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Fuqua

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[54] **METHOD AND APPARATUS FOR AUTOMATICALLY TERMINATING DISPENSING OF BEVERAGE WHEN SUPPLY IS EMPTY**

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[51] **Int. Cl.** **B67d 1/12**

[58] **Field of Search** 222/57, 61, 66, 55, 222/59, 14, 2; 137/12, 486, 487, 460, 498, 188; 194/13

[56] **References Cited**

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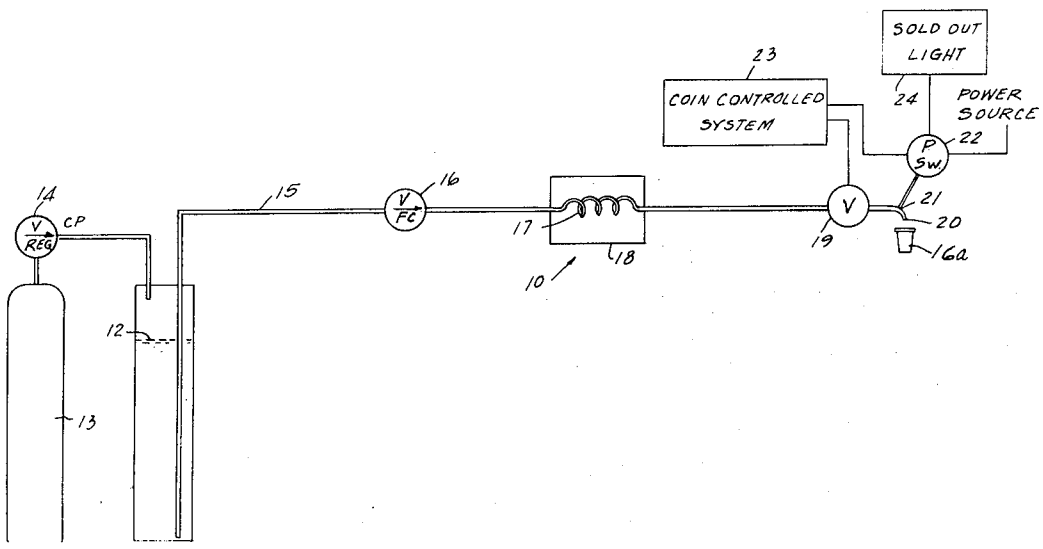
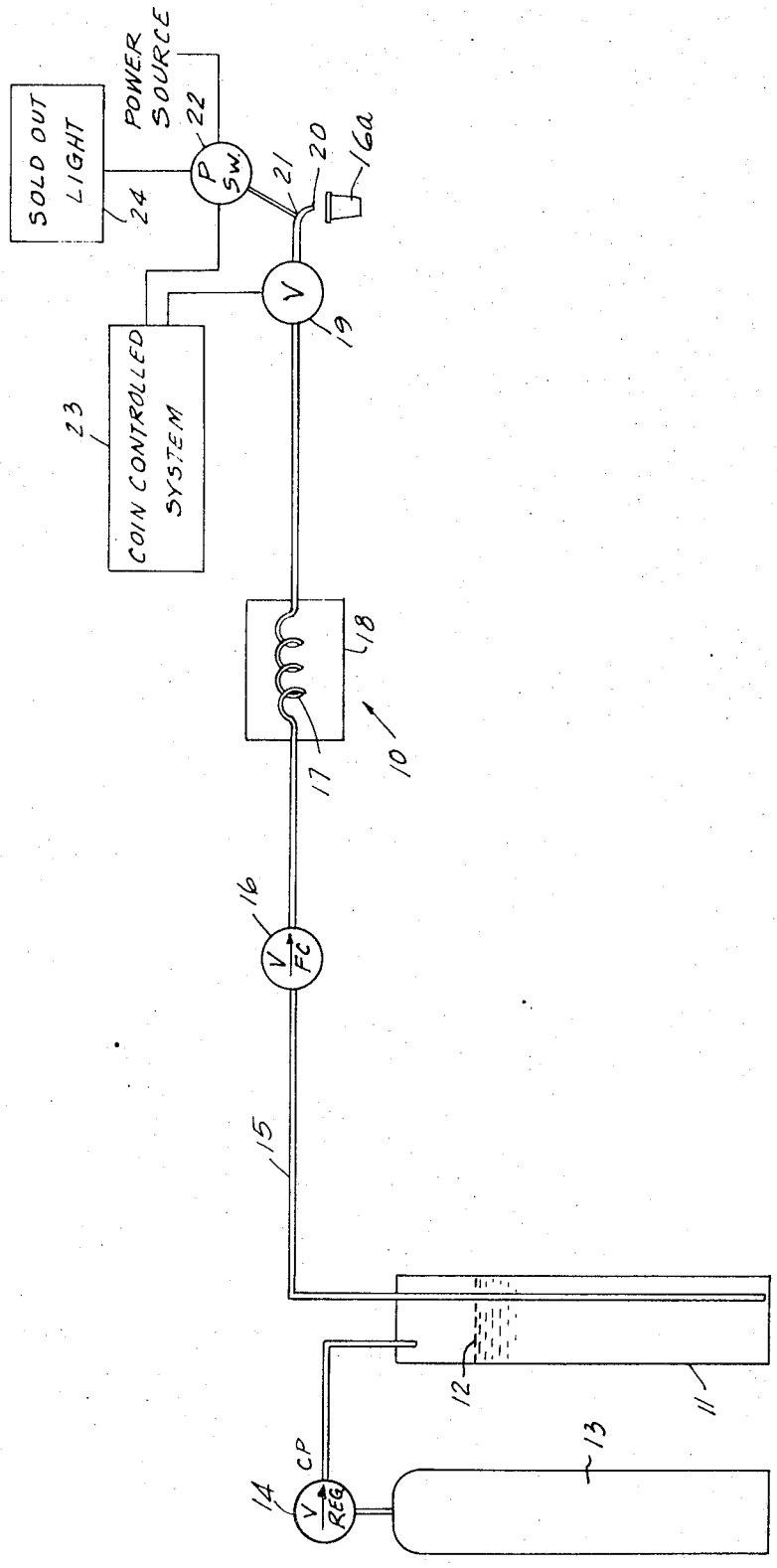
[57] **ABSTRACT**

A beverage dispensing system includes a supply of beverage or beverage ingredient which is subjected to gas pressure and which is conducted through a dispensing line through various components that cause a pressure drop and thence to a dispensing valve. When the supply of beverage is exhausted, pressurized gas in place of beverage passes through the line and raises the pressure upstream of the dispensing valve and also downstream of the dispensing valve where a subseqauent flow restrictor is provided. The increase in pressure is sensed by a pressure switch that disables the dispensing valve and activates "sold-out" indicating means.

12 Claims, 1 Drawing Figure




SOLD OUT LIGHT
POWER SOURCE
22
P SW
21
20
16a
24
V
19
23
COIN CONTROLLED SYSTEM
18
10
17
16
V FC
15
12
11
13
CP
14
V REG

METHOD AND APPARATUS FOR AUTOMATICALLY TERMINATING DISPENSING OF BEVERAGE WHEN SUPPLY IS EMPTY

BACKGROUND

This invention pertains to a beverage dispensing system which may comprise a line for handling pre-mix beverage, or which may comprise the syrup line in a post-mix system, and more particularly to means for sensing the absence of such liquid.

PRIOR ART

It has been known heretofore to employ a float switch in a beverage line connected to take appropriate remedy in the absence of liquid that it senses. Reliable float switches are relatively costly, and are not always trouble-free.

SUMMARY OF THE INVENTION

The present invention utilizes a manually resetable pressure switch that senses an increase in line pressure remotely from the source which takes place when gas as distinguished from beverage is conducted through such line.

Accordingly, it is an object of the present invention to provide an improved beverage dispensing system.

A further object of the present invention is to provide a means for sensing the absence of a liquid or liquid ingredient in the system.

A further object of the present invention is to provide a simple low-cost means for disabling the system in the absence of the liquid and/or indicating the absence of such liquid.

Many other advantages, features and additional objects of the present invention will become manifest to those versed in the art upon making reference to the detailed description and the accompanying sheet of drawings in which a preferred structural embodiment incorporating the principles of the present invention is shown by way of illustrative example.

ON THE DRAWING

The drawing is a diagrammatic view of a beverage dispensing system provided in accordance with the principles of the present invention.

AS SHOWN ON THE DRAWING

The principles of the present invention are particularly useful when embodied in a beverage dispensing system such as illustrated in the drawing, generally indicated by the numeral **10.** The system **10** includes a tank **11** containing a supply **12** of stored beverage or beverage ingredient. The term "beverage" as used herein is intended to be generic to pre-mix beverage, beverage syrup and the like. The tank **11** is pressurized by carbon dioxide gas obtained from a pressure vessel **13** having a pressure regulator **14** that normally is set to deliver a constant pressure, typically on the order of **30** psi. From the tank **11,** a line **15** extends to a cup **16*a*** disposed in a beverage dispensing station of a beverage dispensing machine. In the line **15,** there are various components including a constant flow-rate control valve **16,** a cooling coil **17** disposed within refrigeration means **18** and a dispensing valve **19.** Where the beverage comprises syrup, the dispensing valve **19** is of the mixing type, the line for water not being illustrated herein. The dispensing valve **19** discharges to the cup

16*a*. In this embodiment, there is an orifice **20** provided which serves as a flow restrictor. With the valve **19** open, the effective flow size at the restrictor **20** is preferably less than that anywhere along the length of the line.

In a typical embodiment, the constant flow-rate control valve will permit 40 cc's of beverage to flow in 7 seconds, and under such flow conditions, with a pressure of 30 psi at the inlet, there will be a pressure of about 10 psi at the outlet. The pressure drop from 10 psi to atmospheric is distributed between the remainder of the line, the cooling coil **17,** the dispensing valve **19** and the flow restrictor **20.** It is thus evident that at a point **21** just upstream of the flow restrictor **20,** the pressure is atmospheric when the dispensing valve **19** is closed, and is normally not much above atmospheric when the dispensing valve **19** is open. However, when the supply **12** of liquid beverage or beverage ingredient is exhausted, gas instead of liquid enters the line **15** and the constant flow-rate control valve **16** has practically no significant pressure drop thereacross, and the pressure at the point **21** rises dramatically to about 15 psi.

Pressure responsive means **22,** here comprising a latching type of pressure switch, is connected to sense the pressure at the point **21** and this great increase in pressure is noted and a single-pole double-throw switch therein is actuated so as to remove power from a coin controlled system **23** and hence to remove power from the dispensing valve **19,** and to deliver power to means for indicating that the supply of liquid beverage has been exhausted, such as a "sold-out" light **24.**

With liquid flowing in the line, there is a pressure drop caused by the line itself and by each component that is connected in series in the line so that the pressure switch **22** and point **21** can be placed downstream of one of these pressure drop means, provided that it is followed by another component downstream which will cause a restriction to gas flow to enable the pressure switch **22** to be actuated. With liquid not flowing in the line, the point **21** is so disposed as to be substantially at atmospheric pressure.

As the pressure switch **22** is of the latching type, when the pressure is gone, its switch will remain in the latched-out position. It thus is of the manual reset type and the service man who refills the tank **11** to place the system back in service manually resets the pressure switch **22** that is normally inaccessible to the public. Thus during a latched condition of the pressure switch **22,** the coin controlled system will not accept additional coins, as is well known.

The pressure switch **22** thus senses a normal pressure at a point in the system during dispensing, the pressure at that point being somewhat less than the setting of the pressure regulator **14.** Because of pressure drop owing to the viscosity of the liquid, this normal pressure is relatively low. However, with liquid absent from the system, and the viscosity of gas being negligible, when the liquid is absent, by having been dispensed, the various pressure drops in the line disappear or greatly decrease so as to increase the pressure at the sensing point whereupon the controls **23** are disabled to close the valve **19** until the system is again serviced.

The disclosed apparatus operates in accordance with a method wherein gas is supplied at a predetermined pressure to a supply of the beverage, and during normal dispensing, a normal pressure is sensed at a point in the system which then has a pressure less than the gas pres-

sure. However, when the liquid is exhausted, there is an increase in said normal pressure during dispensing or attempted dispensing and this increase in pressure is utilized to automatically shut down the system.

Although various minor modifications might be suggested by those versed in the art, it should be understood that I wish to embody within the scope of the patent warrented hereon, all such embodiments as reasonably and properly come within the scope of my contribution to the art.

I claim:

1. In a method for automatically dispensing a beverage in a system, the steps comprising:

a. applying gas to a supply of the beverage at a predetermined pressure;

b. from time to time, withdrawing servings of beverage from said supply in response to said pressure;

c. during normal dispensing, sensing the normal pressure at a point in the system which then has a pressure less than that upon said supply; and

d. automatically shutting down the system in response to increase in said normal pressure during dispensing.

2. A system for automatically dispensing a beverage, comprising:

a. a tank for storing a supply of the beverage, and arranged to be connected to a supply of pressurized gas;

b. a line for conducting beverage from said supply;

c. a dispensing valve connected to said line;

d. controls connected to said valve for operating it; and

e. pressure responsive means connected to a point in said line for sensing the normal pressure at such point during dispensing, and responsive to an increase in such normal pressure to disable said controls and to close said dispensing valve.

3. A system according to claim **2** including a constant flow -rate control valve for regulating the flow rate of beverage in said line, said point being downstream of said flow-rate control valve.

4. A system according to claim **2** including a cooling coil in said line and having a pressure-drop thereacross during dispensing, said point being downstream of said cooling coil.

5. A system according to claim **2** including a beverage flow restrictor in said line, said point being upstream of said flow restrictor.

6. A system according to claim **2** including a constant flow-rate control valve and a cooling coil in series with said dispensing valve, and a beverage flow restrictor downstream of said dispensing valve, said point being between said dispensing valve and said flow restrictor.

7. In a method for automatically dispensing a beverage in a system according to claim **1**, the step of regulating the flow rate of beverage withdrawn from the supply.

8. A system according to claim **2** in which said pressure responsive means is of the latching manual reset type to maintain the disablement of said controls.

9. In a method for automatically dispensing a beverage in a system according to claim **1**, the step of cooling the beverage upstream of said point subsequently to withdrawing it from the supply.

10. In a method for automatically dispensing a beverage in a system according to claim **1**, the step of restricting the flow of beverage downstream of said point whereby said increase is enhanced.

11. A system according to claim **5** in which said flow restrictor is an orifice vented to atmosphere downstream of said point.

12. A system according to claim **2** including means in said line causing a pressure drop during beverage flow, and a gas flow restrictor downstream thereof, said point being therebetween.

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