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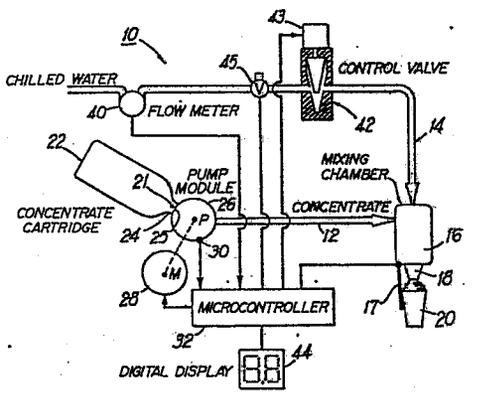
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(54) **Juice dispensing system.**

(57) An orange juice dispensing system including a peristaltic pump (26) driven by a d.c. motor (28) for pumping concentrate through a concentrate conduit (12) to a mixing chamber (16) of a dispensing valve (18), a water line (14) for feeding water to the mixing chamber and including a flow meter (40) and a motorized control valve (42) therein, sensors (30) connected to the pump for sensing concentrate flow rate, and a microcontroller (32)receiving signals from the pump sensors and the water flow meter for controlling the mixture ratio and flow rate by controlling the motorized control valve in the water line and the d.c. motor connected to the concentrate pump. The concentrate is preferably contained in a non-returnable, plastic, semi-rigid container (22).



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Description

JUICE DISPENSING SYSTEM

This invention relates to a system for reconstituting and dispensing juice, and in a preferred embodiment thereof to an orange juice dispensing system that controls the mixture ratio and flow rate.

Postmix orange juice dispensing systems are known; however, such known systems do not provide a satisfactorily controlled mixture ratio. For example, it is known to use constant pressure on a concentrate reservoir to provide a constant flow rate. However, the desired result is not achieved because orange juice concentrate viscosity changes with the season, and with the types of oranges picked, and also because pressure regulators vary slightly which also varies the flow rate. It is also known to use a peristaltic pump for the concentrate, however, it has been found that such pumps are limited in the distance that they will pull concentrate because of the viscosity of the concentrate. It is also known to use gravity feed of concentrate from a reservoir located above the dispensing valve, and to use an automatic flow control refill system for the reservoir. However, such systems occupy a large area of counter space, which is often not acceptable.

According to the present invention there is provided apparatus for reconstituting and dispensing juice, comprising:

(a) a peristaltic pump having an inlet port for receiving juice concentrate;

(b) a mixing chamber for mixing water and concentrate and for dispensing the mixture therefrom as a beverage;

(c) a concentrate conduit extending from said pump to said mixing chamber;

(d) a water line connected to said mixing chamber;

(e) means for sensing the water flow rate and the concentrate flow rate; and

(f) means for controlling at least one of said flow rates to control the mixture ratio of the beverage dispensed from said mixing chamber.

Preferably the apparatus includes a plastic, semi-rigid, non-returnable concentrate container connected to the said pump, such as the well known PET soft drink bottle . However, a reusable container can also be used.

An embodiment of the invention will now be described by way of example and with reference to the accompanying drawings, in which the single Figure is a partly diagrammatic, partly schematic illustration of a system for reconstituting and dispensing orange juice in accordance with the present invention.

The drawing shows a dispensing system 10 wherein juice concentrate and water are fed through a concentrate conduit 12 and a water line 14, respectively, to a mixing chamber 16 having a nozzle 18 for dispensing the resulting beverage into a cup 20.

The juice concentrate is preferably delivered to a restaurant in a semi-rigid, non-returnable, plastic container 22 having a spout, fitting, opening or neck 24. The neck 24 connects to an inlet port 25 of a peristaltic pump 26. The container 22 is vented to atmosphere (such as by an opening 21 in the neck 24 large enough to admit air but not large enough to allow liquid to flow therethrough) and is oriented (inverted) to provide a gravity head for the peristaltic pump 26. A motor 28, preferably a d.c. motor, is connected to and drives the peristaltic pump 26. One or more sensors 30 detect the movement of the pump's rollers (not shown). The period between the sensing of the rollers is proportional to the concentrate flow rate. The sensors 30 are connected to a microcontroller 32 which includes control electronics for sensing the period of the peristaltic pump 26 and the concentrate flow rate.

A flow meter 40 is connected in the water line 14 for measuring the water flow rate. Pulses from the flow meter are proportional to the water flow rate. The flow meter is connected to the microcontroller 32 which contains control electronics for sensing the flow meter pulses.

The microcontroller 32 compares the water flow meter pulses and the peristaltic pump pulses. The microcontroller 32 can vary the speed of the peristaltic pump's d.c. motor 28. The control of the peristaltic pump can thus provide the desired volumetric flow rate of concentrate to maintain the desired mixture ratio.

In a preferred embodiment, the water line 14 also contains a motorized control valve 42, operated for example by a d.c. stepping motor 43. The microcontroller 32 can control the mixture ratio and flow rate by controlling both the d.c. motor 28 and the motorized control valve 42. In addition, the water line 14 includes a solenoid controlled on-off valve 45 controlled by the microcontroller 32. The on-off valve 45 is opened when a lever arm 17 is actuated and is closed when the juice dispensing is completed.

The actual reconstituting of the metered water and concentrate is done in the mixing chamber 16. The resulting beverage is then dispensed through the nozzle 18 into a cup 20. The reconstituting can use either a static or a dynamic mixer.

It is also preferred to provide a digital display 44 connected to the microcontroller 32 which continuously displays the mixture ratio being controlled by the microcontroller 32 so that an operator can tell at a glance if the dispensing system 10 is operating properly. If the display changes from a desired ratio to an unacceptable ratio (for example, when the container 22 becomes empty), the operator can manually turn off the system 10, or alternatively the microcontroller can include means for automatically terminating further flow of water and concentrate.

In an alternative embodiment, the system 10 can include the motorized control valve 42 but no d.c. motor 28 (some other motor means can be used to drive the pump 26). The mixture ratio is then controlled by controlling just the motorized control valve 42.

While a preferred embodiment of this invention

has been described in detail, it is to be understood that variations and modifications can be made therein without departing from the scope of the present invention as set forth in the appended claims. For example, while a particular concentrate container is described, others can be used. For example, a rigid bottle can be used or a flexible bag-in-box can be used with suitable coupling means, and for a rigid bottle, with suitable vent means. Other means can be used for the flow meter, control valve, gravity head and pump port than the particular ones shown.

It is to be clearly understood that there are no particular features of the foregoing specification, or of any claims appended hereto, which are at present regarded as being essential to the performance of the present invention, and that any one or more of such features or combinations thereof may therefore be included in, added to, omitted from or deleted from any of such claims if and when amended during the prosecution of this application or in the filing or prosecution of any divisional application based thereon. Furthermore the manner in which any of such features of the specification or claims are described or defined may be amended, broadened or otherwise modified in any manner which falls within the knowledge of a person skilled in the relevant art, for example so as to encompass, either implicitly or explicitly, equivalents or generalisations thereof.

Claims

1. Apparatus for reconstituting and dispensing juice, comprising:

(a) a peristaltic pump having an inlet port for receiving juice concentrate;

(b) a mixing chamber for mixing water and concentrate and for dispensing the mixture therefrom as a beverage;

(c) a concentrate conduit extending from said pump to said mixing chamber;

(d) a water line connected to said mixing chamber;

(e) means for sensing the water flow rate and the concentrate flow rate; and

(f) means for controlling at least one of said flow rates to control the mixture ratio of the beverage dispensed from said mixing chamber.

2. Apparatus as claimed in claim 1 wherein said sensing means comprises sensors in said pump for detecting the concentrate flow rate therethrough, and including a d.c. motor connected to said pump for driving said pump, and a microcontroller for varying the speed of said d.c. motor for controlling the concentrate flow rate through said pump to maintain the desired mixture ratio.

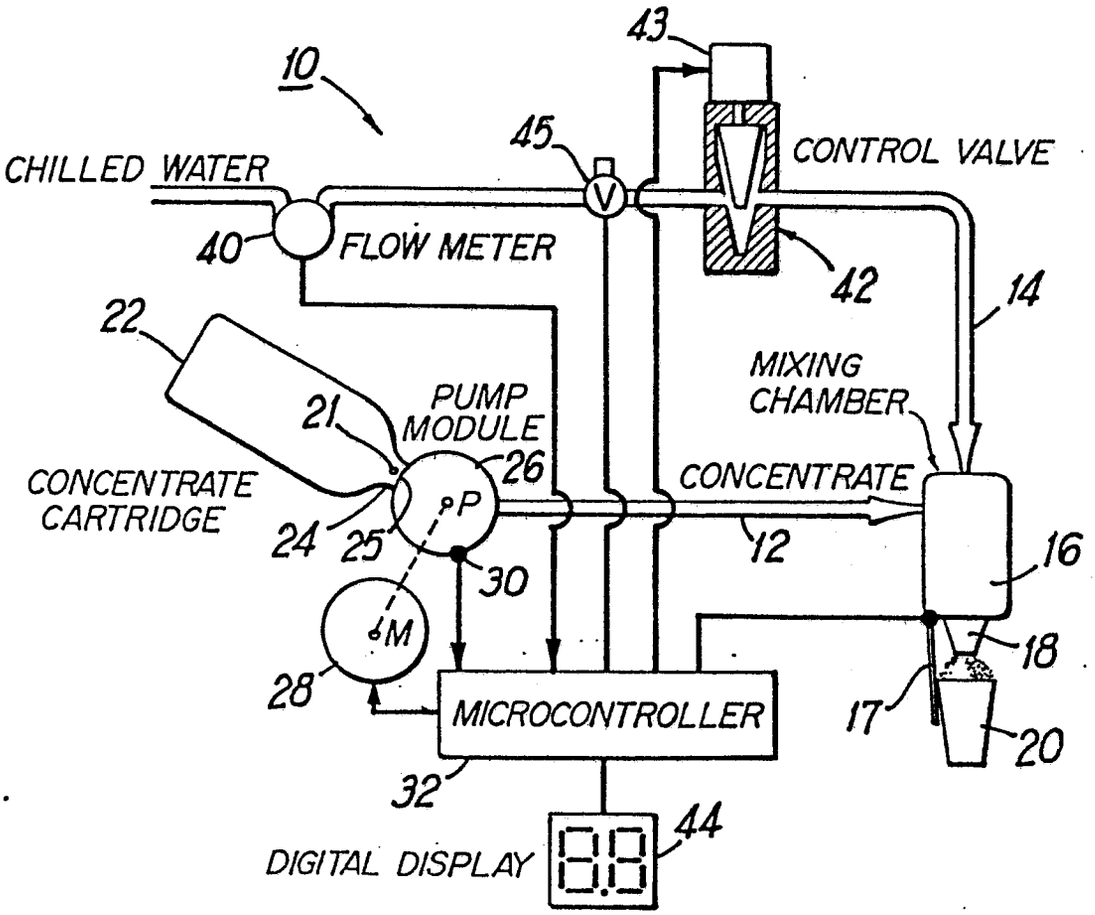
3. Apparatus as claimed in claim 1 wherein said sensing means includes a flow meter in said water line for measuring the water flow rate, a motorized control valve in said water line, and a microcontroller for maintaining the desired mixture ratio by adjusting said motorized water control valve.

4. Apparatus as claimed in claim 3 wherein said sensing means includes sensors in said pump for detecting the concentrate flow rate therethrough, a d.c. motor connected to said pump for driving said pump, and wherein said microcontroller includes means for maintaining said desired ratio by controlling both said d.c. motor and said motorized control valve.

5. Apparatus as claimed in claim 4 wherein said microcontroller also includes means for controlling the total flow rate to said mixing chamber.

6. Apparatus as claimed in any preceding claim including a semi-rigid, non-returnable concentrate container connected to said pump, and means for venting said container to atmosphere.

7. Apparatus as claimed in claim 6 wherein said container is connected to said pump in an inverted position.


10
43
45
CONTROL VALVE
CHILLED WATER
V
40
FLOW METER
42
14
22
MIXING
CHAMBER
21
PUMP
MODULE
26
CONCENTRATE
CONCENTRATE
CARTRIDGE
P
24
25
12
16
30
M
18
28
MICROCONTROLLER
17
20
32
DIGITAL DISPLAY
44
88

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EUROPEAN SEARCH REPORT

Application Number

EP 87 30 9573

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.4)
Y	GB-A-2 146 620 (SCHWEPPES) * Page 2, line 37 *	1,3	B 67 D 1/00 B 67 D 1/12
Y	WO-A-8 302 935 (SIGNET SCIENTIFIC CO.) * Abstract; figure 2 *	1,3	
A	GB-A- 970 220 (LICENTIA) * Page 2, lines 78-109; figures *	2,4	
A	GB-A-2 020 631 (LUIGI GOGLIO) * Page 1, lines 60-76 *	6,7	
A	GB-A-2 033 333 (COCA-COLA) * Whole document *	6,7	
A	CH-A- 449 427 (SCHNYDER) * Whole document *	6,7	
A	US-A-4 053 901 (SKAFVENSTEDT et al.) * Whole document *	6,7	
A	DE-A-1 909 012 (SPECTRA ANALYZER)		TECHNICAL FIELDS SEARCHED (Int. Cl.4)
A	EP-A-0 176 318 (JET SPRAY CORP.)		B 67 D F 04 B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	18-01-1988	SCHELLE,J.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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