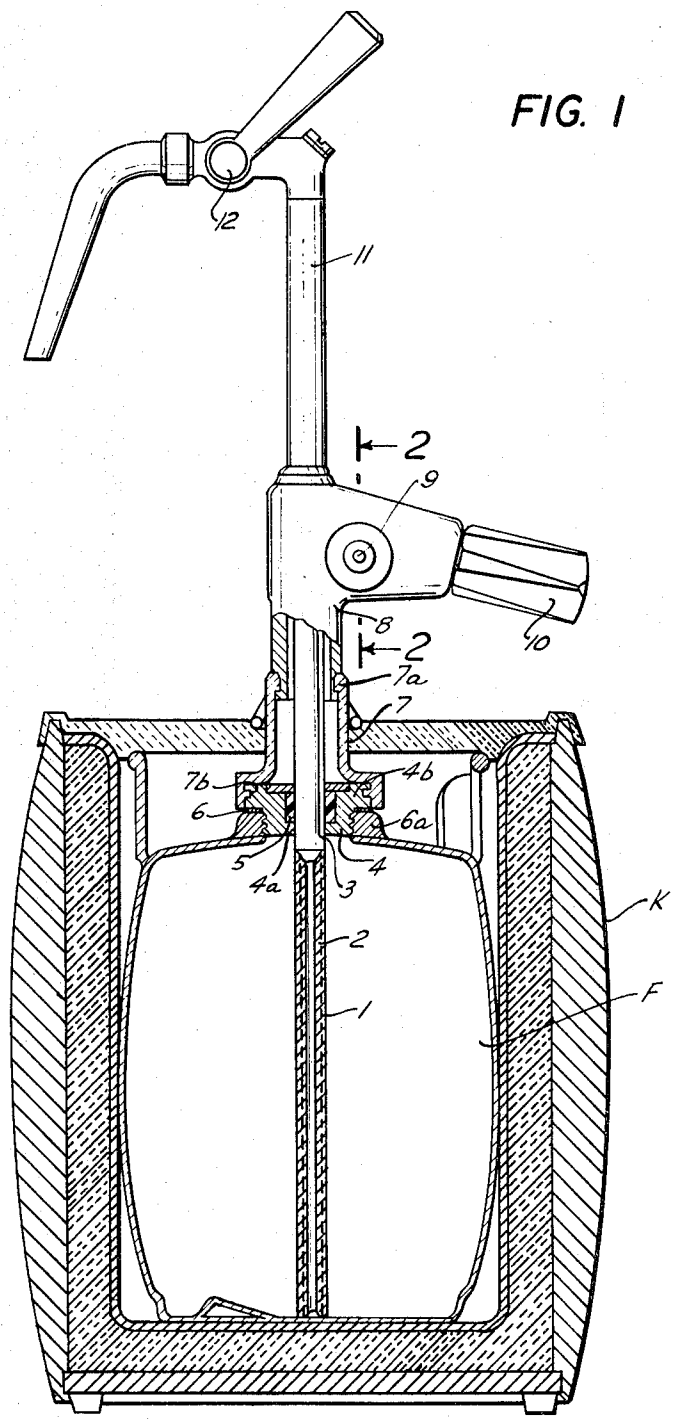

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FIG. 2

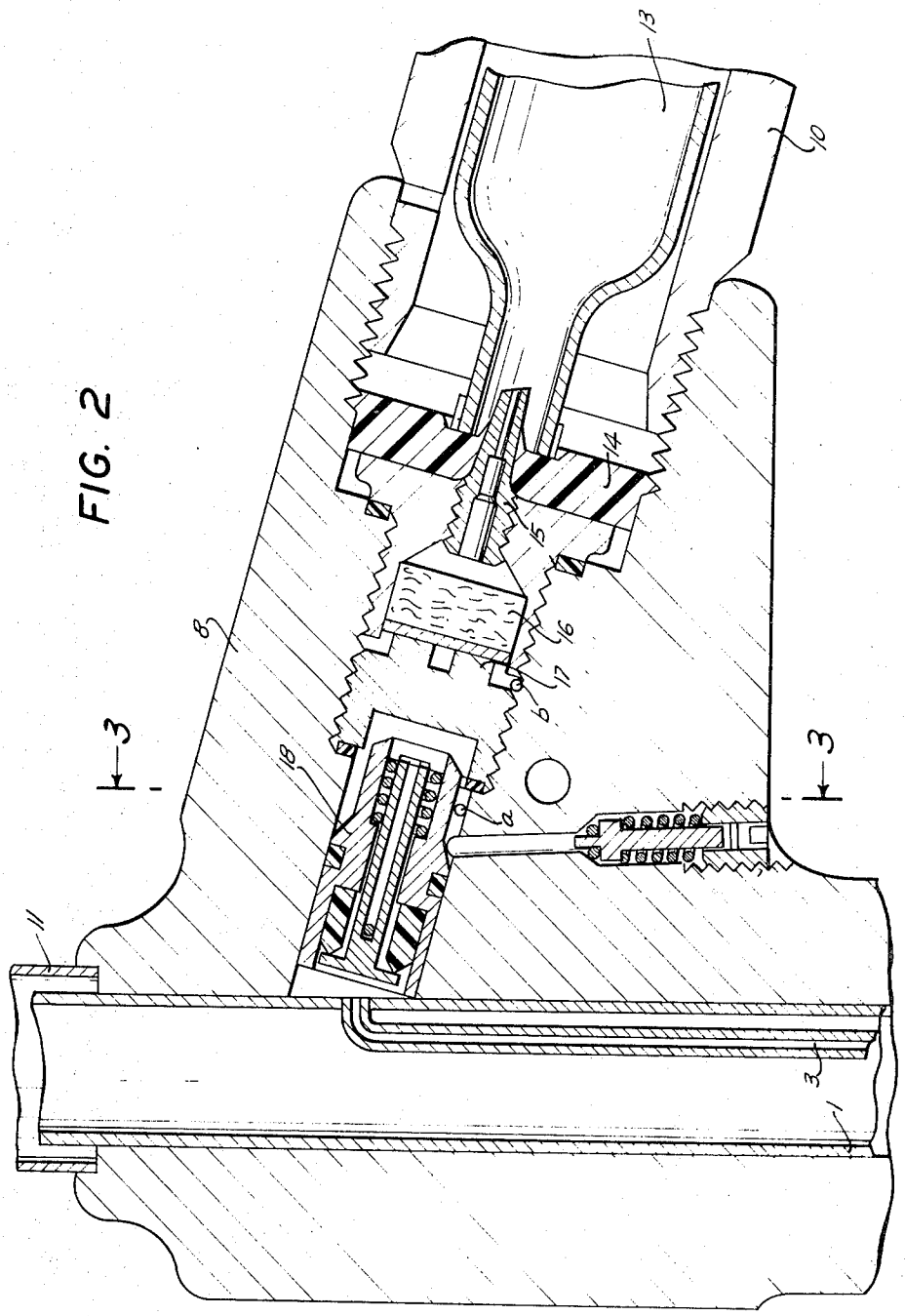

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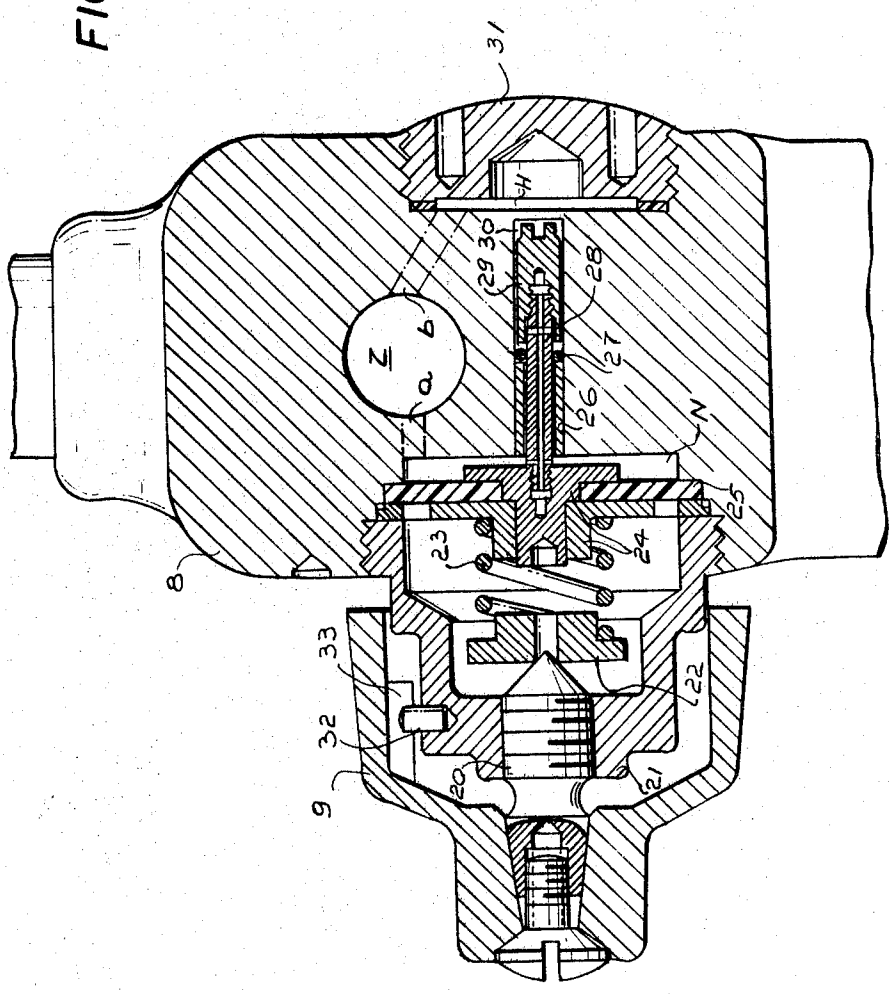
FIG. 3



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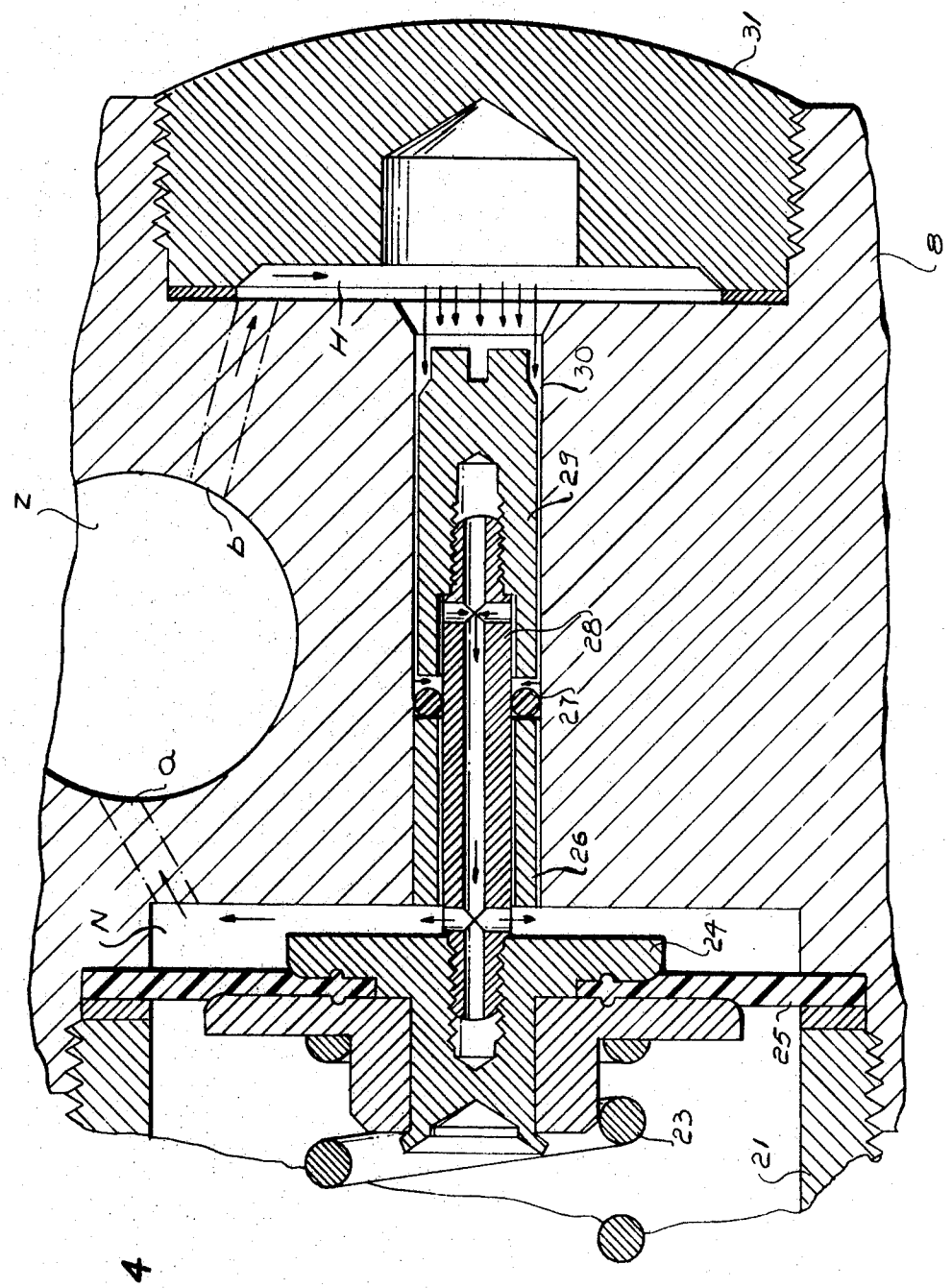

FIG. 4

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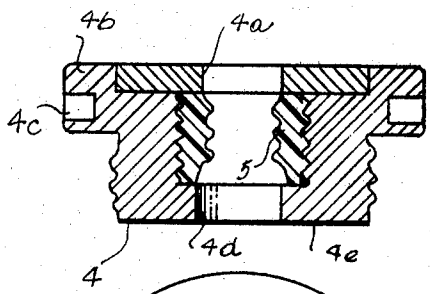


FIG. 5

FIG. 6

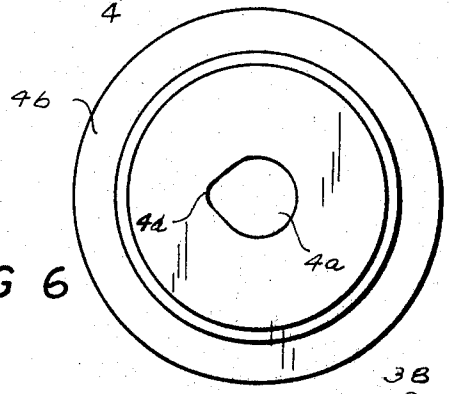


FIG. 7

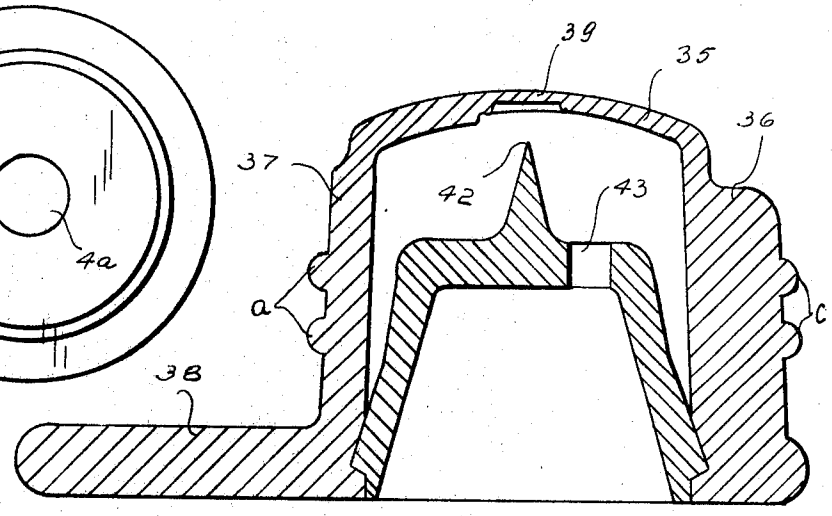
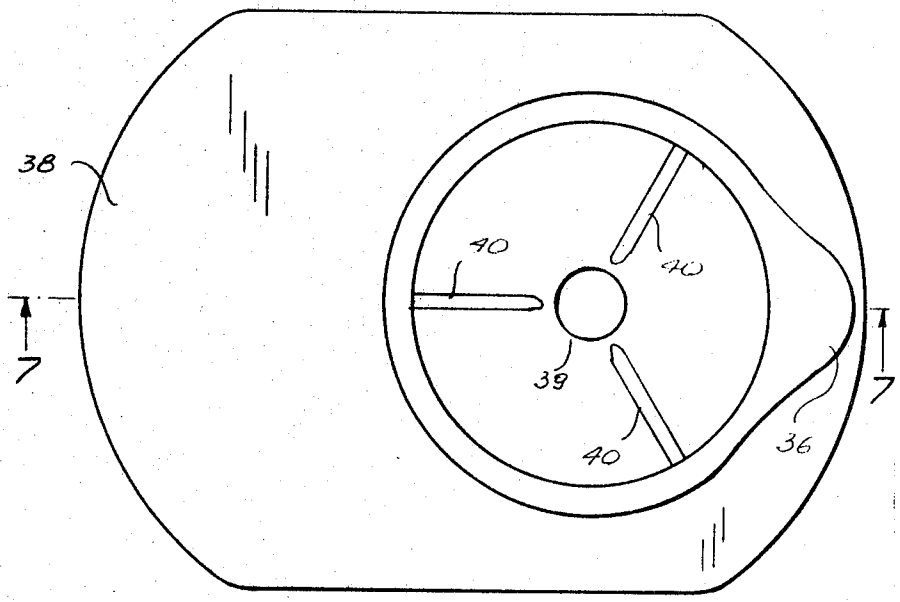


FIG. 8



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DEVICE FOR DISPENSING CARBONATED BEVERAGES

BACKGROUND OF THE INVENTION

Beer is generally tapped from a barrel or other container by broaching it. When tapping by means of carbonic acid gas pressure the carbonic acid gas is introduced into the beer barrel from a steel container through a pressure-reducing valve and the beer is led to a tapping cock through an immersed tube and a beer line and is taken therefrom. In order to ensure the flowing out of the beer, a predetermined pressure must exist above the level of the liquid. It is no not difficult to do this in a large beer-tapping installation.

The pressure-reducing valve can be constructed sufficiently large in order to function faultlessly. The size of the valve is determined by the closure spring necessary for closing the valve, and by the size of the valve membrane. In large pressure-reducing valves, very high forces, which amount to several kilograms are necessary for sealing the valve seats which consist of plastic materials resistant to carbonic acid gas. This requires a large membrane which again can only be accommodated in a large valve.

For small installations, which can only offer a few cubic centimeters space for a valve, such pressure-reducing valves cannot be used. The known small tapping installations thus do not operate with a pressure-reducing valve but with manual pressure regulation according to a manometer value. The pressure thus has to be reset or adjusted after each tapping procedure. Essentially disadvantageous is, however, the fact that with a broached barrel which has been standing for a long time and in which the pressure has not been subsequently adjusted, a pressure loss occurs which is not automatically compensated. The beer in the barrel is thus not under the necessary pressure and spoils and is unenjoyable, just as is the case with an opened beer bottle.

Moreover, the faultless tapping of known beer barrels in small installations is cumbersome and difficult and depends considerably on the skill of the person performing the operation.

Thus, for example, one of the most common forms of tapping is accomplished as follows: In a bore present in the barrel closure member, a screw part having a rubber seal is inserted and by tightening a wingnut the rubber seal is radially spread and the barrel part is thus sealed. The immersion tube is sealed in a stuffing box provided in an upper part of this arrangement. This immersion pipe is passed through the stuffing box until it is seated on the closure member or bung provided in the screw closure of the barrel. By blows on the immersion pipe, the bung is pressed into the barrel and the pipe is then inserted as far as the bottom of the barrel. In order to prevent beer from escaping around the immersion pipe at the stuffing box, during the broaching procedure, or beer spraying out of there under pressure, a relatively large cloth, for example a towel, has to be wound around at this region. If the immersion pipe is then in the correct position, the stuffing box nut is tightened up and a faultless seal is ensured.

It is already well known and is desirable and advantageous to supply the beverage which is to be taken from the vessel with carbonic acid gas and simultaneously to tap it.

It is moreover desired in home-tapping installations, to tap beer in the same way as in normal draught installations, that is to say so-called barrel beer. For this purpose, however, the barrel or other vessel for receiving the beer has to be filled directly in the brewery, i.e. the vessel has to be filled in the same way as genuine barrel beer.

The known domestic syphons, which are used in the household among other things also for dispensing beer are generally filled at a commercial establishment with a draught supply cock or are filled domestically by emptying bottles of beer into the syphon vessel. Thus domestic syphons do not really supply genuine draught beer because the beer has to be refilled in the aforedescribed manner, which changes the delicate nature of the beer by permitting the escape of carbonic acid gas due to the fact that the beer comes into contact with the ambient air.

Moreover, the subsequent pressurizing of the beer by means of carbonic acid gas from suitable carbon dioxide capsules does not give the beer back the initial quality, since in this way the carbonic acid gas associated with albuminous materials and suspended bodies is not introduced again in the original form.

SUMMARY OF THE INVENTION

It is an object of the invention to provide a device for dispensing carbonated beverages, more particularly beer, with which the broaching and tapping is essentially simplified and which can moreover be used in the household, without difficulty and while retaining a faultless quality of the beverage.

The invention consists in a device for dispensing carbonated beverages, more particularly beer, comprising an assembly for broaching and tapping a container in which the beverage is disposed. This assembly comprises a built-in valve arrangement having a valve body in which a pressure-reducing valve, in the form of an automatically acting single stage pressure-reducing valve, is provided. Means are provided for supplying carbonic acid gas to the pressure-reducing valve. The gas supplying means comprises means for receiving a carbonic acid gas capsule disposed in front of the valve, a pressure-setting device being allocated to the valves. The assembly also comprises a tapping cock and an immersion pipe for insertion into the container, a throttle insert being arranged in the immersion pipe, the immersion pipe being adapted to cooperate with a packing ring seal provided in a closure of the container when the immersion pipe is inserted into the container through the said seal.

The construction according to the invention and the arrangement of the individual structural parts provide a tapping installation which is suitable for use in the household. The new construction of the pressure-reducing valve results in an extremely compact construction of the same, so that it can be used in the tapping assembly itself.

The new closure of the beverage container allows a simple broaching of the barrel by introducing the immersion pipe, without use of further tools of auxiliary means. The device does not have to be tightened by means of a nut and the danger does not exist that liquid can leak out of the beverage container during the broaching.

The throttle means which are disposed in the immersion pipe make it possible to tap the beer while it is in the barrel under a relatively high pressure, without the beer completely frothing when it emerges from the tapping cock. As is known, the beer must be kept under its saturation pressure, in order that no carbonic acid gas associated with albuminous material can escape. This pressure amounts for example at 8° C. to 0.75 atmosphere excess pressure. If under these conditions the beer has to pass through only a short path during tapping, it flows out with great turbulence even when the cock is only slightly opened, and the carbonic acid gas causes foaming. This difficulty does not occur with normal beer tapping in public houses, where the beer is disposed in the beer cellar, since the beer is pressurized in a rising line extending to the tapping cock positioned frequently 5 to 6 meters higher. For this, a pressure is required which is higher than the necessary saturation pressure. With small tapping installations, as is known, the path from the lower part of the immersion pipe to the outlet at the tapping cock is, however, very short. Under these conditions without particular precautions it is not possible to tap at a higher pressure, although this is theoretically required for the beer quality. The result of this is that in the known small tapping installations, tapping can be effected only at considerably below the theoretically necessary pressure, which results in the escape of the carbonic acid gas associated with the albuminous material and the suspended bodies, whereby the quality and thus the taste of the beer is impaired. This disadvantage is eliminated by the device according to the invention.

BRIEF DESCRIPTION OF THE DRAWING

The nature of the invention and its advantages will appear more fully from the following detailed description taken in conjunction with the appended drawing, in which:

FIG. 1 is a side elevation, partly in section, of a tapping device according to the invention, in which the tapping assembly is inserted in a beverage container, which is disposed in an outer receiving container;

FIG. 2 is a longitudinal section through the valve body in the tapping assembly, in which the pressure container is disposed in front of the valve, and in which the carbon dioxide transition pipe in the rising pipe can be partly seen;

FIG. 3 is a sectional view of the pressure-reducing valve, taken along line 3–3 of FIG. 2;

FIG. 4 is an enlarged detail of FIG. 3, which illustrates details of the pressure-reducing valve, and simultaneously illustrates by means of arrows the flow path of the pressure medium;

FIG. 5 is a sectional view of the closure member of the beverage container;

FIG. 6 is a plan view of the closure member illustrated in FIG. 5;

FIG. 7 is a sectional view of the sealing cap; and

FIG. 8 is a plan view of the sealing cap.

DETAILED DESCRIPTION

Referring now to the drawing there is illustrated in FIG. 1 the entire device, applied to a vessel or barrel F which is inserted in a container K having an insulating jacket and a positioning collar. The barrel F and container K may have any suitable shape. The latter container may advantageously have cooling means in order to keep the beverage sufficiently cold.

The immersion pipe 1, which extends through the barrel closure 4, which is described below in detail, is introduced into the barrel F. This part of the device is illustrated in section.

The section of the immersion pipe 1 extending upwardly from the barrel F (and through any cladding provided on the barrel), has a sleeve portion which has a laterally extending projection for receiving the valve body 8, the adjusting knob 9 and the container 10 for the carbon dioxide capsule 13. The tapping assembly is given a pleasing appearance by an ornamental delivery pipe 11 through which the pipe 1 passes. A tapping cock 12 having an outlet pipe is connected to the upper end of the immersion pipe 1.

From FIG. 1 it can be noted that in the device according to the invention, the essential components, namely the tapping cock, immersion pipe and pressure-reducing valve are combined to form a single unit and thus a relatively small device is provided with which the tapping of barrel beer is exceptionally simplified and can be performed by everyone without special skilled knowledge or particular preparations. This is achieved with the construction of the individual elements, and their relationship to one another.

An essential requirement for faultlessly tapping beer is a predetermined carbon dioxide pressure, under which the beer should stand during the tapping procedure. This carbon dioxide pressure is dependent on the beer temperature and is also particularly dependent on the desired appearance of a fully tapped glass to the consumer. With the tapping device of the invention, the pressure is selectable within a range of about 0.4 to 1.1 atmospheres excess pressure, whereby the tapping procedure and thus the appearance of the beer can be suited to the personal wishes of the consumer. The carbon dioxide amount necessary to obtain this result is contained in a CO_2 capsule 13, preferably a 16 g. capsule. This capsule is inserted in the capsule container 10 provided therefor, and is screwed with the latter into the tapping device. The free end of the valve body 8 has an open threaded bore into which the capsule container 10 is threaded. The receiving space for the capsule container 10 is closed in the direction of the valve by a seal 14 through which a broaching tip 15 extends for penetrating the neck of the capsule 13. This broaching tip 15 connects the interior of the capsule 13 via the bore *b* with the high-pressure space H of the pressure-reducing valve (see Fig. 3). A purification filter 16 for the carbon dioxide is provided behind the rearward end of the broaching tip 15. The end of the neck of the capsule 13 is penetrated in a known manner by the cutting edge of the broaching tip, so that the carbon dioxide can escape from the capsule 13 via the bore in the broaching tip 13. The capsule container 10 with the capsule 13 is, of course, screwed into the valve body 8 only after the barrel F has been broached.

The valve body 8 is formed as a lateral projection of the sleeve surrounding the immersion pipe 1. It contains an automatically controlling single stage pressure-reducing valve, a nonreturn valve 18 and an excess pressure valve 19. The pressure of the carbon dioxide is reduced to the tapping pressure by means of the pressure-reducing valve. We have devised a pressure-reducing valve which operates without a closure spring, and which can be constructed essentially smaller than known valves of this kind. In the pressure-reducing valve forming part of the tapping installation of the invention, the dimensions of the valve membrane and of the setting spring are considerably reduced when compared with such valves of conventional construction, and thus the external dimensions of the valve can be kept small and pleasing. This requirement is achieved in that as a sealing element an O-ring 27 made of a suitable elastomer mixture is used. The elastomer material used is chemically inert with respect to the prevailing carbon dioxide pressurized gas, and, consequently, does not experience any dimensional changes.

The valve is provided in the gas inlet part with a sieve-felt filter 16 which holds back impurities such as rust, scale and the like, and behind which the high-pressure part of the valve is disposed. A sealing screw 17 (see FIG. 2) separates the low-pressure part N from the high-pressure part H, closed at one side by the closure cap 31 (FIG. 3). The low-pressure part N is closed off by the membrane 25. A precision bore 30 is provided behind the closure cap 31. A valve shank 29 is slidably disposed within the bore 30. A hollow pull rod 28 is threadably mounted in the shank 29 which extends through the O-ring seal 27 and through the externally profiled bush 26. The latter serves as a seat for the O-ring 27. One end of this pull rod 28 is fixed to the membrane mount 24. The O-ring 27, which firmly surrounds the pull rod 28 and which is firmly seated in the precision bore 30, bears against the bush 26 due to the pressure in the high-pressure part H of the valve, since the gas space at its low-pressure part N is connected via its central bore and the annular space between the external profile of the bush 26 and the bore 30 with the low-pressure chamber and is thus practically pressureless. A bore *b* which extends through the valve body 8, is provided in front of the sealing and closure screw 17. This bore extends downwardly at an inclination and connects the gas inlet chamber or the central bore Z with the high-pressure chamber H behind the closure cap 31.

A transverse bore is connected to the axial bore of the rod 28 and is arranged in the part of the pull rod 28 in front of the O-ring 27. A second transverse bore of the pull rod 28, which likewise communicates with the axial bore, is disposed in front of the membrane mount 24, and communicates the axial bore with the low-pressure space N. Furthermore, an oblique bore *a* leads upwardly from this low-pressure or membrane chamber N and terminates behind the closure screw 17 in the central bore Z.

The hollow space behind the closure screw 17, that is to say the space which forms part of the low-pressure chamber, is connected with a precision nonreturn valve 18. At the region at which this nonreturn valve 18 meets the rising pipe or immersion pipe 1, there is arranged the upper opening of the transition pipe 3 for the carbon dioxide. The upper end of the transition pipe 3 is connected as, for example, by soldering into the rising pipe 1. The latter pipe is sealingly mounted preferably with synthetic plastic material in the portion of the valve body 8 through which it extends. The transition pipe 3

terminates shortly above the throttle 2, which is described further below. The immersion pipe 1 extends into the closure of the barrel 4 so that the lower end of the transition pipe 3 extends slightly below the barrel closure 4 and, consequently, extends into the gas space which forms directly below the upper region of the barrel F. The gas thus flows through the transition pipe 3 and first emerges below the closure seal 4 in the gas space of the barrel F to be tapped.

The pressure adjustment means are arranged in the form of a knurled knob 9 on the side of the valve where the membrane 25 is mounted. The knob 9 is provided with index numbers. In this knob 9 a threaded pin 20 is fixed by means of a tapper (FIG. 3) the free end of pin 20 being pointed and presses on the spring cup 22. A helical spring 23 is seated on the spring cup 22 and is arranged between the threaded adjusting pin 20 and the membrane mount 24. The membrane 25 is indirectly carried by a cap 21 which is fixedly screwed to the valve body 8. The cap 21 has a counterthreaded bore opposite the membrane 25 in which the setting pin 20 is threadably mounted. A pin 32 projects from the outer periphery of the cap 21 and thereby limits the angle of rotation of the setting knob 9 by engaging a projection 33 extending inwardly from the setting knob 9. In order to adjust the valve to a desired pressure range, the conical connection 20 is loosened and the knob 9 is then turned to the corresponding position and is screwed tight. The valve is thus adjustable within wide limits and can easily be adapted to all operational requirements.

An excess pressure valve 19, known per se, communicates with the outside air and is disposed in the valve body 8 as illustrated in FIG. 2.

A further essential feature of the tapping assembly is the throttle 2 which is screwed into the lower section of the tapping pipe 1. This throttle 2 consists of a synthetic plastic resistant to the media in question, such as carbonic acid gas and beer, and enables the beverage standing at a relatively high pressure in the barrel, more particularly beer, to be tapped without it entirely foaming as it emerges from the tapping cock. As already mentioned above, beer must be continuously maintained under its saturation pressure, in order that no carbonic acid gas, connected with albuminous and suspended materials, can escape. In order now to allow tapping at this saturation pressure, the beer must be prevented from flowing through the rising pipe 1 into the glass with great turbulence. In order to counteract this turbulence, the throttle pipe 2 is inserted in the lower part of the rising pipe 1. The inlet and outlet of this throttle are conically formed and the average cross section of the throttle bore relative to the length thereof has a predetermined ratio, for example about 1.5:100. The diameter of the longitudinal bore in the throttle preferably tapers inwardly from the beer inlet side to the outlet side in the ratio of about 2:1, the bore diameter at its beginning and end widening greatly. This throttle pipe insert 2 occupies essentially the entire length of the section of the immersion pipe 1 disposed in the barrel. Since the lower end of the throttle pipe 2 is used to cooperate in the tapping of the barrel, it is so constructed that when penetrating the barrel closure 4 a sliding through the packing ring seal 5 in the barrel closure 4 is facilitated. For this reason, the lower end of the wall of the throttle pipe 2 is advantageously conically tapered, as can be noted from FIG. 1.

The narrow bore in the throttle pipe 2 which gradually tapers inwardly in an upward direction and which widens conically outwardly at its upper end to conduct the flow of the beer from the lower part of the barrel under pressure, throttles the speed of flow and prevents foaming of the beer. It is thus possible that, even with a short rise path, the beer can be tapped at its theoretical saturation pressure or even at a higher pressure, and thus the quality of the beer can be completely retained.

The barrel F is provided with a specially constructed closure 4 which facilitates broaching the barrel F. The closure member 4 is screwed into a threaded member 6*a* arranged over a central upper opening of the barrel. The barrel closure member 4 has a T-shaped longitudinal section and is provided with a central bore 4*a* the diameter of which essentially corresponds to the outer diameter of the rising pipe 1, so that it can easily slide therethrough. The leg portion of the T-shaped closure member 4 has an enlarged threaded bore section into which a cylindrical seal member 5 of suitable elastomer material is screwed FIGS. 5 and 6). The member 5 has preferably a coarse internal thread. The closure member 4 has a flange portion 4*b* which has a pair of opposite recesses 4*c* adapted to receive mating projections 7*b* of the connecting member 7 so that the closure member 4 can be connected to the member 7 in bayonetlike fashion. The connecting member 7 has, except the upper and lower portions thereof, preferably a cylindrical shape. The member 5 is adapted to form a sealed joint around the pipe 1 when the latter has been passed therethrough.

In order to keep the barrel F perfectly sealed during storage time and prior to being used, the closure member 4 is hermetically sealed by means of a specially constructed sealing cap 35 (FIGS. 7 and 8). When the pipe 1 is introduced into barrel F it penetrates this cap 35 and acts to push it out of the closure member 4. This sealing cap 35 can be easily penetrated and pushed out of the closure member 4. A sealing gasket 6 is disposed between the flange portion 4*b* and the threaded member 6*a*.

The connecting member 7 serves also as positioning means so that the closure member 4 may be fitted into a container such as for example the cooling container K. Furthermore, the connecting member 7 serves to maintain the entire tapping assembly in position over the barrel F. The lower portion of the bore 4*a* has an indentation 4*d* into which is moved a mating projection 36 of the sealing cap 35. The latter is slid into the bore 4*a* of the closure member 4 so that the projection 36 moves along a track formed by the indentation 4*d*. In this manner the sealing cap 35 can be firmly mounted in the closure member 4 and cannot be rotated therein.

The sealing cap 35 has essentially the shape of a hat, the flange of which has a broadened tongue-shaped portion 38. The projection 36 extends from the opposite side of the sealing cap 35 along the entire height thereof. The main body of the sealing cap is provided with a plurality of ridges *C* (FIG. 7) which serve to ensure a seal when the cap 35 has been seated in the closure member 4. The roof of the cap 35 is slightly arched and is, preferably, provided with radial indentations 4 (FIG. 8) to increase the elasticity of the cap 35. In order to facilitate the perforating of the barrel closure by means of the end of the pipe 1, the roof of the cap 35 has a thinned circular section 39 at its center. A rigid member 41, having the shape of a truncated cone, is firmly mounted inside the cap 35. The member 41 has an upper pointed end 42 which extends close to the inner surface of the roof of the cap 35, more specifically, close to the inner surface of the thinned section 39. A pressure equalization passage 43 is disposed in the rigid member 41 adjacent to the point 42 thereof. When pressure is exerted on the roof of the sealing cap 35 by, for example, the pipe 1 it flexes downwardly and is perforated by the point 42 of the rigid member 41. This perforation effects a communication between the interior of the barrel and the ambient atmosphere or, in the alternative, with an arrangement connected to the barrel F via the pipe 1. The tapping installation may in this manner be connected to the interior of the barrel F for tapping the beverage stored therein.

When the barrel F is tapped as described above, the cap 35 is pushed out of the closure member 4. The cap 35 is mounted in the lower portion of the bore 4*a* so that the roof of the cap 35 is positioned just below the cylindrical seal member 5. The upper surface of the broadened tongue-shaped portion 38 of the sealing cap 35 bears against the bottom surface 4*e* of the closure member 4.

The pipe 1 presses down on the roof of the sealing cap 35 that it is deflected downwardly and the pointed end 42 penetrates the thin circular portion 39. The relatively thin roof can be easily bent and, consequently, the end of the pipe 1

comes to bear against the rigid truncated conically shaped member **41**. An additional push of a relatively small force by the pipe **1** causes the cap **35** to be pushed out of the closure member **4**. The broadened tongue-shaped portion **38** causes the cap **35** to undergo a pivotal movement when it is pushed out by the pipe **1**, thereby preventing the cap **35** to remain hanging on the pipe **1** or to close the opening of the pipe **1**.

The sealing cap is made of a suitable plastic or synthetic material which does not deteriorate when stored in a carbonated beverage. All of the portions of sealing cap **35** are made of relatively elastic material whereas the member **41** is made of stiff material.

The tapping operation is effected as follows:

The tapping installation **8** is lowered with the pipe **1** into the bore **4** *a* and pushed through the cylindrical seal member **5** of the closure member **4**. By applying a relatively small force the pipe **1** traverses the seal member **5** and the lower end of the pipe **1** comes to bear against the roof of the cap **35**. The latter is then penetrated by the point **42** as described above after the seal member **5** has formed a seal around the lower end of the pipe **1**. The latter then pushes the cap **35** entirely out of the closure member **4**. The torque exerted by the tongue-shaped portion **38** prevents the cap **35** from closing the lower end of the pipe **1** during this pushing-out action. The tapping installation is now introduced into the barrel F until the projections **7***a* of the connecting member **7** snap into mating recesses in the valve body **8** thereby positioning the latter over the barrel F. The entire tapping installation can thus be firmly positioned over the barrel F and in the closure member **4**. The pipe **1** is sealingly engaged by the member **5** so that no pressure losses occur after the tapping installation of the invention has been installed. The penetrating and pushing out of the sealing cap **35** is easily accomplished in a sanitary manner and presents no particular difficulties. The connecting member **7** can be removed and reused over and over again.

When the immersion pipe **1** has been thus seated on the barrel F it is disposed closely above the bottom of the beer barrel F, so that the barrel F can be tapped until empty. Moreover, the outlet opening of the carbon dioxide transition pipe **3** is just cleared by the seal **5** in the barrel closure **4**, and guides the carbon dioxide into the space above the liquid level in the barrel.

A CO_2 capsule, preferably containing 16 g. of gas, is used in the tapping operation. This capsule **13** is inserted in the capsule container **10**, the neck of the capsule extending somewhat from the receiving sleeve of the valve body **8**. The CO_2 gas pressure is adjusted by means of the setting screw on the adjusting knob **9** to a low value, that is to say to one of the index numbers **1** to **3**. The capsule container **10** with the capsule **13** is then screwed into the threaded sleeve of the valve body **8** provided therefor on the tapping device. After for example about two rotations, a first resistance is felt, which is rapidly overcome by forceful turning. By this means, the metal plate closing the capsule **13** is penetrated by the broaching tip **15** provided therefor. By further turning, the capsule neck is moved onto the seal **14** and drawn forcefully thereagainst. The path for the tapping gas is now free and the desired tapping pressure is then set to a value which has been obtained by stepwise further turning of the setting screw or which has been found to be advantageous from earlier tappings.

The CO_2 gas standing at 60 atmospheres excess pressure flows through the bore in the broaching tip **15** into the pressure-reducing valve, possible impurities being held back in the filter **16**. The highly pressurized gas passes into the bore *b* in front of the closure screw **17**, is obliquely downwardly guided and flows into the high-pressure space H under the closure cap **31** (FIG. **3**). From there, the gas flows through the narrow annular space between the valve shank **29** and the precision bore **30** where a pressure drop occurs as a result of the throttle action taking place therein. The gas then flows into the annular space between the valve shank **29** and the pull rod **28** and through a first transverse bore provided in that portion of the pull rod **28** which is disposed within the valve shank **29**, from thence into the axial bore of the pull rod **28**. From there the gas passes into a second transverse bore in the pull rod **28** which is disposed in front of the membrane mount **24**, thus forming an outlet in the low-pressure space N, from whence the gas emerges from the valve. The path of the gas is shown by arrows in FIG. **4**.

As the gas flows into the chamber N below the membrane **25**, the membrane flexes against the prestressed valve spring **23** and compresses the spring after reaching a force which slightly exceeds the spring force. Thereby, the valve shank **29** is drawn by the pull rod **28** against the O-ring seal **27** and the valve closes. In this manner the special O-ring **27** cooperates with the bush **26** to ensure complete sealing of the valve.

When pressurized gas is required for tapping, then due to the ensuing pressure drop, the force exerted by the membrane **25** is reduced and the spring **23** presses the valve shank **29** away from the O-ring **27** and the valve opens. The CO_2 gas required in the tapping procedure leaves the membrane chamber through the oblique bore *a*, which leads upwardly and terminates in the central bore Z behind the closure screw **17**. From there the gas flows into the hollow space formed by the closure screw **17** and from there through the nonreturn valve **18** and passes into the upper end of the transition pipe **3**, from whence it flows through this pipe **3** as far as its lower end and emerges from there into the gas space of the barrel. In this way, the pressure necessary for tapping the beer is maintained.

By rotating the setting knob **9**, the threaded pin **20** can be axially reciprocally moved. This movement compresses the spring **23** to a greater or lesser degree, whereby correspondingly more or less pressure is necessary below the membrane **25** to overcome the spring force of the spring **23**.

If now after broaching and setting the pressure, the tapping cock **12** is opened, beer at the desired pressure will flow out of the barrel F, the beer having in every respect the qualities of beer tapped in large draught installations. After the dispensing of the beer has been completed and the tapping cock **12** closed, the pressure in the gas space of the barrel F automatically assumes the required pressure above the liquid level, due to the pressure reducing valve, so that the beer can be readily stored without losing quality.

The beer barrel or beer vessel **7** can be inserted in a container K which has, for example, an electrical refrigeration system. The barrels are filled in the brewery and are delivered closed just as normal barrel beer.

The device of the invention explained with reference to beer tapping can, of course, be used also for dispensing other beverages, e.g. fruit juices or lemonades, which in this way can be enriched with carbonic acid gas, the procedure being the same as described above.

Although our invention has been illustrated and described with reference to the preferred embodiment thereof, we wish to have it understood that it is in no way limited to the details of such embodiment but is capable of numerous modifications within the scope of the appended claims.

We claim:

1. A device for dispensing beverages containing carbonic acid gas, more particularly beer, comprising in combination:

a first container wherein said beer is adapted to be stored, said first container having an opening;

a tapping assembly operatively mounted on said first container and extending through said opening of said first container, said tapping assembly comprising:

a first immersion pipe having an inlet opening adjacent to the bottom of said first container and extending upwardly through said opening of said first container and having an outlet opening at its upper end;

tapping cock means operatively mounted on said first pipe outside of said first container;

valve body means operatively connected to said first pipe outside of said first container; and

a second container adapted to hold a predetermined quantity of pressurized carbonic acid gas operatively mounted in said valve body;

means for selectively supplying pressurized carbonic acid gas into said first container; and

an automatic pressure-controlling, single stage, pressure-reducing valve means disposed in said valve body, said pressure-reducing valve means having a high-pressure inlet and a low-pressure outlet, said high-pressure inlet being in communication with said second container and said low-pressure outlet being in communication with said first immersion pipe, and throttle means disposed in said first immersion pipe, said throttle means being made of a plastic material which is chemically inert with respect to the beverage and carbonic acid stored in said first container, said throttle means having a substantially cylindrical passage extending therethrough for conducting the beverage stored in the container, said passage having an inlet and outlet in the shape of a truncated cone, the diameter of said passage tapers gradually inwardly from the inlet of said passage to the outlet thereof at a ratio of substantially 2:1.

2. The device as set forth in claim 1, including a second pipe having an upper inlet opening in communication with said first low-pressure outlet and a lower outlet opening extending to a limited degree into said first container.

3. The device as set forth in claim 2, including valve pressure-adjusting means operatively connected to said automatic pressure-controlling, single stage, pressure-reducing valve means for adjusting the gas pressure limits automatically maintained by said pressure-reducing valve means in said first container.

4. A device for dispensing beverages containing carbonic acid gas, more particularly beer, comprising in combination:

a first container wherein said beer is adapted to be stored, said first container having an opening;

a tapping assembly operatively mounted on said first container and extending through said opening of said first container, said tapping assembly comprising:

a first immersion pipe having an inlet opening adjacent to the bottom of said first container and extending upwardly through said opening of said first container and having an outlet opening at its upper end;

tapping cock means operatively mounted on said first pipe outside of said first container;

valve body means operatively connected to said first pipe outside of said first container; and

a second container adapted to hold a predetermined quantity of pressurized carbonic acid gas operatively mounted in said valve body;

means for selectively supplying pressurized carbonic acid gas into said first container; and

an automatic pressure-controlling, single stage, pressure-reducing valve means disposed in said valve body, said pressure-reducing valve means having a high-pressure inlet and a low-pressure outlet, said high-pressure inlet being in communication with said second container and said low-pressure outlet being in communication with said first immersion pipe, said valve body having at least two separate bores, said automatic pressure-controlling, single stage, pressure-reducing valve means being disposed in a first one of said two bores, and nonreturn valve means being disposed in a second one of said two bores, said pressure-reducing valve means including valve shank means movably disposed in said first bore and dividing it into a high-pressure chamber and a low-pressure chamber, first and second channels, respectively connecting said high-pressure chamber and low-pressure chamber with said second bore at two points in said bore which are spaced from each other.

5. A device for dispensing beverages containing carbonic acid gas, more particularly beer, comprising in combination:

a first container wherein said beer is adapted to be stored, said first container having an opening;

a tapping assembly operatively mounted on said first container and extending through said opening of said first container, said tapping assembly comprising:

a first immersion pipe having an inlet opening adjacent to the bottom of said first container and extending upwardly through said opening of said first container and having an outlet opening at its upper end;

tapping cock means operatively mounted on said first pipe outside of said first container;

valve body means operatively connected to said first pipe outside of said first container; and

a second container adapted to hold a predetermined quantity of pressurized carbonic acid gas operatively mounted in said valve body;

means for selectively supplying pressurized carbonic acid gas into said first container; and

an automatic pressure-controlling, single stage, pressure-reducing valve means disposed in said valve body, said pressure-reducing valve means having a high-pressure inlet and a low-pressure outlet, said high-pressure inlet being in communication with said second container and said low-pressure outlet being in communication with said first immersion pipe, said second container having a threaded neck portion and said second bore in said valve body has a mating threaded portion, a through-bored broaching tip and a sealing disc mounted in said second bore opposite said second container, said broaching tip extending through said sealing disc, whereby said neck portion is adapted to sealingly engage said sealing disc and said broaching tip is adapted to pierce said neck portion in a substantially axial direction when said second container is threadably inserted into said second bore of said valve body.

6. The device as set forth in claim 5, including gas passage-blocking means disposed in said second bore between said two points in said second bore, and purification filter means disposed in said second bore between said broaching tip and said first channel.

7. A device for dispensing beverages containing carbonic acid gas, more particularly beer, comprising in combination:

a first container wherein said beer is adapted to be stored, said first container having an opening;

a tapping assembly operatively mounted on said first container and extending through said opening of said first container, said tapping assembly comprising:

a first immersion pipe having an inlet opening adjacent to the bottom of said first container and extending upwardly through said opening of said first container and having an outlet opening at its upper end;

tapping cock means operatively mounted on said first pipe outside of said first container;

valve body means operatively connected to said first pipe outside of said first container; and

a second container adapted to hold a predetermined quantity of pressurized carbonic acid gas operatively mounted in said valve body;

means for selectively supplying pressurized carbonic acid gas into said first container; and

an automatic pressure-controlling, single stage, pressure-reducing valve means disposed in said valve body, said pressure-reducing valve means having a high-pressure inlet and a low-pressure outlet, said high-pressure inlet being in communication with said second container and said low-pressure outlet being in communication with said first immersion pipe, a second pipe having an upper inlet opening in communication with said first low-pressure outlet and a lower outlet opening extending to a limited degree into said first container, valve pressure-adjusting means operatively connected to said automatic pressure-controlling, single stage, pressure-reducing valve means for adjusting the gas pressure limits automatically maintained by said pressure-reducing valve means in said first container, said valve body having at least two separate bores, said automatic pressure-controlling, single stage, pressure-reducing valve means being disposed in a first one of said two bores, and nonreturn valve means being disposed in a second one of said

two bores, said pressure-reducing valve means including valve shank means movably disposed in said first bore and dividing it into a high-pressure chamber and a low-pressure chamber, first and second channels, respectively connecting said high-pressure chamber and low-pressure chamber with said second bore at two points in said bore which are spaced from each other, and wherein said valve shank means defines at least one gas passage in said first bore, first gas-sealing means disposed in said first bore, said adjusting means comprising a flexible membrane mounted in said valve body opposite said valve shank means, adjustable biasing means operatively connected to said flexible membrane, a pull rod connected, on the one hand, to said valve shank means and, on the other hand, to said flexible membrane, the latter moving said valve shank means between a first position in which gas passes through said gas passage in said first bore and a second position in which said first gas-sealing means seal said gas passage in said first bore.

8. The device as set forth in claim **7**, including excess pressure release valve means operatively mounted in said valve body and being in communication with said second bore at a point located between said upper inlet opening of said second pipe and said second channel in said second bore, said second pipe being mounted within said first pipe and the upper inlet thereof being soldered to said first pipe and being in communication with said second bore.

9. The device as set forth in claim **8**, including throttle means disposed in said first immersion pipe, said throttle means being made of a plastic material which is chemically inert with respect to the beverage and carbonic acid stored in said first container, said throttle means having a substantially cylindrical passage extending therethrough for conducting the beverage stored in the container, said passage having an inlet and outlet in the shape of a truncated cone, the diameter of said passage tapers gradually inwardly from the inlet of said passage to the outlet thereof at a ratio of substantially 2:1.

10. A device for dispensing beverages containing carbonic acid gas, more particularly beer, comprising in combination:

a first container wherein said beer is adapted to be stored, said first container having an opening;

a tapping assembly operatively mounted on said first container and extending through said opening of said first container, said tapping assembly comprising:

a first immersion pipe having an inlet opening adjacent to the bottom of said first container and extending upwardly through said opening of said first container and having an outlet opening at its upper end;

tapping cock means operatively mounted on said first pipe outside of said first container;

valve body means operatively connected to said first pipe outside of said first container; and

a second container adapted to hold a predetermined quantity of pressurized carbonic acid gas operatively mounted in said valve body;

means for selectively supplying pressurized carbonic acid gas into said first container; and

an automatic pressure-controlling, single stage, pressure-reducing valve means disposed in said valve body, said pressure-reducing valve means having a high-pressure inlet and a low-pressure outlet, said high-pressure inlet being in communication with said second container and said low-pressure outlet being in communication with said first immersion pipe, a second pipe having an upper inlet opening in communication with said first low-pressure outlet and a lower outlet opening extending to a limited degree into said first container, and comprising closure means threadably mounted in said opening of said first container and defining a third bore, said first immersion pipe extending through said third bore, second sealing means mounted in said third bore and adapted to sealingly engage said first immersion pipe, and bayonet-type connecting means removably connecting said first immersion pipe to said closure means, thereby maintaining said first pipe in a substantially vertical position inside and outside of said first container.

11. The device as set forth in claim **10**, wherein said first container is adapted to be stored prior to being tapped, said closure means including a sealing cap removably mounted in said third bore when said first container is so stored and adapted to be pushed out by said first pipe when the latter is inserted into said first container.

12. The device as set forth in claim **11**, wherein said closure means has a flange portion having a plurality of recesses, said bayonet-type connecting means coacting with said recesses to vertically position said first pipe over and inside said first container.

13. The device as set forth in claim **12**, wherein said sealing cap comprises a first cylindrical portion which is closed by a bottom portion at one end thereof and a second conical portion having a pointed end which is mounted inside said first portion, said pointed end extending towards said bottom portion, whereby when said bottom portion is flexed towards said second conical portion so as to come in contact with said pointed end, the latter is adapted to pierce said bottom portion.

14. The device as set forth in claim **13**, wherein said bottom portion has a central thinned section which is pierced by said pointed end.

15. The device as set forth in claim **14**, wherein said first portion consists of a relatively elastic plastic material and said second portion consists of a relatively stiff plastic material.

16. The device as set forth in claim **15**, wherein said sealing cap is mounted in said third bore of said closure means underneath and adjacent said second sealing means, said first cylindrical portion having a laterally extending projection and said third bore of said closure means having a corresponding mating recess so that when said sealing cap is mounted in said third bore said projection extends into said recess and said sealing cap is, consequently, nonrotatably mounted in said third bore.

17. The device as set forth in claim **16**, wherein said first portion of said sealing cap includes a flange portion laterally extending from one side of said first portion, said flange portion abutting against said closure means so that when said sealing cap is pushed out of said third bore by said first pipe said sealing cap tends to undergo a pivotal movement.

18. A method for broaching and tapping a first container having stored therein a beverage containing carbonic acid gas, comprising the steps of:

piercing closure means sealing said first container by means of an immersion pipe forming part of a tapping installation;

thereafter producing a predetermined pressure in said first container by introducing carbonic acid gas from a CO_2 capsule into said first container via a second pipe forming part of said tapping installation; and

maintaining said predetermined pressure in said first container by means of an automatic pressure-controlling, single stage, pressure-reducing valve, which includes movable valve shank means which cooperate with first gas-sealing means, said valve shank means defining at least one gas passage and being connected to a flexible membrane, so that valve shank means are movable between a first position in which gas passes into said first container via said second pipe and a second position in which said first gas-sealing means seal said gas passage, thereby maintaining said predetermined pressure in said first container.

19. A device for dispensing beverages containing carbonic acid gas, more particularly beer, comprising in combination:

a first container wherein said beer is adapted to be stored, said first container having an opening;

a tapping assembly operatively mounted on said first container and extending through said opening of said first container, said tapping assembly comprising:

a first immersion pipe having an inlet opening adjacent to the bottom of said first container and extending upwardly through said opening of said first container and having an outlet opening at its upper end;

tapping cock means operatively mounted on said first pipe outside of said first container;

valve body means operatively connected to said first pipe outside of said first container; and

a second container adapted to hold a predetermined quantity of pressurized carbonic acid gas operatively mounted in said valve body;

means for selectively supplying pressurized carbonic acid gas into said first container; and

an automatic pressure-controlling, single stage, pressure-reducing valve means disposed in said valve body, said pressure-reducing valve means having a high-pressure inlet and a low-pressure outlet, said high-pressure inlet being in communication with said second container and said low-pressure outlet being in communication with said first immersion pipe, said valve body means having a housing through which the first pipe extends, said housing being in the form of a single lateral projection having a space therewithin for receiving a container of pressurized carbonic acid gas, said pressure-reducing valve being contained in said housing.

20. The device as set forth in claim **19**, comprising a high-pressure relief valve disposed within the housing, means for adjusting the pressure-reducing valve disposed within the housing, and a manipulating means connected to the last named means and disposed outwardly of the housing.

21. A device for dispensing beverages containing carbonic acid gas, more particularly beer, comprising in combination:

a first container wherein said beer is adapted to be stored, said first container having an opening;

a tapping assembly operatively mounted on said first container and extending through said opening of said first container, said tapping assembly comprising:

a first immersion pipe having an inlet opening adjacent to the bottom of said first container and extending upwardly through said opening of said first container and having an outlet opening at its upper end;

tapping cock means operatively mounted on said first pipe outside of said first container;

valve body means operatively connected to said first pipe outside of said first container; and

a second container adapted to hold a predetermined quantity of pressurized carbonic acid gas operatively mounted in said valve body means for selectively supplying pressurized carbonic acid gas into said first container;

an automatic pressure-controlling, single stage, pressure-reducing valve means disposed in said valve body, said pressure-reducing valve means having a high-pressure inlet and a low-pressure outlet, said high-pressure inlet being in communication with said second container and said low-pressure outlet being in communication with said first immersion pipe;

a second pipe having an upper inlet opening in communication with said first low-pressure outlet and a lower outlet opening extending to a limited degree into said first container; and

valve pressure-adjusting means operatively connected to said automatic pressure-controlling, single stage, pressure-reducing valve means for adjusting the gas pressure limits automatically maintained by said pressure-reducing valve means in said first container.