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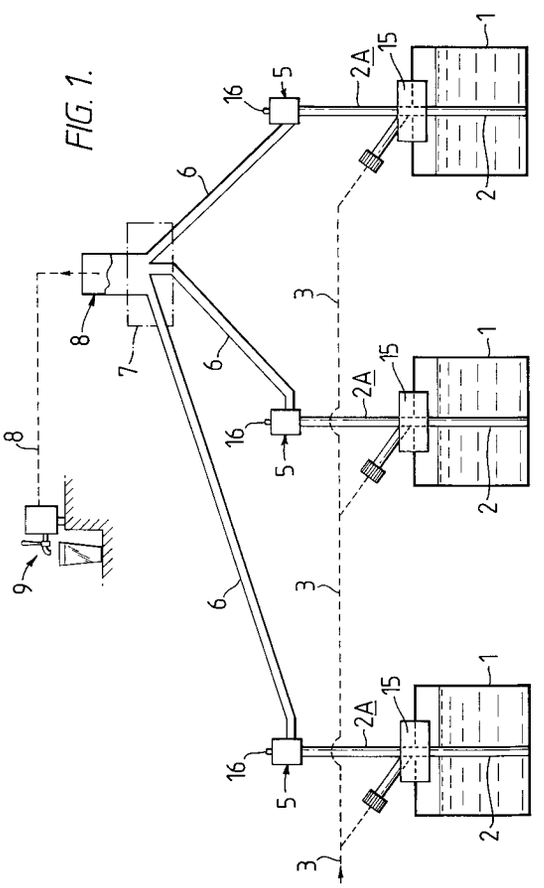
(54) A liquid dispensing system.

(57) A liquid dispensing system, primarily for beverage, has an array of containers 1 from which liquid is to be dispensed simultaneously by gas under pressure in the headspace of those containers. Liquid is dispensed from each container through an isolating valve 5 and a common delivery tube 8 to a dispensing tap 9. Each valve 5 includes a float which responds to density of fluid therein and when sensing liquid provides communication between its container 1 and the tap 9 and when sensing gas or foam therein from its container closes communication between its container and the tap 9. Alternative forms of isolating valves 5 may be used that are responsive to variations in electrical conductivity of fluid flow or variations in light absorption or refraction of fluid flow.

FIG. 1.



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TECHNICAL FIELD & BACKGROUND ART

The present invention relates to a liquid dispensing system and is particularly concerned with systems in which liquid is dispensed from a chamber of a container by displacement of the liquid with gas under pressure in the chamber. The invention was primarily developed for dispensing fermented beverages such as stout, lager, ale or other beer or cider from kegs, casks or other containers but can, advantageously, be applied to the dispensing of other liquids that are displaced from containers by pressurised gas which, typically, is introduced to the container from a remote gas pressure source.

In the dispensing of beverage such as beer from a keg in a retail premises for on-sales consumption it is frequently necessary for bar staff to have to remove an empty keg from the dispensing system and fit a full keg to the system at most inconvenient times. To alleviate this problem it has hitherto been proposed to provide a beverage dispensing system in which two or more kegs are incorporated in the system with sensing and electrically controlled valve switch mechanism which permits beverage to be drawn from a particular keg in the system, detects when that keg is empty of beverage and automatically switches so that dispensing of beverage commences and continues from the next full keg in the system. This process continues throughout all of the kegs in the system so that initially a relatively large reservoir of beverage may be available for dispensing and the empty kegs can be replaced by full ones at convenient intervals. However, such systems with automatic sensing and changeover valve switches are relatively expensive and generally require frequent maintenance and servicing.

A further proposal for a beverage dispensing system has several containers or kegs which are connected one with another in series and beverage is drawn from a first container in the series as gas under pressure is introduced into the end container of the series so that beverage flows from one container to another as the containers progressively empty from the end container along the series towards the first container. Again this provides a large reservoir of beverage for dispensing and permits the empty containers in the series to be replaced by full ones as convenient. However, the disadvantage of this latter system is that the first container in the series may never become empty and consequently not require changing so that this container can become a source of infection and contamination for beverage which is displaced through it from further new containers that may be fitted down the series.

It is an object of the present invention to provide a liquid dispensing system, primarily for beverage, which alleviates the disadvantages of the prior proposals.

STATEMENT OF INVENTION & ADVANTAGES

According to the present invention there is provided a liquid dispensing system comprising at least two containers simultaneously from which liquid is to be dispensed by gas under pressure through a dispensing control valve that is common for the containers, and wherein liquid flow from each container communicates with the control valve by way of an isolating valve that is discretely associated with that respective container, each said isolating valve being responsive to variations in fluid flow from its associated container and being arranged to open communication between its associated container and the control valve in response to liquid emanating from its associated container and reacting to close communication between its associated container and the control valve in response to gas or foam emanating from its associated container.

By the present invention it is envisaged that the liquid dispensing system, which, for convenience, will hereinafter be referred to as a beverage (such as beer) dispensing system, will provide for beverage to be dispensed simultaneously from all of the containers (such as kegs or casks) in the system when the dispensing control valve is open. In each case beverage will be dispensed from its respective container by gas under pressure in the headspace of that container; such gas will, in a typical arrangement, be derived from a gas ring main which is common for all of the containers (although each container may be provided with an individually associated source of gas under pressure such as a gas cylinder). Because of tolerance variations in manufacturing sizes for connecting pipes, conduits and valvery, it is extremely unlikely that all of the containers will empty of beverage at exactly the same rate - albeit that the rate of dispensing from each respective container may be substantially constant - and as a container empties of beverage gas or foam which is formed from the beverage in that container will be displaced to the isolating valve associated with that container. During normal dispensing of beverage the isolating valve, in response to beverage flow being detected from its associated container maintains communication between that container and the dispensing control valve. However, as the container empties and gas or foam is displaced from the container to its associated isolating valve the latter reacts and closes off communication between that particular empty container and the dispensing control valve so that the container is isolated in the system. Consequently as each container in the system becomes empty of beverage its associated isolating valve isolates that container from the dispensing control valve although other containers in the system may still have adequate beverage content to continue dispensing therefrom. By this proposal a large reservoir of beverage can be available initially for dis-

pensing so alleviating the requirement for frequent changing of empty containers; each container in the system will eventually empty and thus be likely to be replaced at regular intervals to alleviate contamination, and there is no requirement for expensive switching mechanisms which periodically change the system so that the dispensing valve will connect progressively from one container to another as the containers empty.

One or more of the isolating valves is preferably responsive to variations in density of fluid emanating from its associated container so that when the density of liquid is sensed the isolating valve is maintained open and when the lesser density of gas or foam is sensed the isolating valve is closed. With this in mind the isolating valve may be in the form of a simple float valve having a chamber within which a float is located so that the float responds to the density of the beverage, effectively to float in the chamber to a first condition in which communication is opened between a container and the dispensing valve and upon gas or fob entering the chamber the float effectively sinks in the decreased density environment to a second condition which causes communication between the container and the dispensing valve to be closed. The displacement of the float may serve to open or close flow control ports for the beverage from the container to the dispensing valve through the float chamber or may control a simple electrical system in which, say, the float has a magnet that triggers an electrical reed switch, to control actuation of a closure valve from the associated container to determine whether that container is isolated from the system or communicates with the dispensing valve.

Other forms of isolating valves may be employed, for example which provide the required response by sensing variations in electrical conductivity between liquid and gas or foam emanating from its associated container or by sensing variations in light absorption or diffraction between liquid and gas or foam emanating from its associated container.

DRAWINGS

One embodiment of a liquid dispensing system constructed in accordance with the present invention will now be described, by way of example only, with reference to the accompanying illustrative drawings, in which

Figure 1 schematically illustrates the system, and
Figure 2 diagrammatically illustrates an isolating valve associated one with each of the containers in the system.

DETAILED DESCRIPTION OF DRAWINGS

The system illustrated in Figure 1 is intended for the dispensing of beer from an array of kegs 1 of which three are shown. The beer may have nitrogen gas in solution so that during dispensing such gas evolves to provide a head of froth on the beer in known manner. The beer is to be dispensed from a chamber in each keg 1 by the admission of gas under pressure into the headspace of that chamber causing the beer to be displaced from the keg by way of a riser tube 2 which extends from adjacent the bottom of the beer chamber. Typically the gas under pressure will be nitrogen, carbon dioxide or a mixture thereof and be introduced into the headspace of each keg from a gas main 3 (that is common for all of the kegs) and possibly by way of a reducing valve 4 associated one with each keg (so that the gas which is introduced to the headspace will usually be at a pressure in the order of 2.3 bar). If required the gas main 3 can be replaced by separate sources of gas under pressure (such as gas cylinders) for the individual kegs.

The riser tube 2 of each keg communicates by way of an extension tube 2A with an isolating valve 5 which is discretely associated with that particular keg. Each isolating valve 5 communicates through a tube or conduit 6 and a connector/adaptor indicated at 7 with a main beer supply tube 8 for a bar mounted manually operable dispensing control valve or tap 9.

The three isolating valves 5 are of similar form as shown in Figure 2 comprising an upstanding chamber 10 having a side port 11 which communicates with the extension tube 2A from its associated keg and a bottom port 12 which communicates with the tube 6 that connects to the main delivery tube 8. Located within the chamber 10 is a float 13 having at its lower end a seal 14. The characteristics of the float are selected so that when the chamber 10 is substantially full of beer, the float 13 responds to the density of the beer and floats to a first condition clear of the port 12 as shown in Figure 2. However, when the chamber 10 is substantially empty of beer and contains gas or foam, the float 13 reacts to the lesser density and sinks to a second condition where its sealed end 14 closes the port 12 and thereby shuts off communication between the associated conduits 2A and 6 to prevent fluid flow from its respective container to the beer delivery tube 8.

During use of the system and with each keg 1 containing beer, when the control tap 9 is opened to dispense beer, gas pressure in the headspace of each keg displaces beer from that keg by way of tubes 2, 2A into and through the float chamber 10 of the respectively associated isolating valve 5 (thereby maintaining the float 13 in its first condition) and by way of the respective conduit 6 and the tube 8 to the dispensing tap 9 so that beer is simultaneously dispensed from the three kegs.

Because of variations in permitted tolerances for tubing sizes and valve structures it is likely that beer will be dispensed from the various kegs at different rates. As a keg empties of beer it will be appreciated

that froth or foam derived from the beer in that particular keg will eventually be displaced by the gas pressure through the tubes 2, 2A to enter the float chamber 10 thereby causing the float 13 to sink to its second condition and seal the port 12 to isolate the empty keg from the main delivery tube 8. This is achieved without interfering with dispensing from other kegs in the system which may still contain beer.

Full kegs 1 will usually be supplied for installation in the system fitted with the riser tube 2 and having a coupler 15 convenient for bar staff to connect the extension tube 2A and reducing valve 4 as appropriate for a particular keg. Although the system shown has three kegs the adaptor 7 provided on the main delivery tube 8 can be provided with any number of two or more connection ports to which conduits 6 from respective kegs may be connected. If required these connection ports for coupling to the tubes 6 can include closure valves to isolate a particular isolating valve 5 from the beer delivery tube 8 (as may be required for servicing of the isolating valves) or in the event that a particular connection port is not used.

By use of the system it is intended that empty kegs may quickly and simply be replaced by full kegs at convenient intervals. When a full keg is fitted to the system it is possible that the float chamber 10 will contain gas or foam so that the float 13 is in its second condition where the port 12 is closed by the float 13 and beer flow through the isolating valve is prevented. To alleviate this problem the isolating valve 5 includes at or towards the top of the float chamber 10 a vent valve 16 (see Figure 2) which is spring loaded or otherwise biased to normally close communication between the float chamber 10 and atmosphere but may be manually displaced temporarily to open such communication. When a full keg is connected to communicate with an isolating valve 5, the vent valve 16 of the isolating valve may temporarily be opened to permit gas or froth in its float chamber 10 to be displaced through the vent to atmosphere as beer from the keg enters and charges the float chamber 10 by way of the port 11 causing the float 13 to lift to its first condition and open the port 12 to permit dispensing from that particular keg.

It will be realised that the dispensing system illustrated is of a relatively simple structure and in practice conventional facilities (such as beer coolers, pump assistance for the beer dispensing and the like) frequently associated with known beer dispensing systems may be provided.

Claims

1. A liquid dispensing system comprising at least two containers simultaneously from which liquid is to be dispensed by gas under pressure through a dispensing control valve that is common for the containers, and wherein liquid flow from each container communicates with the control valve by way of an isolating valve that is discretely associated with that respective container, each said isolating valve being responsive to fluid flow from its associated container and being arranged to open communication between its associated container and the control valve in response to liquid emanating from its associated container and reacting to close communication between its associated container and the control valve in response to gas or foam emanating from its associated container.

2. A system as claimed in claim 1 in which said response of at least one isolating valve is determined by sensing variations in density of fluid flow from its associated container.

3. A system as claimed in claim 2 in which said at least one isolating valve comprises a float located within a float chamber and which is displaceable in response to variations in density of fluid in that chamber, said float being displaceable to a first condition in response to liquid in the float chamber to cause communication to be opened between its associated container and the control valve and being displaceable to a second condition in response to sensing a decreased density caused by gas or foam in its float chamber to cause communication to be closed between its associated container and the control valve.

4. A system as claimed in claim 3 in which the float in its second condition closes a port in the float chamber through which liquid is intended to flow from that float chamber to the dispensing control valve.

5. A system as claimed in claim 3 in which the displacement of the float controls an electrical system which determines opening and closure of valve means so that said valve means is open in the first condition of the float to open communication between its associated container and the control valve and is closed in the second condition of the float to close communication between its associated container and the control valve.

6. A system as claimed in any one of claims 3 to 5 in which the float chamber has a vent valve by which that chamber may temporarily be opened to atmosphere for venting therefrom gas or foam during initial charging of the chamber with liquid to displace the float into its said first condition.

7. A system as claimed in claim 1 in which said response of at least one isolating valve is deter-

mined by sensing variations in electrical conductivity between liquid and gas or foam emanating from its associated container.

8. A system as claimed in claim 1 in which said response of at least one isolating valve is determined by sensing variations in light absorption or diffraction between liquid and gas or foam emanating from its associated container.

9. A system as claimed in any one of the preceding claims in which the isolating valves for the respective containers communicate by way of an adaptor with a common liquid delivery tube to the dispensing control valve, said adaptor permitting isolating valves and respectively associated containers to be added to or removed from the system.

10. A system as claimed in any one of the preceding claims in which gas under pressure for dispensing liquid from each container is provided from a gas main that is common for all of the containers and communicates with the headspace formed by the liquid in the respective containers.

11. A system as claimed in any one of the preceding claims for dispensing beverage such as beer or cider.

FIG. 1.

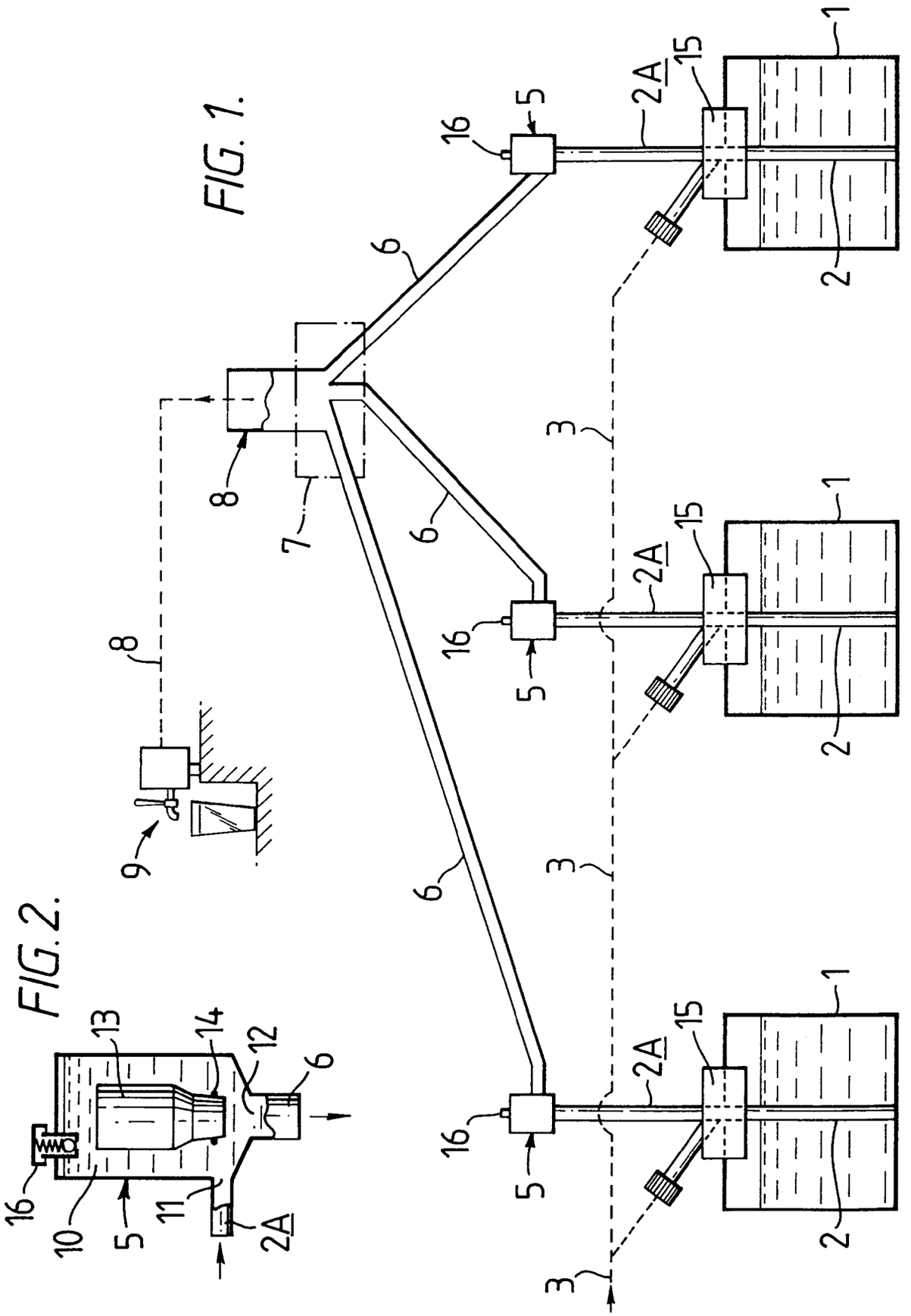

FIG. 2.

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EUROPEAN SEARCH REPORT

Application Number
EP 93 30 6707

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
X Y	US-A-3 878 970 (J. NEZWORSKI) * column 2, line 58 - column 7, line 53 * * figures 1-3 * ---	1-4,6, 9-11 5,7,8	B67D1/12
Y A	US-A-4 305 527 (J. MCMILLIN ET AL.) * column 2, line 62 - column 3, line 50 * * figure 1 * ---	5 1-3,9-11	
Y	DE-B-10 28 519 (PHILIPP HILGE KELLEREIMASCHINEN-FABRIK) * column 1, line 30 - line 42 * -----	7,8	
			TECHNICAL FIELDS SEARCHED (Int.Cl.5) B67D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	26 November 1993	Smolders, R

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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