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(54) Apparatus for dispensing a liquid

(57) A dispenser for wine comprises a metering chamber (14) which is normally connected to an inverted bottle (not shown) via passages (34, 26, 22). When the central stem (19) is pushed upward, passages (26) move out of register with passages (34) to isolate the chamber (14) from the bottle, and passages (27) connect the chamber (14) to outlet (25). At the same time a recess (38) formed in the stem (19) moves into register with a passage (36) to admit CO_2 at slightly super-atmospheric pressure to the metering chamber. When the stem (19) is released a spring (20) returns it to its lower position, and the CO_2 in the chamber (14) enters the bottle to allow refilling of the chamber (14) without admitting air to the bottle.

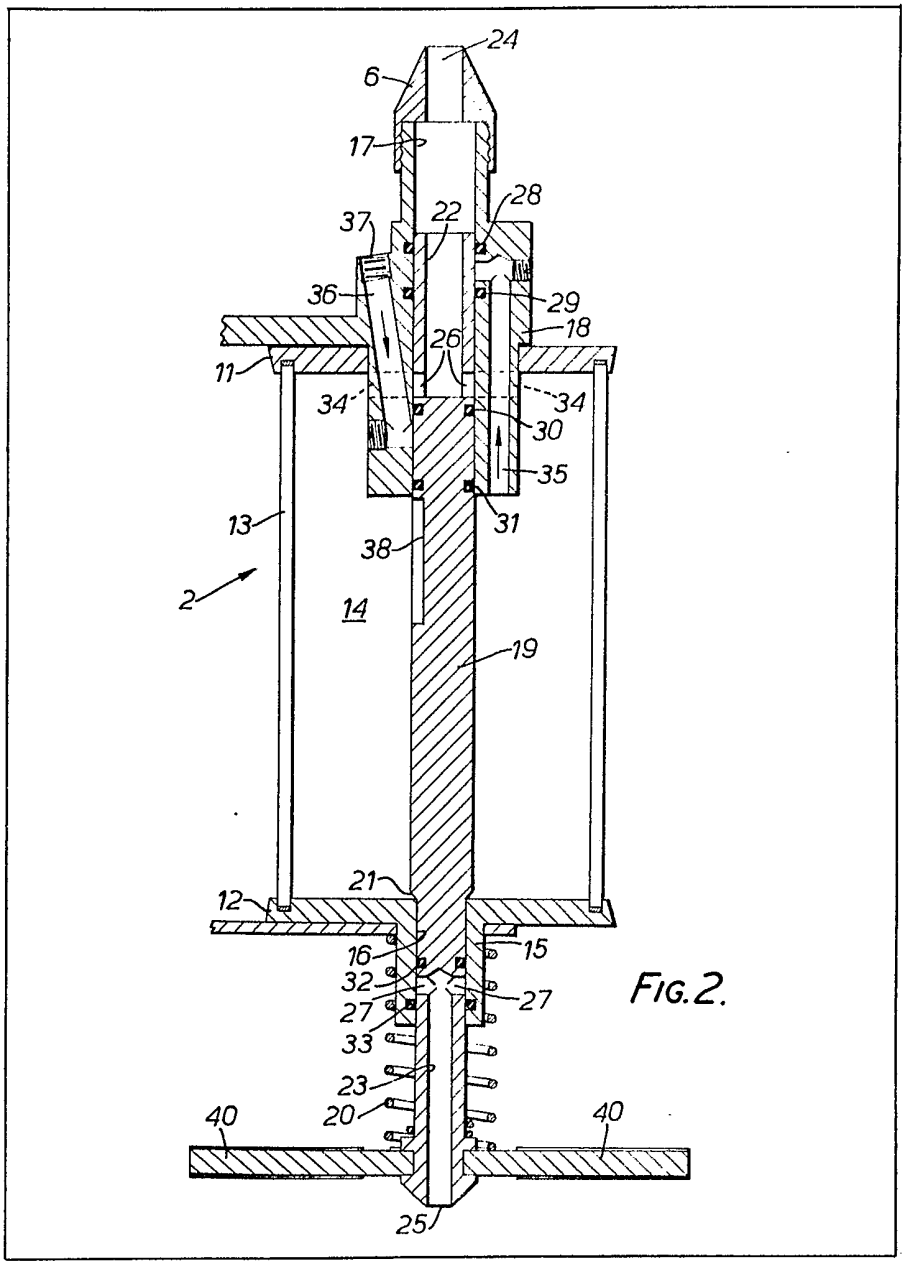

FIG. 2.

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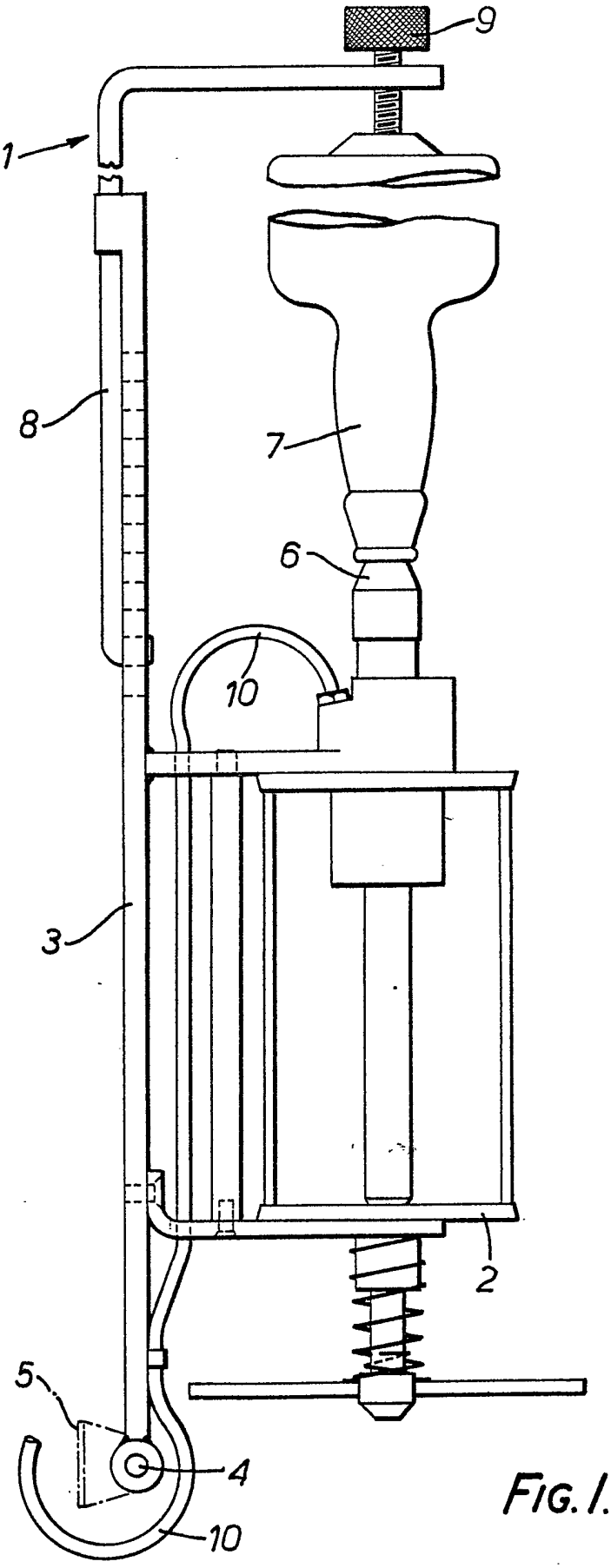

FIG. 1.

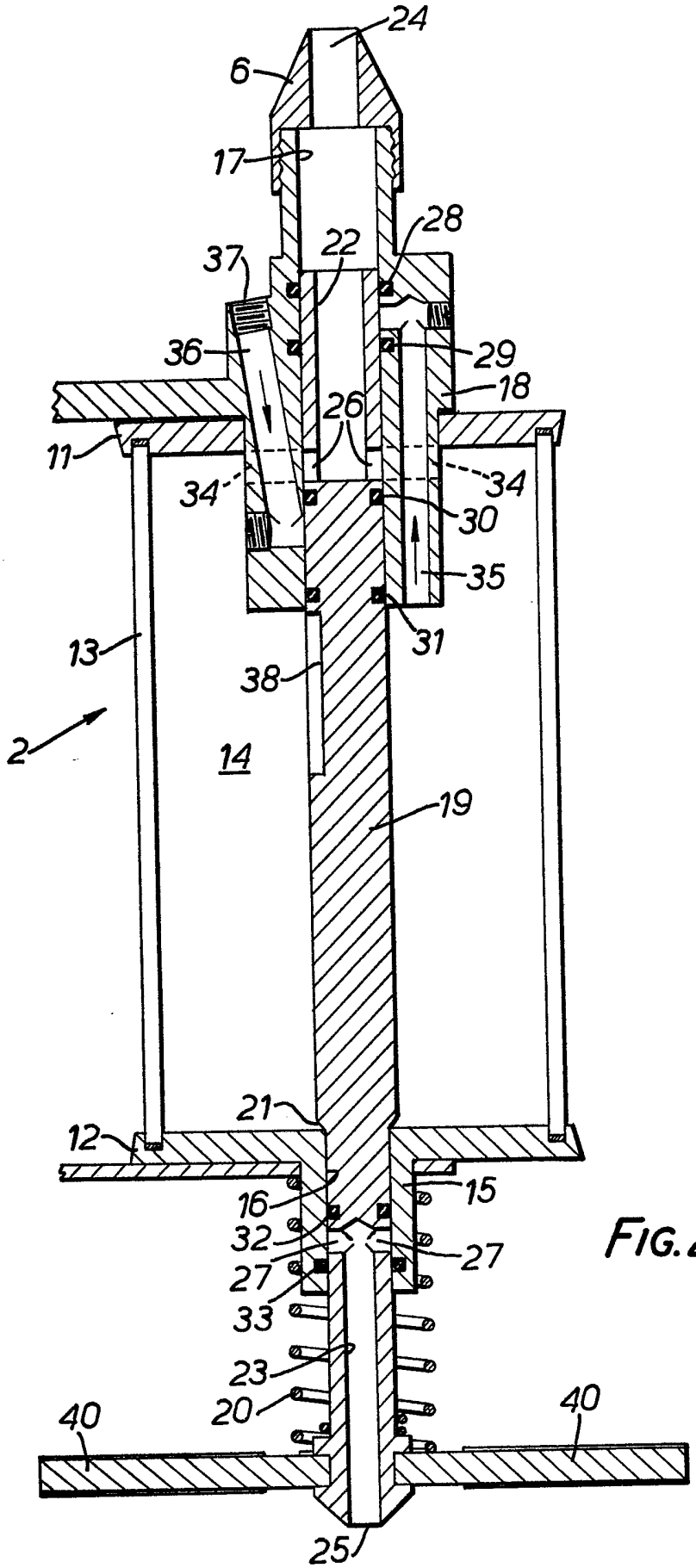
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FIG. 2.

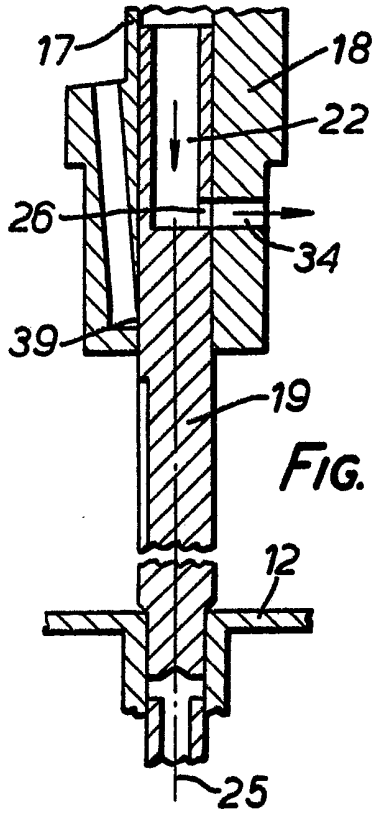

FIG. 3A.

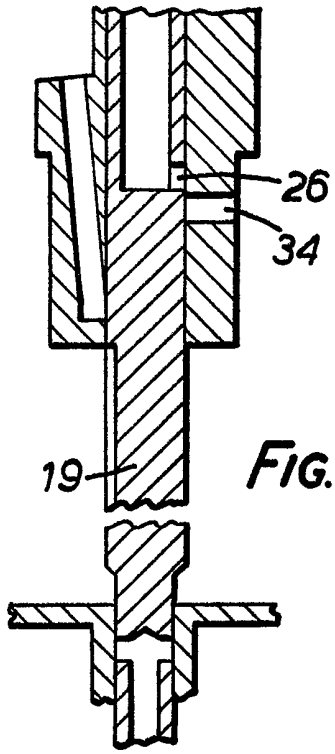

FIG. 3B.

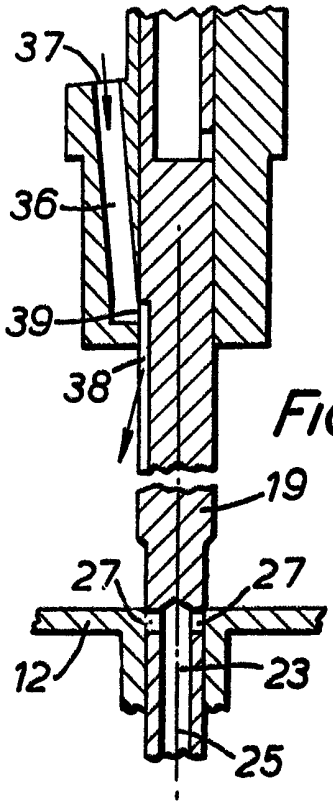

FIG. 3C.

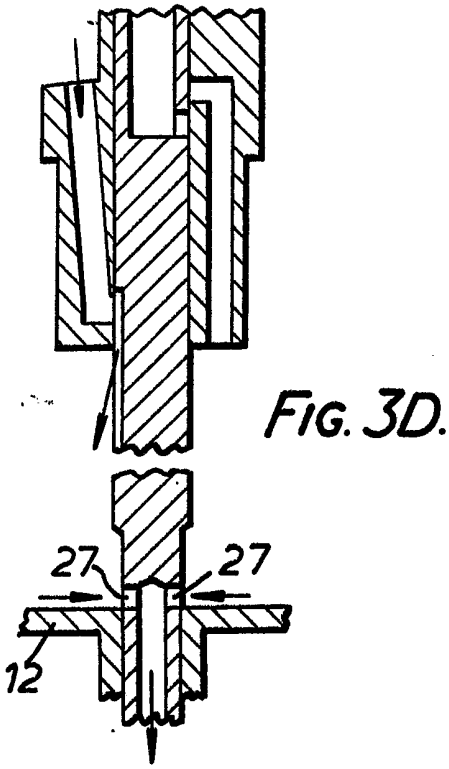

FIG. 3D.

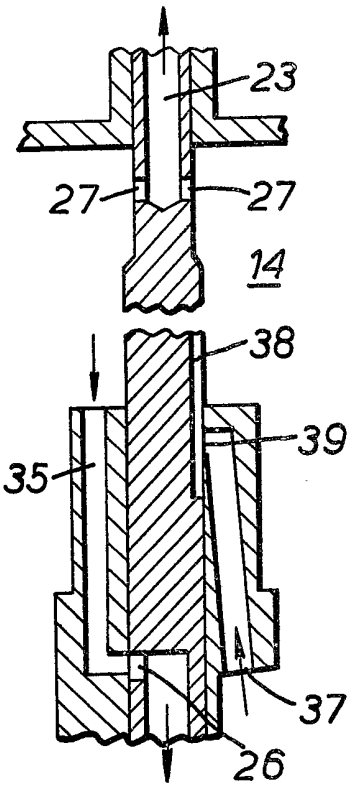

FIG. 4.

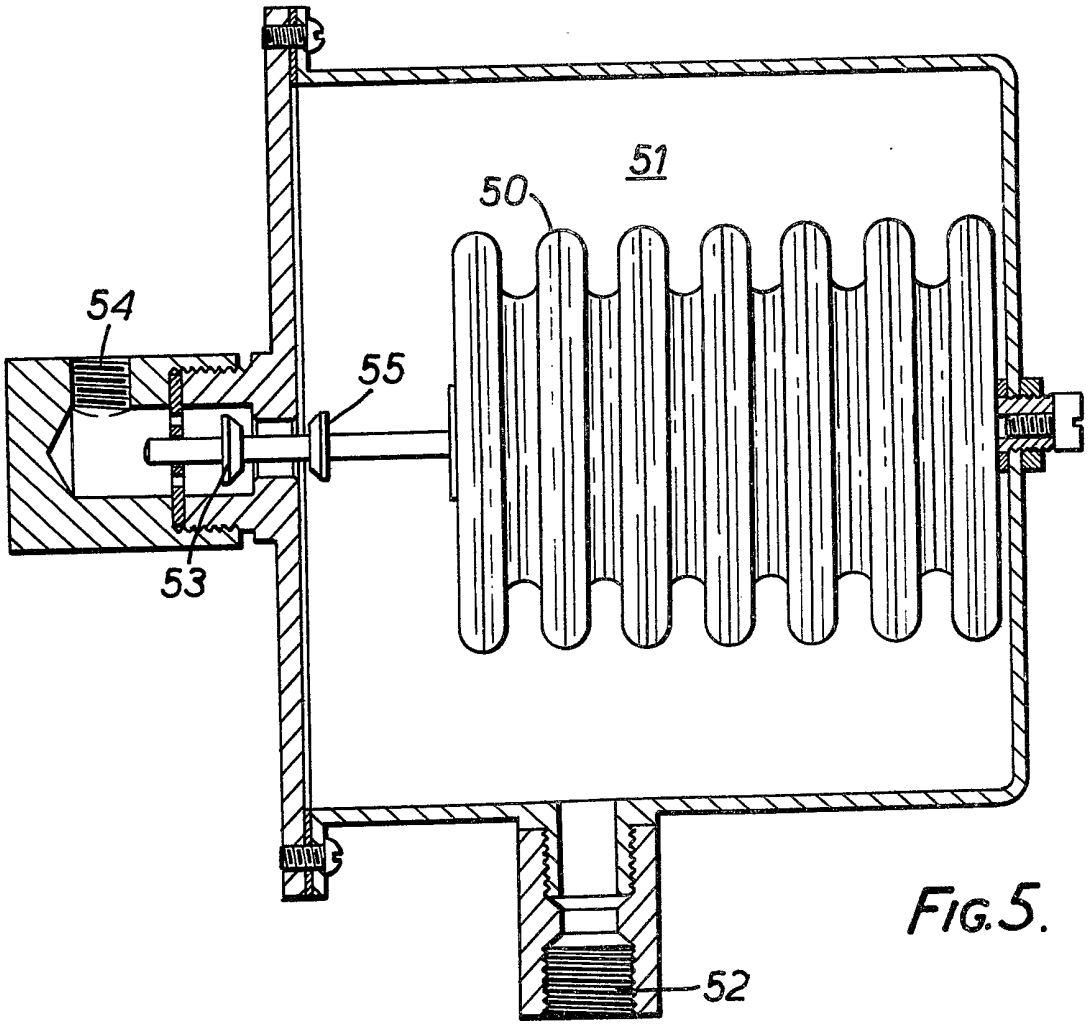

FIG. 5.

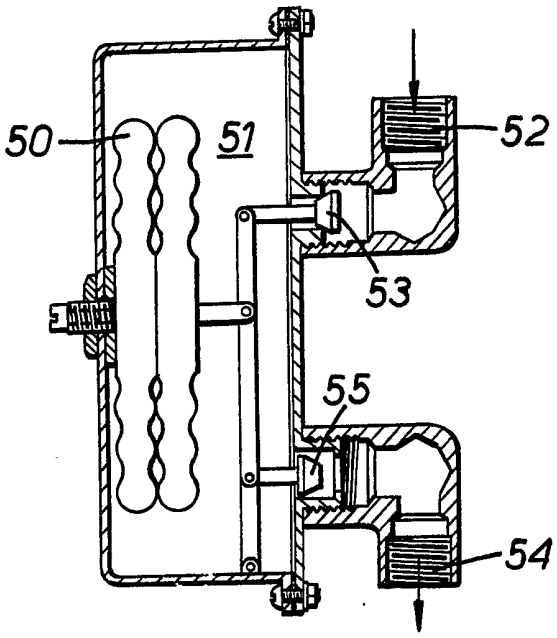

FIG 6.

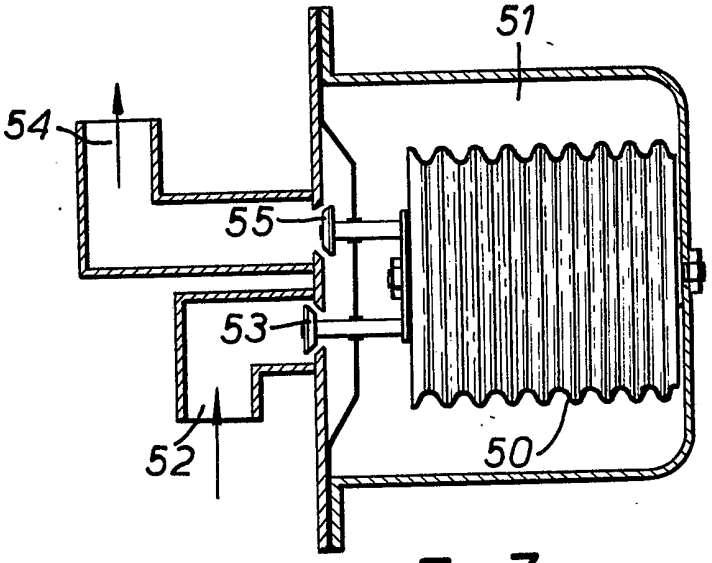

FIG. 7.

SPECIFICATION

Apparatus for dispensing a liquid

This invention relates to apparatus for dispensing a liquid, and more particularly to apparatus for dispensing a metered quantity of liquid from a closed vessel.

It is common practice to dispense a metered quantity of alcoholic beverage from a so-called "optic" (Registered Trade Mark) into a glass. During such dispensing air is allowed to enter the vessel, usually a glass bottle, in which beverage is contained. This renders such dispensing technique unsuitable for use with beverages which will be deleteriously affected by contact with air. Notably, the technique is unsuitable for fine wines which would be oxidized by the oxygen contained in the air admitted to the bottle during dispensing.

It is further known to use compressed gas to dispense alcoholic beverages, for example beer. In this technique, a compressed gas, usually carbon dioxide, is admitted to a closed vessel of beverage to be dispensed at super-atmospheric pressure. A siphon tube extends to the bottom of the vessel and accordingly when a tap connected to the siphon tube is opened liquid is dispensed due to gas pressure above the liquid in the closed vessel. In place of a simple tap a metering device may be employed which provides for accurate dispensing of a metered quantity of liquid. This technique is not, however, suitable for use in dispensing many liquids since the pressure at which gas must be admitted to the vessel in order to drive liquid out through the siphon pipe is such that the gas will commonly dissolve in significant quantities in the liquid. Such dissolution of gas within the liquid renders the technique unsuitable for many applications, including the dispensing of wine.

According to one feature of the present invention there is provided apparatus for dispensing a metered quantity of a liquid comprising: a metering chamber for holding a predetermined quantity of liquid; a first normally open valve connecting an upper region of the metering chamber to a closed vessel of liquid to be dispensed; a second normally closed valve openable to permit emptying of the metering chamber of liquid, the second valve being coupled to the first valve such that when the second valve is open the first valve is closed, and means for supplying a chosen gas at super-atmospheric pressure to the metering chamber when the second valve is open.

In the case when the apparatus is used to dispense a wine the chosen gas will be a gas which does not deleteriously affect the wine at the pressure at which is it supplied. The gas may conveniently be carbon dioxide supplied at a pressure which is only very slightly above atmospheric pressure. At a very low super-atmospheric pressure the amount of carbon dioxide which will dissolve in the wine is not sufficient to present any objections to the use of carbon dioxide. However, it should be understood that any suitable gas may be used depending on the nature of the liquid to be dispensed.

In the preferred embodiment of the invention the apparatus is embodied in the form of an optic upon which a wine bottle can be mounted to provide for metered dispensing of wine from the bottle whilst at the same time ensuring that wine remaining in the bottle does not deteriorate due to contact with atmospheric oxygen.

In many applications it will be important that the pressure of gas supplied to the dispensing apparatus does not exceed a predetermined value. For example, in the case when the liquid being dispensed is wine contained in a glass bottle, and the chosen gas is carbon dioxide, it is important that the carbon dioxide is not supplied at a pressure sufficiently high to cause a significant quantity of carbon dioxide to dissolve in the wine, or sufficiently high to cause bursting of the bottle. Accordingly, in a preferred embodiment of the invention the means for supplying a chosen gas comprises a gas pressure regulator for delivering gas at a chosen pressure, and a pressure monitoring safety valve located between the pressure regulator and the metering chamber for isolating the metering chamber from the pressure regulator in the event that the pressure of gas delivered by the pressure regulator exceeds a predetermined value. Preferably, the pressure monitoring safety valve is of a fail-safe design in which, in the event of failure of the pressure monitoring means within the valve, the valve reverts to a closed position ensuring isolation of the metering chamber from the pressure regulator.

Preferably, the apparatus comprises a third normally closed valve located between the means for supplying a chosen gas and a metering chamber. The third valve is coupled to the first and second valves such that when the second valve is opened the third valve is opened to admit chosen gas to the metering chamber.

In the preferred embodiment the first, second, and third valves ae mechanically rigidly connected together, and may, for example, include a common movable member.

Preferably, the three valves may be moved to a purge configuration in which all three valves are open thereby permitting the purging of air from the liquid storage vessel and the metering chamber when a new vessel of liquid is connected to the apparatus.

The above and further features and advantages of the invention will become clear from the following description of preferred embodiments thereof, given by way of example only, reference being had to the accompanying drawings, wherein:

Figure 1 is an elevational view of an embodiment of the present invention;

Figure 2 is an enlarged cross sectional view of part of the embodiment of Figure 1;

Figures 3A—3D illustrate stages in dispensing a liquid;

Figure 4 illustrated the purging of air from the apparatus of Figure 1; and

Figures 5—7 show three possible designs of

pressure monitoring safety valves.

The liquid dispensing apparatus 1 shown in Figure 1 comprises a metering unit 2 mounted on a support 3 which is secured by a pivotal connection 4 to a bracket 5 which in turn is secured to a suitable support, for example a bar shelf. The support 3 may be rotated about the pivotal connection 4 between the generally vertical use position illustrated in Figure 1, and an inverted loading position displaced 180° from the position illustrated in Figure 1. Means (not shown) are provided for normally maintaining the support 3 in the use position illustrated.

A tapering seal 6 is provided at the top of the metering unit 2 to form a seal with the neck of a wine bottle 7. The support 2 includes an adjustable section 8 which is association with a screw clamp 9 enables bottles of a range of sizes to be accommodated on the apparatus. A flexible pipe 10 supplies carbon dioxide to the metering unit from a convenient source as will be described in more detail hereinafter.

Referring now to Figure 2 the metering unit 2 is shown in more detail and on a larger scale.

The metering unit 2 comprises top and bottom plates 11, 12 sealingly engaged with the upper and lower ends respectively of a clear tube 13 to define a metering chamber 14 of predetermined volume. Typically, in the case when wine is being dispensed the metering chamber will have a volume of 170 ml. The tube 13 is of a clear material providing a visual indication that the metering chamber is full of liquid at the commencement of dispensing.

A tubular projection 15 is formed integrally with the bottom plate 12 and includes a central passage 16 which is axially aligned with a central passage 17 formed in a valve body 18 secured to the top plate 11. A vertically movable stem 19 is slidably mounted in the passages 16, 17 and is biased downwardly as viewed in Figure 2 by a spring 20 so that, in its normal position, a shoulder 21 on the stem 19 engages the upper surface of the bottom plate 12.

Upper and lower axial passages 22, 23 are formed in the opposite ends of the stem 19, the upper passage 22 freely communicating with a liquid inlet port 24 formed in the seal 6, and the lower axial passage 23 freely communicating with a liquid outlet port 25 formed at the bottom of the stem 19. Radial passages 26 formed in the stem 19 communicate with the upper axial passage 22 whilst radial passages 27 formed in the stem communicate with the lower axial passage 23. O-ring seals 28—31 provide sliding sealing contact between the stem 19 and the valve body 18, whilst O-ring seals 32, 33 provide for sliding sealing contact between the stem 19 and the tubular projection 15. Radial passages 34 formed in the valve body 18 freely communicate the top of the metering chamber 14 with the central passage 17 of the valve body whilst a passage 35 connects the lower surface of the valve body 18 with the central passage 17. A passage 36 extends from a gas inlet port 37 to which the pipe 10 is connected to the central passage 17 of the valve body 18.

Finally, a slot or recess 38 is formed in the side of the stem 19 immediately below the seal 31.

Referring now to Figures 3A—3D various components of the metering unit are illustrated schematically in various operating positions. Referring firstly to Figure 3A the bottom plate 12, valve body 18, and stem 19 are illustrated in the position shown in Figure 2. This is the normal "rest" position of the unit in which it will be seen that the radial passage 34 in the valve body 18 is aligned with the radial passage 26 in the stem 19 to provide free communication between the metering chamber 14 and the liquid inlet port 24 via the central passage 17 and axial passage 22. The port 39 by which the passage 36 enters the central passage 17 is closed by the stem 19, and the liquid outlet port 25 is isolated from the metering chamber. Thus, the metering chamber is completely filled with liquid and there is no gas flow into the metering chamber or liquid flow out of the metering chamber.

Referring now to Figures 3B—3D when it is desired to empty the contents of the metering chamber 14 into a glass the glass is pressed against the cross-arms 40 secured to the stem 19 to raise the stem 19 against the bias of spring 20. As the stem begins to rise (Figure 3B) the passage 26 is moved out of register with the passage 34 to isolate the metering chamber from the liquid inlet port 24. Further upward movement of the stem 19 (Figure 3C) brings the recess 38 into register with the port 39 thereby allowing carbon dioxide from the gas inlet port 37 to flow via the passage 36, port 39 and recess 38 into the metering chamber. As the stem 19 continues to rise, the radial passages 27 move clear of the bottom plate 12 to provide a free drainage passage for liquid in the metering chamber 14 which is accordingly displaced from the metering chamber by inflowing carbon dioxide. In the normal fully raised position (Figure 3D) the lower surface of the passages 27 are flush with the upper surface of the bottom plate 12 to allow complete drainage of liquid from the metering chamber 14.

It will be appreciated that the sequence of events illustrated in Figures 3B—3D will normally be carried out as a single continuous movement and the relative positions illustrated in Figure 3C will not be maintained for any significant length of time. It is, however, desirable for the port 39 to be opened to the metering chamber 14 before the passages 27 emerge into the metering chamber 14 in order to avoid any possibility of air flowing into the metering chamber via the port 25, passage 23, and passages 27.

When the metering chamber 14 has been completely emptied the glass is removed from the arms 40 and the components re-assume the position illustrated in Figure 3A thereby enabling the metering chamber to refill and enabling the carbon dioxide contained in the metering chamber to flow into the bottle 7.

It will be appreciated that the above described

operating sequence enables a metered quantity of liquid to be dispensed from the bottle 7 without atmospheric air entering the bottle 7 and thereby damaging the contents thereof.

When a new bottle of wine is to be installed in the dispensing apparatus a certain small air space will be present above the wine in the bottle and the chamber 14 may be full of air. In order to prevent such air damaging the wine, after the bottle has been installed on the seal 6 the apparatus is inverted and firm downward pressure is applied to the stem 19, e.g. by the palm of the hand. This causes the stem to move beyond the normal operating position illustrated in Figure 3D to the purge position illustrated in Figure 4 (it being understood that Figure 4 is inverted relative to Figures 3A—3D because the entire apparatus is inverted during the purge phase of operation).

In the position illustrated in Figure 4 the port 39 is open to the metering chamber 14 by way of the recess 38 whilst the passage 26 is in register with the passage 35. In this configuration carbon dioxide flowing into the metering chamber from the gas inlet port 37 can purge air contained in the bottle and in the metering unit to the exterior via passages 27 and 23. After a suitable period of purging the stem 19 is released and is returned to its rest position by spring 20 and the entire unit is returned to its use configuration as illustrated in Figure 1.

Preferably, a second spring in addition to the spring 20 is provided whereby a significantly larger force is required to move the stem to the purge position against the bias of the second spring than is required to move the stem to the position illustrated in Figure 3D against the bias of the spring 20.

In the preferred embodiment of the invention the pipe 10 is connected to a source of carbon dioxide at a slightly super-atmospheric pressure, for example at a pressure of 0.25 pounds force per square inch above atmospheric pressure. At this very low pressure very little carbon dioxide will dissolve in the wine and accordingly the effect of operation of the unit will not be to produce "carbonated" wine. Further, at this very low super-atmospheric pressure there is very little danger that the bottle 7 will be burst due to gas pressure. Commonly, the carbon dioxide will be obtained by means of the commercially available pressure reduction valve from the carbon dioxide source commonly available on licenced premises for the pressure dispensing of beers. In order to obviate any possibility of damage to the wine/bursting of the bottle due to failure of the pressure regulator a pressure monitoring safety valve is preferably incorporated between the pressure regulator and the dispensing apparatus 1. Three suitable forms of safety valve are illustrated in Figures 5—7. In all three forms of safety valve an evacuated capsule or so-called "barometric bellows" 50 located within a rigid walled chamber 51 is used to sense the pressure of gas delivered to the chamber 51 from a pressure regulator via an inlet port 52. In the event that the pressure delivered from the pressure regulator exceeds a predetermined value the capsule 50 contracts to move a valve head 53 against an associated seat in order to prevent the excess pressure being communicated to the outlet 54 to the pipe 10. In the event of the capsule 50 developing a leak and thereby becoming insensitive to excess pressure within the chamber 51, the inherent resilience of the capsule will cause a second valve member 55 to move into engagement with an associated seat in order to shut off the flow of gas to the outlet 54. It will be appreciated therefore that the safety valves illustrated in Figures 5, 6 and 7 each serve to cut off the supply of gas to the metering unit if the supplied pressure delivered by the pressure regulator exceeds a predetermined value, and at the same time each unit is fail safe in the sense that a fault developing in the monitoring unit, i.e. the vacuum capsule, automatically cuts off the supply of gas from the metering unit.

Whilst the invention has been described in relation to a carbon dioxide metering system for use with wine it will be appreciated that many variations may be made within the scope of the invention. For example, the chosen gas may be a gas other than carbon dioxide, for example nitrogen, and the unit may be altered in size and shape in order to accommodate other uses. For example, the metering unit could be used to dispense metered quantities of liquid, for example 0.75 litres from a barrel into a bottle. Such a system would be particularly useful for dispensing bulk wine at, for example, a wine merchants. In such a case, the ability to dispense wine by the bottle from a barrel without the risk of spoiling the remaining contents of the barrel is of considerable advantage.

In a modification of the invention means are provided to permit continuous discharge of liquid associated with a continuous inflow of chosen gas. Such means may be provided in association with the above described metering apparatus by providing a suitable valving arrangement, or may be provided on a non-metering apparatus in which chosen gas is admitted continuously as liquid is withdrawn.

CLAIMS

1. Apparatus for dispensing a metered quantity of a liquid comprising: a metering chamber for holding a predetermined quantity of liquid; a first normally open valve connecting an upper region of the metering chamber to a closed vessel of liquid to be dispensed; a second normally closed valve openable to permit emptying of the metering chamber of liquid, the second valve being coupled to the first valve such that when the second valve is open the first valve is closed, and means for supplying a chosen gas at super-atmospheric pressure to the metering chamber when the second valve is open.

2. Apparatus according to claim 1 wherein the closed vessel is a bottle and including means for forming a releasable seal with the neck of the bottle whereby the bottle may be replaced by a full

bottle when it is empty.

3. Apparatus according to claim 1 or claim 2 wherein at least part of the walls of the metering chamber is transparent.

4. Apparatus according to claim 1 or claim 2 wherein the gas supply means comprises a gas pressure regulator for delivering gas at a chosen pressure, and a pressure monitoring safety valve located between the pressure regulator and the metering chamber for isolating the metering chamber from the pressure regulator in the event that the pressure of gas delivered by the pressure regulator exceeds a predetermined value.

5. Apparatus according to claim 4 wherein the pressure monitoring safety valve is effective to isolate the metering chamber from the pressure regulator in the event of a fault developing in the pressure monitoring device of the pressure monitoring safety valve.

6. Apparatus according to any preceding claim including a third normally closed valve located between the means for supply a chosen gas and the metering chamber, the third valve being coupled to the first valve and the second valve such that when the second valve is opened the third valve is opened to admit the chosen gas to the metering chamber.

7. Apparatus according to claim 6 wherein the first, second, and third valves are mechanically interconnected for conjoint movement.

8. Apparatus according to claim 7 wherein the first, second and third valves include a common movable member.

9. Apparatus according to any of claims 6 to 8 wherein the first, second and third valves are movable to a configuration in which all three valves are open.

10. Apparatus according to any preceding claim wherein the valves are movable to a configuration permitting continuous discharge of liquid from the vessel in association with continuous inflow of chosen gas.

11. Apparatus for dispensing a metered quantity of a liquid, substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

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