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Petranyi

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[45] **June 11, 1974**

[54] **APPARATUS FOR DISPENSING LIQUID FROM A LIQUID SUPPLY MANIFOLD**

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[73] Assignee: **DEC International, Inc.,** Madison, Wis.

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[52] **U.S. Cl.** **222/373**

[51] **Int. Cl.** **B67d 5/52**

[58] **Field of Search** 222/56, 61, 132, 51, 64, 222/373, 442, 444

[56] **References Cited**

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Primary Examiner—Stanley H. Tollberg

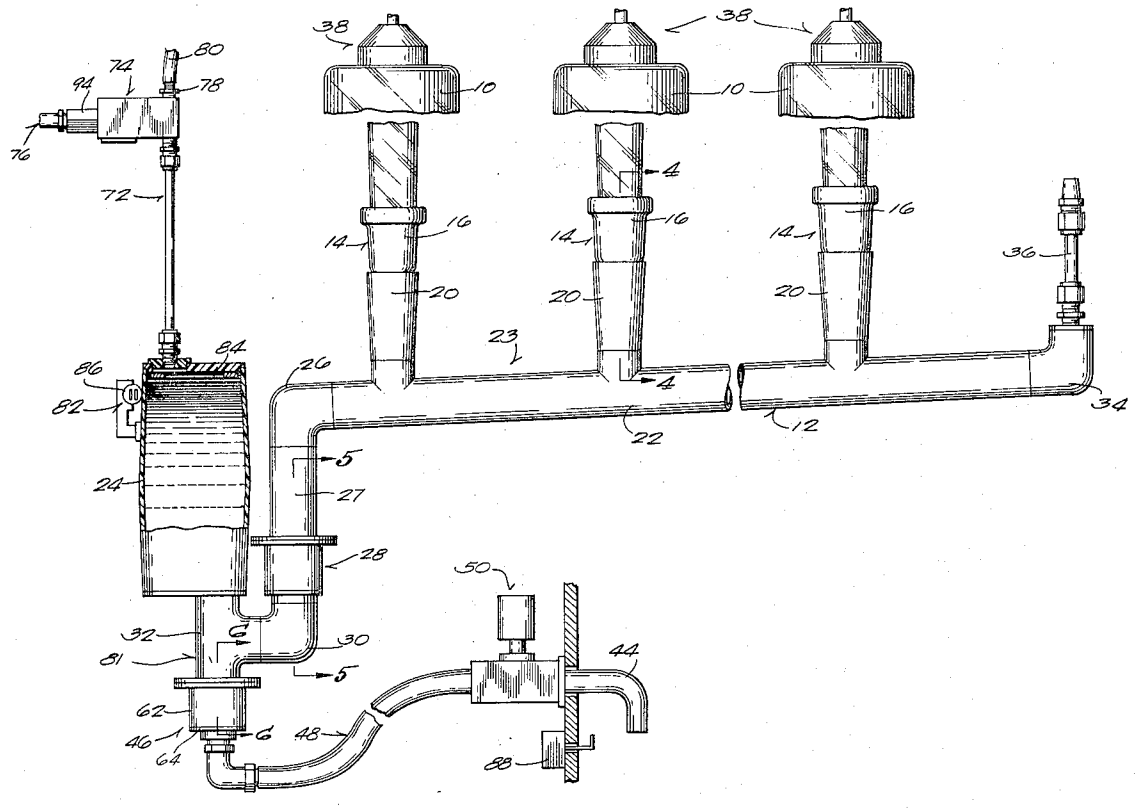
Attorney, Agent, or Firm—Michael, Best & Friedrich

[57] **ABSTRACT**

A liquid dispensing system including a liquid supply manifold connected to a liquid dispensing reservoir. A check valve is interposed between the manifold and the reservoir to permit liquid flow from the manifold to the reservoir and to prevent reverse flow from the reservoir to the manifold. A dispenser outlet is connected to the reservoir and a dispenser valve is provided thereat to control liquid flow from the dispenser outlet. A source of air under pressure is connected to the reservoir and a control valve is provided to alternately place the reservoir into communication with the source of air under pressure and then subsequently cut off the source of air pressure and place the reservoir into communication with the atmosphere. During the period the reservoir is placed in communication with the air under pressure, the liquid dispenser valve is opened to thereby cause a quantity of liquid to be dispensed from the reservoir out through the dispenser outlet.

The manifold assembly includes a plurality of liquid containers connected thereto with the container closest to the reservoir being at a lower elevation than the next adjacent container and so on up the line to the last container which is located at the highest elevation. The end of the reservoir adjacent the last container is open to the atmosphere. With this arrangement liquid flowing from the manifold to displace the liquid dispensed from the reservoir will be supplied first from the container at the highest elevation and then from the container at the second highest elevation and so on down the line to the container at the lowest elevation.

12 Claims, 9 Drawing Figures



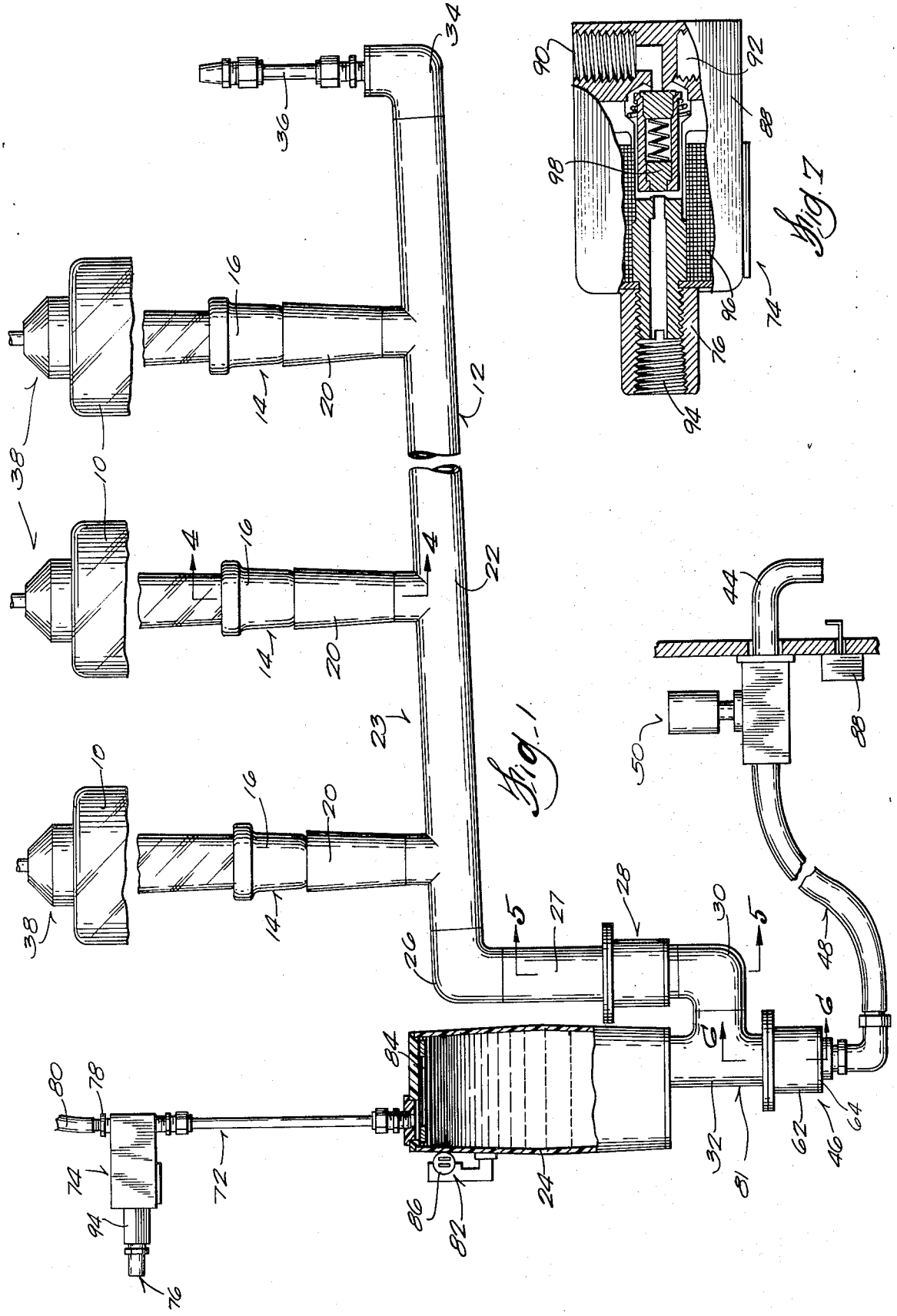

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Fig. 1

Fig. 7

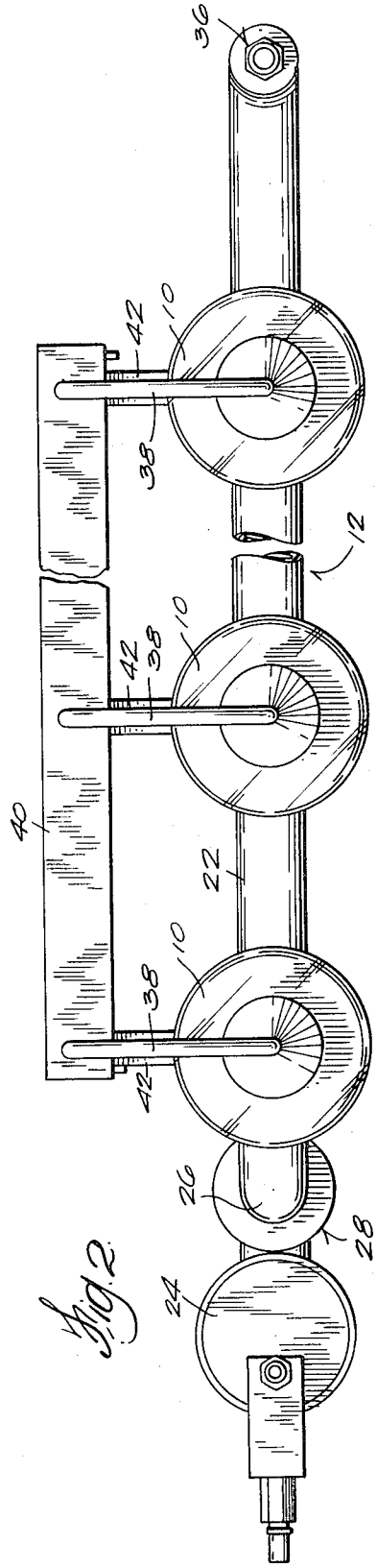


Fig. 2

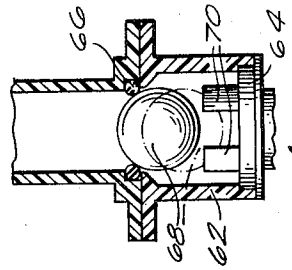


Fig. 6

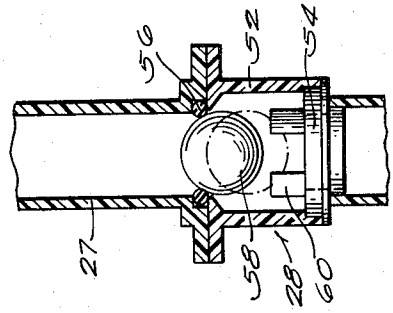


Fig. 5

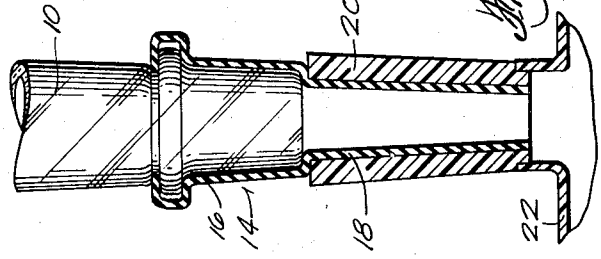


Fig. 4

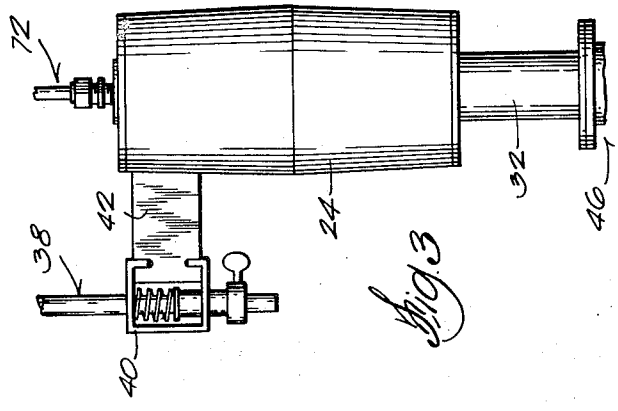
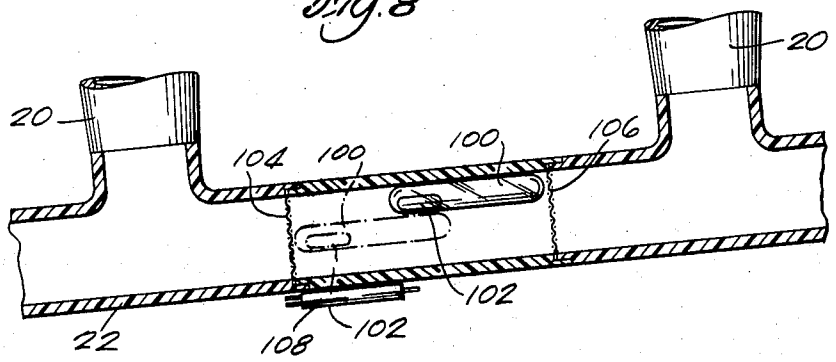


Fig. 3

Fig. 8



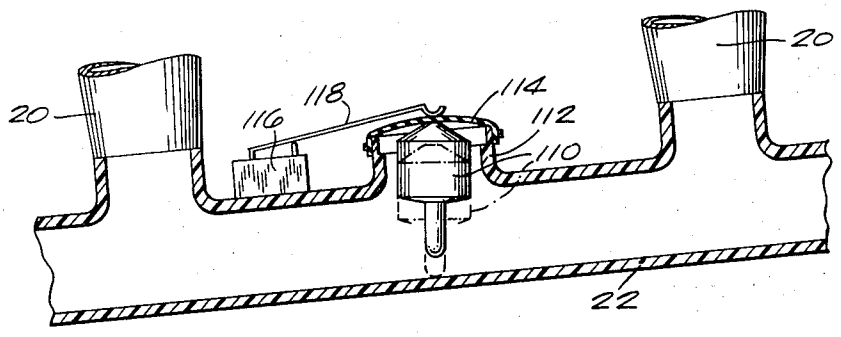


Fig. 9

APPARATUS FOR DISPENSING LIQUID FROM A LIQUID SUPPLY MANIFOLD

BACKGROUND OF THE INVENTION

I. Field of the Invention. This invention relates to a method and apparatus for dispensing liquid from a container and relates specifically to a system for dispensing liquor designed for use in bars, restaurants and similar establishments.

II. Description of the Prior Art. In many prior systems the liquor supply is placed under pressure for purposes of forcing it from the system through a liquid dispenser. This means, of course, that in replenishing the supply, care must be taken to shut off the air pressure at the point at which the supply is replenished. Furthermore, during operation care must be taken to prevent rupture of the liquor bottles due to excessive pressures. Also, in pressure systems of the type described above, the liquor bottles are generally connected in series wherein liquor from one bottle must pass through the next adjacent bottle and on through the system. Such an arrangement is objectional since it may be in violation of certain state statutes and local ordinances which prohibit the refilling and subsequent dispensing of liquor from a liquor bottle. The present invention eliminates these problems by providing a system wherein the liquor replenishing supply arrangement is designed to replenish the liquid dispensed from the system by gravity flow. The system also contemplates a manifold arrangement wherein the respective liquor bottles are emptied one at a time, there being no flow from one bottle to another. Finally, the system contemplates a dispenser reservoir which can be isolated from the supply manifold wherein liquid can be dispensed therefrom under pressure to provide a relatively fast pour which can be accurately controlled.

SUMMARY OF THE INVENTION

A liquid dispensing system comprising a liquid dispensing reservoir and a liquid supply container in fluid communication with the reservoir. A check valve is interposed between the supply container and the reservoir to permit flow by gravity from the container to the reservoir and to prevent reverse flow from the reservoir back into the supply container. A liquid dispenser conduit is connected to the outlet of the reservoir and at each dispensing station a valve is provided to control liquid flow from the reservoir. A source of air under pressure is connected to the liquid reservoir and a control valve means is provided to alternately place the reservoir into communication with the compressed air source and subsequently shut off such communication and place the reservoir in communication with the atmosphere to allow liquid to flow by gravity from the manifold to the reservoir to thereby replenish the liquid dispensed from the reservoir during the period it was connected to the compressed air source.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partially schematic side elevation view with certain parts broken away, showing the liquid dispensing system of the present invention;

FIG. 2 is a top plan view of the dispensing system shown in FIG. 1;

FIG. 3 is a fragmentary end elevation view of the system shown in FIG. 1;

FIG. 4 is a sectional view taken along line 4—4 of FIG. 1;

FIG. 5 is a sectional view taken along line 5—5 of FIG. 1;

FIG. 6 is a sectional view taken along line 6—6 of FIG. 1;

FIG. 7 is an enlarged view with parts broken away of the three-way solenoid operated control valve identified by reference numeral 74 in FIG. 1; and

FIGS. 8 and 9 are fragmentary side elevation views (with parts broken away) showing alternative arrangements for sensing the liquid level in the system.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings in detail, FIG. 1 shows the general layout of the system wherein a plurality of liquor bottles **10** (generally quarts or half-gallons) are mounted in an upside down position on a manifold assembly **12.**

The mounting procedure is as follows. After a full bottle of liquor is uncapped, a rubber nozzle **14** having a base portion **16** and a tip portion **18** (FIG. 4) is fitted over the bottle neck with the base portion **16** of the nozzle in sealed engagement with the bottle. To install a filled bottle on the manifold assembly **12,** the tip portion **18** is either bent over or pinched shut by the operator. The bottle is then inverted and the tip portion is slipped inside one of the spout members **20** of the manifold assembly **12.** The inside surface of spout **20** is tapered slightly to provide a sealed fit between the spout and the tip portion **18** of the nozzle **14.**

The bottles **10** are held securely in inverted position on the manifold by means of spring loaded clamp rod assemblies **38** which are adapted to engage and grip the bottom of each bottle **10.** As shown in FIG. **3,** assemblies **38** are supported on a channel member **40.** Channel member **40** and manifold assembly **12** are fastened together by means of a plurality of bracket members **42.** The number of bottles **10** mounted on a single manifold assembly will vary depending on the requirements of the application, space limitations and other factors.

The horizontal leg **22** of manifold assembly **12** communicates with the bottom portion of a reservoir **24** by means of an elbow **26,** a vertical tube **27,** a check valve assembly **28,** an elbow **30** and a tee **32.** The end of horizontal leg **22** of the manifold communicates with the atmosphere through an elbow **34** and a breather tube assembly **36** as shown in FIG. **1.** For reasons to be explained in detail hereinafter, leg **22** of the mainfold assembly is not exactly horizontal but instead slopes upwardly from left to right (as viewed in FIG. **1**) at an angle of approximately 2°–3°. The several filled bottles and manifold assembly can be considered together as a single liquid supply container means **23.**

The reservoir **24** also communicates with a liquid dispenser nozzle **44** through tee **32,** a check valve assembly **46,** a conduit means **48** and a solenoid operated valve means **50.** Check valve assemblies **28** and **46** may be of any suitable design. In the preferred embodiment valve assembly **28** (FIG. **5**) is comprised of a valve body **52,** a ball stop member **54** mounted in the lower end of body **52,** an O-ring member **56** mounted at the upper end of body **52** and a ball member **58** mounted inside body **52.** In operation ball **58** moves between an open position (shown in dotted lines) wherein the ball

rests on upstanding legs **60** of ball stop **54** and a closed position (shown in solid lines) wherein the ball is seated against the O-ring member **56.** Similarly, valve assembly **46** (FIG. **6**) is comprised of a valve body **62,** a ball stop member **64** mounted in the lower end of body **62,** an O-ring member **66** mounted at the upper end of body **62** and a ball member **68** mounted inside body **62.** In operation ball **68** moves between an open position (shown in dotted lines) wherein the ball rests on upstanding legs **70** of ball stop **64** and a closed position (shown in solid lines) wherein the ball is seated against the O-ring member **66.**

A tube assembly **72** is connected to the top portion of reservoir **24** and a three-way solenoid valve means **74** is connected to the end of the tube assembly. Valve **74,** when in its de-energized position, places tube assembly **72** and reservoir **24** into communication with the atmosphere through a breather tube **76.** When the valve **74** is energized, tube assembly **72** and reservoir **24** are placed into communication with a source of air under pressure (not shown) by means of a nipple **78** and a tube **80.** Since tube **72,** reservoir **24,** tee **32** and elbow **30** are in constant communication with each other they can be considered together as comprising a single dispensing reservoir means or system **81.**

A liquid level sensing means **82** is provided for sensing the level of liquid in reservoir **24.** In one embodiment (FIG. **1**) a sensing means is comprised of a floating magnetic member **84** and a reed switch means **86** mounted on the exterior of the reservoir as shown at the level at which it is desired to sense the liquid level. In operation when the level in reservoir **24** reaches the level of reed switch **86,** floating magnetic member **84** will activate the reed switch to its closed position. This will close an electric circuit and energize some kind of warning device such as a buzzer or warning light located at the dispensing station for the system.

FIGS. **8** and **9** show alternative arrangements for sensing the level of the liquid in the system. In the FIG. **8** embodiment a cigar-shaped hollow capsule **100** having a magnet **102** therein is positioned in the horizontal leg **22** of the manifold as shown. A pair of grate-like retainer members **104, 106** are provided to retain the capsule in the desired location. A reed switch **108** is mounted adjacent the lower surface of leg **22** and is electrically connected to some kind of a warning device. As the liquid level in the system drops, the capsule **100** and magnet **102** will descend closer and closer to switch **108** until the magnetic lines of force become great enough to acutate the switch.

In the FIG. **9** embodiment a plunger-like float **110** is mounted in a cylindrical housing **112** formed in the horizontal leg **22** of the manifold. A flexible membrane **114** is mounted across the top of housing **112** and is positioned to cooperate with an actuating arm **118** of a snap action switch **116** so that when the liquid level drops, float **110** will descend causing membrane **114** to be deflected downwardly by the arm **118.** Downward deflection of arm **118** will close switch **116** which in turn will energize a warning device.

While the construction of three-way valve means **74** can be of any suitable design, FIG. **7** shows one of the several acceptable types. As shown, valve **74** is comprised of a body **88** having three ports, **90, 92** and **94,** for connection to the source of compressed air, the reservoir tube **72** and the breather tube **76,** respectively. The valve contains a solenoid **96** for actuation of a splined valve plunger **98.** With the valve **74** de-energized (FIG. **7**) port **92** will communicate through the valve body with port **94** and under such condition port **90** will be shut off. When the valve is energized, solenoid **96** will actuate valve plunger to the left as viewed in FIG. **7** causing ports **90** and **92** to be placed in communication through the valve body and causing port **94** to be shut off.

OPERATION OF PREFERRED EMBODIMENT

To use the above described liquid dispensing system the manifold assembly **12** is first fully loaded with full bottles **10** of liquor. The particular procedure recommended for connecting individual bottles to the spouts **20** of the manifold assembly has been described previously. However, it should be pointed out that the preferred sequence for installing bottles is to start by connecting a full bottle to the spout **20** nearest reservoir **24** which is the spout at the lowest elevation and then to move to the next higher spout and then to the next higher spout and so on until the manifold has been completely loaded. The number of bottles which can be accommodated by the manifold **12** can vary depending on the length of the manifold. For most installations a six-bottle manifold will be suitable.

After the first bottle has been connected to the manifold described above, liquid will flow by gravity into the system, filling up reservoir **24** and horizontal leg **22** of the manifold assembly **12.** The reservoir is designed so that it will be filled to the top after about six bottles have been installed on the manifold. Tube **72** will start to fill up as additional bottles above six are added.

With bottles **10** connected to all manifold nozzles, the system is ready for use, however, the system could operate without a full complement of bottles in which event the empty spouts would be capped to keep out dust and dirt. To dispense liquid from the system the operator (the bartender in a liquor installation) will actuate a switch **88** (shown schematically in FIG. **1**) which is wired to simultaneously energize three-way solenoid valve **74** and the dispensing solenoid valve **50.**

As explained previously, energization of three-way valve **74** will place the liquid in tube **72** and reservoir **24** in communication with a source of compressed air. With dispensing valve **50** energized to its open position, the air pressure applied to the reservoir through valve **74** will cause liquid to flow under pressure from reservoir **24** through tee **32,** check valve assembly **46,** conduit **48,** valve **50** and then out through dispenser **44.** It will be appreciated that the flow under pressure from reservoir **24** will cause check valve **28** to close to thus prevent any flow of liquid back into the manifold. It will also be appreciated that upon initial start-up of the system, it will be necessary to actuate switch **88** several times to force liquid through conduit **48** to the dispenser **44.** This is particularly true where the elevation of dispenser **44** is at a higher elevation than the system.

The amount of pressure applied to the reservoir system **81** during the pressure dispensing cycle will vary depending primarily on the length of conduit **48** and the elevation of dispensing outlet **44** with respect to the rest of the system. For example, with a conduit length in the neighborhood of 200 feet and an elevation differential of about 12 feet a pour of one ounce in one second will require a pressure of about 25 p.s.i.g.

The amount of liquid which will be dispensed through dispenser outlet 44 will depend on the length of time valves 74 and 50 remain energized. This time interval can be controlled by the operator or if desired a timer means (not shown) can be employed to provide a predetermined period of energization (irrespective of how long switch 88 is depressed) which in turn will result in a predetermined amount of liquid dispensed each time the valves are energized by actuation of switch 88.

To terminate the dispensing phase of the overall operation valves 50 and 74 are de-energized simultaneously causing valve 50 to close and causing valve 74 to cut off communication between the reservoir and the source of compressed air and at the same time vent the reservoir by placing it in communication with the atmosphere through breather tube 76.

The closing of valve 50 will, of course, shut off flow of liquid through dispenser outlet 44. With valve 50 closed and with the reservoir vented to atmosphere, air will flow into the manifold system through breather tube 36 and will flow back through horizontal leg 22 of the manifold until it reaches the highest spout 20 at which point it will rise up through the liquid in the bottle, causing a displacement of liquid therefrom. The liquid displaced from the highest bottle will cause liquid to flow by gravity from the manifold through check valve 28 to thereby replace the liquid previously dispensed from the reservoir system 81 through dispenser outlet 44. When the entire system reaches equilibrium, all flow will stop.

It will be appreciated that as additional amounts of liquid are dispensed from the system in the manner described above, the dispensed amounts will continue to be displaced from the highest bottle (the bottle closest to breather tube 36) until such bottle is completely empty. After the highest bottle at the end of the manifold is emptied, the next highest bottle will be emptied and so on down the line until all bottles are emptied.

The presence of check valve 46 in the system is of particular importance in installations wherein dispenser outlet 44 is located at a substantially higher elevation than the rest of the system. This check valve 46 holds the column of liquid back when the line (or lines) to the dispenser station are initially filled and prevents flow back into the system in the event solenoid valve 50 develops a leak or fails to close for any reason.

In normal operation the system will usually be checked visually before all bottles are emptied. Assuming a system having a six bottle manifold, with four of the six bottles empty, to reload the system the operator simply removes the four empty bottles and replaces them with full bottles as described previously, keeping in mind that in doing so full bottles are connected to the lowest open manifold nozzle first and then up the line to the highest.

It is important to note at this point that empty bottles can be replaced with full bottles as described above without taking the system out of operation. This is because check valve 28 prevents back flow into the manifold during the pressure dispensing cycle of the operation. When this cycle is terminated, replacement liquid will flow by gravity into the reservoir system 81 from the then highest remaining bottle on the manifold in which liquid is still present.

The floating magnetic member 84 and reed switch 82 combination installed on reservoir 24 provide a means for alerting the operator when the liquid level in the system reaches a point wherein replenishment is necessary. The reed switch 82 is positioned at an elevation wherein a signal will be given at about the time the next to lowest bottle becomes empty. In the system shown in FIG. 1 this will be accomplished by positioning reed switch 82 at the upper portion of the reservoir as shown. The alternative liquid level sensing arrangements shown in FIGS. 8 and 9 function as described previously to provide the same general objective, namely, to alert the operator when the liquid level reaches a predetermined low level.

It will be appreciated from the foregoing description that the dispensing system shown and described provides a relatively simple, easily operated and effective arrangement for dispensing liquor and other liquids. The gravity feed displacement manifold eliminates the need for pressurizing the bottles and thus eliminates the possibility of bottle failure and the need for a complex valving arrangement to relieve the system of pressure for purposes of replacing empty bottles. The use of a pressure dispensing cycle for dispensing liquid makes it possible to provide a relatively fast pour wherein the volume dispensed can be accurately controlled.

I claim:

1. A liquid dispensing system comprising:
a liquid dispensing reservoir means;
a liquid supply container means in fluid communication with said reservoir means, said container means being vented to atmosphere;
a check valve means interposed between said container means and said reservoir means to permit liquid flow from said container means to said reservoir means and to prevent reverse flow from said reservoir means to said container means;
a liquid dispenser outlet means in fluid communication with said liquid dispensing reservoir means;
a liquid dispenser valve means adapted to control liquid flow through said outlet means;
a source of air under pressure connected to said liquid dispensing reservoir means;
a vent means to atmosphere connected to said liquid dispensing reservoir means; and
a control valve means associated with said liquid dispensing reservoir means, said source of air under pressure and said reservoir vent means, said control valve means operative to alternately place said reservoir means into communication with said source of air under pressure and subsequently cut off said source of air under pressure and place said reservoir means into communication with the atmosphere through said vent means.

2. A liquid dispensing system according to claim 1 in which there is a second check valve means located at the outlet from said liquid dispensing reservoir means to permit flow from said liquid dispensing reservoir means to said liquid dispenser outlet means and to prevent reverse flow from said outlet means to said reservoir means.

3. A liquid dispensing system according to claim 1 in which said liquid dispenser valve means and said control valve means are both actuated by electric solenoids, said solenoids being electrically connected to a single switch means so that they can be energized simultaneously.

4. A liquid dispensing system according to claim 1 in which said liquid supply container means is comprised

of a manifold assembly and a plurality of liquid containers removably connected to said manifold assembly with one end of said manifold assembly being connected to said liquid dispensing reservoir means and the other end of said assembly being vented to the atmosphere.

5. A liquid dispensing system according to claim **4** in which said liquid containers are mounted on said manifold in such a way so that the elevation of the container at said other end of said manifold assembly is higher than the next adjacent container and so on down the line of containers to the container at said one end of said manifold assembly, which container is at an elevation lower than all of the other containers.

6. A liquid dispensing system according to claim **5** in which said liquid containers are bottles which have been inverted and then connected to said manifold while in inverted position so that the liquid in said bottles will flow by gravity from said bottles into said manifold assembly and then into said liquid dispensing reservoir means.

7. A liquid dispensing system according to claim **1** in which said control valve means is comprised of a three-way valve having a first and second position, said valve operable when in said first position to place said liquid dispensing reservoir means into communication with said source of air under pressure and at the same time shut off communication between said reservoir and said reservoir vent means, said valve being further operable when in said second position to place said liquid dispensing reservoir means into communication with the atmosphere through said reservoir vent means and at the same time to cut off communication between said liquid dispensing reservoir means and said source of air under pressure.

8. A liquid dispensing system according to claim **1** in which there is a liquid level sensing means for sensing the level of the liquid in the system and for energizing a warning means when the liquid level reaches a predetermined level.

9. A liquid dispensing system according to claim **8** in which said liquid level sensing means is comprised of a floating magnetic member positioned within the liquid system and a reed switch means mounted on the exterior of the system adjacent said floating magnetic member, said magnetic member operable to actuate said reed switch means when the liquid level in the system reaches a predetermined level.

10. A liquid dispensing system according to claim **8** in which said liquid level sensing means is comprised of a float member mounted within the liquid system, a flexible membrane exposed to the exterior of the system and positioned for contact by said float member for movement in response to corresponding movement of said float member, and a switch means having an actuating arm operatively associated with said membrane for actuation of said switch means in response to movement of said membrane.

11. A liquid dispensing system according to claim **8** in which said control valve means is comprised of a three-way valve having a first and second position, said valve operable when in said first position to place said liquid dispensing reservoir means into communication with said source of air under pressure and at the same time to shut off communication between said reservoir and said reservoir vent means to thereby cause liquid to flow under pressure from said reservoir out through said dispenser outlet, said valve means further operable when in said second position to place said liquid dispensing reservoir into communication with the atmosphere through said reservoir vent means and at the same time to cut off communication between said liquid dispensing reservoir means and said source of air under pressure to thereby allow liquid to flow by gravity from said container means to said reservoir means.

12. A liquid dispensing system according to claim **11** in which said three-way valve and said liquid dispenser valve are operatively connected to each other so that when said three-way valve is actuated to its second position, said liquid dispensing valve will be actuated to its open position.

* * * * *

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,815,792 Dated June 11, 1974

Inventor(s) JOHN F. PETRANYI

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Change address of Inventor from "Calif." to --Wis.--

Column 3, line 50, "acutate" should read --actuate--.

Signed and sealed this 17th day of September 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents