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(54) **Beverage dispense system**

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Description

[0001] This invention relates to beverage dispense and more especially, the invention concerns the dispense of post-mix beverages such as colas and flavoured sodas in which a concentrate such as a syrup or flavour is mixed with a diluent, typically still or carbonated water, at the point of dispense.

[0002] The concentrate and diluent are typically mixed in the correct proportions in a post-mix dispense valve for dispense of the beverage at a dispense outlet of a counter top fitting such as a dispense tower. The tower may have multiple outlets for the dispense of the same or different beverages.

[0003] Usually the beverage ingredients are delivered to the tower in separate supply lines from remote sources of the ingredients. Typically, the diluent supply lines pass through a cooler for dispense of chilled beverages. The cooler is often positioned well away from the serving area and the diluent lines are contained in an insulated sheath known as a python to prevent the diluent warming up between the cooler and the tower. The concentrate lines are also contained in the python and may be passed through the cooler.

[0004] Chilled post-mix soft drinks such as colas and flavoured sodas are typically dispensed by mixing a diluent with a concentrate in a ratio of approximately 5:1. Dispense of a drink having a temperature of about 4 to 5°C can be achieved if the diluent temperature is about 2°C and the concentrate temperature is about 14°C. Accurate control of the diluent temperature in particular is desirable to maintain the required temperature and this can be a problem during periods of high cooling demand when several drinks are dispensed one after another.

[0005] For this reason, many dispense systems are designed to meet these requirements which in practice may only occur for a limited period of time each day. As a result, for a large part of each day when the cooling demand is low, the system is operating under conditions that are not required to meet the cooling demand. This is inefficient, is wasteful of energy and adds to operating costs. As energy costs rise and the environmental effects of inefficient use of energy increase, there is a need for the design of beverage dispense systems that are more efficient and make better use of available energy.

[0006] It is known from US-A-5279446 and GB-A-2291698 to pump coolant through a coolant circuit within a python to cool product lines in the python and to control a pump circulating the coolant in response to coolant temperature.

[0007] A beverage dispense system according to the preamble of claim 1 is known from US 2003/0071060 A.

[0008] The present invention seeks to provide a system for dispensing beverages, particularly soft drinks and more especially post-mix soft drinks.

[0009] It is a preferred object of the invention to provide such a system that can provide one or more benefits and advantages from reduced energy consumption, simplified

installation, less syrup waste and easier sanitisation.

[0010] According to a first aspect of the invention, there is provided a beverage dispense system as defined in claim 1. Preferred features of the system are defined in dependent claims 2 to 6.

[0011] By controlling the pump speed in response to the temperature of the cooling fluid, the circulation of the cooling fluid can be higher during periods of high cooling demand than during periods of low cooling demand thereby reducing power consumption during periods of low cooling demand.

[0012] The cooling circuit may provide cooling for one or more concentrate lines. In a system for dispensing post-mix beverages, the concentrate lines may contain a concentrate such as a syrup or flavour for mixing with a diluent such as still or carbonated water to produce a desired beverage. In this arrangement, the cooling circuit may form part of the dispense circuit and contain diluent for mixing with concentrate that has been cooled by the diluent prior to dispense. Alternatively, the cooling circuit may be separate from the dispense circuit and contain a coolant for cooling both the concentrate and diluent.

[0013] According to a second aspect of the invention, there is provided a method of controlling the pump speed in the beverage dispense system as defined in claims 1-6, and as defined in claim 7.

[0014] Other features, benefits and advantages of the invention in each of its aspects will be understood from the description hereinafter of an exemplary embodiment given by way of example only, with reference to the accompanying drawings in which:-

Figure 1 is a schematic lay-out of a beverage dispense system embodying the invention;

Figure 2 is a view, to an enlarged scale, showing details of the syrup cooling in the dispense tower of the system shown in Figure 1;

Figure 3 is a view, to an enlarged scale, showing a modification of the system of Figure 1;

Figure 4 is a view, to an enlarged scale, showing details of the cooler for the system of Figures 1 and 3; and

Figures 5 and 6 show details of the python shown in Figure 1.

[0015] Referring first to Figure 1 of the drawings, a post-mix beverage dispense system is shown comprising a manifold valve block 1 provided with a plurality of post-mix dispense valves generally designated by the reference number 3. In this embodiment, the manifold valve block 1 has six dispense valves 3a, 3b, 3c, 3d, 3e, 3f but it will be understood that the number of dispense valves may be chosen according to requirements.

[0016] The dispense valves 3 are connected by indi-

vidual supply lines generally designated by the reference number 5 to separate supplies of a concentrate generally designated by the reference number 7. In this embodiment, there are six supply lines 5a,5b,5c,5d,5e,5f and six supplies of concentrate 7a,7b,7c,7d,7e,7f - one for each dispense valve 3a,3b,3c,3d,3e,3f. It will be understood, however, that this arrangement is not essential and that the number of supply lines and supplies of concentrate may be varied according to the number of dispense valves and the beverage requirements. For example, two or more dispense valves may be connected to a common supply of concentrate for dispense of the same beverage.

[0017] The manifold valve block 1 is also connected to a diluent re-circulation line or loop generally designated by reference number 9 for supplying diluent to each of the dispense valves 3a,3b,3c,3d,3e,3f for mixing with concentrate at the point of dispense to deliver a desired beverage to a container such as a glass, cup or the like placed under an outlet (not shown) of the associated dispense valve 3a,3b,3c,3d,3e,3f. In this embodiment, the re-circulation loop 9 contains carbonated water (often referred to as "soda" water) for dispense of carbonated post-mix beverages from the dispense valves 3. It will be understood, however, that this is not essential and that any other suitable diluent may be employed such as still water for dispense of non-carbonated drinks such as fruit juices.

[0018] The dispense valves 3 are configured to mix carbonated water and concentrate in the relative proportions required for the beverage to be dispensed. The relative proportions may vary for different beverages and the valves are configured individually on initial set-up according to the beverage to be dispensed. Such configuration may be carried out manually or automatically. For example, the dispense valves 3 may be controlled by a programmable controller such as a microprocessor that allows the relative proportions of diluent and concentrate to be set on an individual basis at any time by a service engineer. The controller may also control other functions of the dispense system via a suitable user interface for operating the dispense valves 3 according to customer selection of a desired beverage. Alternatively, the dispense valves 3 may be manually operable.

[0019] The diluent re-circulation loop 9 includes a carbonator tank 11 and a circulation pump 13 driven by an electric motor 14. The carbonator tank 11 is provided at a location remote from the manifold valve block 1, for example in a storage area such as a cellar or cold room, and in this embodiment, is immersed in a bath of chilled water provided by an ice bank cooler 15. Chilled carbonated water is pumped around the re-circulation loop 9 from the carbonator tank 11 to the manifold valve block 1 and back to the carbonator tank 11. The carbonated water returning to the carbonator tank 11 passes through a cooling coil 17 immersed in the chilled water bath of cooler 15 to cool the carbonated water prior to re-entering the carbonator tank 11.

[0020] Between the cooler 15 and the manifold valve block 1, the re-circulation loop 9 is contained in an insulated sheath 19 (commonly referred to as a "python") and the temperature of the carbonated water returning to the carbonator tank 11 is monitored by a temperature sensor 20 provided before the cooling coil 17 for a purpose described later herein.

[0021] The carbonator tank 11 has an inlet connected to a source of still water such as mains water via a supply line 25 for adding still water to the carbonator tank 11 to replace carbonated water that has been dispensed when the water level in the carbonator tank 11 falls to a predetermined minimum. The upper and lower water levels in the carbonator tank 11 are controlled by level sensors (not shown) that also control operation of a pump 27 in the water supply line 25 to boost the water pressure for addition to the carbonator tank 11 where it is simultaneously carbonated by injecting a supply of carbonating gas into the water stream as it is added to the carbonator tank 11.

[0022] The pressure of carbonating gas in the headspace above the water level in the carbonator tank 11 is maintained at a level sufficient to prevent the carbonating gas coming out of solution so that the desired carbonation level of the carbonated water circulating in the carbonated water re-circulation loop 9 is maintained. Typically, the carbonating gas is carbon dioxide but other gases such as nitrogen may be employed and the term "carbonating" gas is to be construed accordingly.

[0023] The water supply line 25 passes through a cooling coil 29 immersed in the chilled water bath of the cooler 15 upstream of a T-junction 31 for supply of chilled water to either the carbonating tank 11 or to a coolant re-circulation line or loop 21 according to demand. Cooling the still water before it is added to the carbonator tank 11 assists the carbonation process to achieve the desired carbonation level in the carbonated water for dispense of carbonated beverages from the dispense valves 3.

[0024] The coolant re-circulation loop 21 passes from the cooler 15 to a cooling module 32 adjacent to the manifold valve block 1 for cooling concentrate supplied to the manifold valve block 1 in the supply lines 5a,5b,5c,5d,5e,5f. The cooling module 32 has a chamber 33 with an inlet connected to the re-circulation loop 21 to receive chilled water from the cooler 15 and an outlet connected to the re-circulation loop 21 to return the water back to the cooler 15. The return flow of water passes through a cooling coil 35 immersed within the chilled water bath of cooler 15. The water is circulated around the coolant loop 21 by a pump 23. Between the cooler 15 and the coolant chamber 33, the coolant re-circulation loop 21 is contained in the insulated sheath 19 and the temperature of the water returning to the cooler 15 is monitored by a temperature sensor 39 provided before the cooling coil 35 for a purpose described later herein.

[0025] The manifold valve block 1 and coolant chamber 33 are contained in a beverage dispenser, for example in a dispense tower (not shown), provided at a location

remote from the cooler 15 such as a bar or similar serving area where the tower may be located on a counter top for connection to the various supply lines 5 for the concentrates 7, and the re-circulation loops 9 and 21 for carbonated water and coolant. The re-circulation loop 9 may supply carbonated water to more than one tower 1 in the same or different serving areas. Alternatively or additionally, the carbonator tank 11 may supply carbonated water to separate re-circulation loops 9 for supply to more than one tower. Similarly, the re-circulation loop 21 may supply coolant to more than one tower 1 in the same or different serving areas. Alternatively or additionally, separate re-circulation loops 21 may be provided for supply of coolant to more than one tower. All combinations and configurations are possible according to the number and position of the towers.

[0026] Referring now to Figure 2, the arrangement for cooling the concentrate supplied to the tower 1 is shown in more detail. Most post-mix beverages contain approximately 85% of diluent and 15% of concentrate. In many existing dispense systems the concentrate is cooled by passing the supply lines to the dispense tower in the python. This increases the cooling demand in the python resulting in an energy consumption to cool the soda in the soda re-circulation loop 9 that is higher than actually required to achieve and maintain the required concentrate temperature. For example, at a dispense rate of 4 drinks per minute, the energy to cool the concentrate (syrup) is 10 kcal. A 20 metre python containing six concentrate supply lines contains 10 litres of concentrate and the energy consumption is 10W/m or 1750 KWh per year.

[0027] To reduce the energy consumption for cooling the concentrate, the present invention removes the concentrate lines from the python and cools the concentrate in the dispense tower. More specifically, the concentrate is cooled within the tower immediately prior to dispense and the supply lines 5 passing through the coolant chamber 33 contain a significantly lower volume of concentrate that is subjected to cooling compared to existing systems in which the concentrate supply lines are contained in the python 19.

[0028] As shown, the concentrate supply lines 5a,5b,5c,5d,5e,5f pass through the coolant chamber 33 within the tower to the manifold valve block 1. The chamber 33 is insulated to prevent heat exchange between the coolant in the chamber 33 and the warmer surroundings in the serving area. The carbonated water re-circulation loop 9 by-passes the coolant chamber 33 and is connected to the manifold valve block 1 within the tower 1.

[0029] The coolant re-circulation loop 21 is connected to the chamber 33 for circulating chilled still water through the chamber 33 to cool the concentrate delivered in supply lines 5a,b,5c,5d,5e,5f to the dispense valves 3a,3b,3c,3d,3e,3f. The chamber 33 is provided with an internal flow guide 37 that directs the flow of coolant through the chamber 33 to optimise heat exchange with

the concentrate supply lines 5a,5b,5c,5d,5e,5f passing through the chamber 33.

[0030] In this embodiment, the flow guide 37 comprises a partition wall that divides the chamber 33 into an inlet chamber 33a and an outlet chamber 33b. Coolant from the re-circulation loop 21 enters the inlet chamber 33a at the lower end of the coolant chamber 33. The coolant is confined by the flow guide 37 to flow upwards to the upper end of the coolant chamber 33 where it flows across the partition wall into the outlet chamber 33b. The coolant is confined by the flow guide 37 to flow downwards to the lower end of the coolant chamber 33 where it exits the coolant chamber and returns to the re-circulation loop 21.

[0031] In this embodiment, three of the concentrate supply lines pass through the inlet chamber 33a and the other three concentrate supply lines pass through the outlet chamber 33b. It will be understood, however that other arrangements of the concentrate supply lines 5 may be employed as desired. For example, while the lines are shown extending linearly through the coolant chamber 33, this is not essential and other configurations of the concentrate lines within the coolant chamber 33 may be employed such as coils to increase the surface area available for heat transfer to achieve the desired cooling of the concentrate. Furthermore, it will be understood that other configurations of coolant chamber 33 may be employed to direct the flow of coolant over the concentrate supply lines 5 to achieve the desired cooling of the concentrate.

[0032] As will be appreciated, the above arrangement reduces the length of the concentrate supply lines 5a,5b,5c,5d,5e,5f which reduces syrup wastage and makes sanitisation of the lines easier. Also, the concentrate sources can be sited close to the dispense tower, for example on a shelf under the counter top in the serving area, which simplifies replacement of the concentrate sources.

[0033] Typically, the concentrate and diluent are mixed in a ratio approximately of 1:5 and a temperature of approximately 4 to 5°C in the dispensed beverage can be achieved with a concentrate temperature of around 14°C where the diluent temperature is about 2°C. Passage of the concentrate supply lines 5 through the cooling chamber 33 is generally sufficient to achieve the necessary cooling of the concentrate without passing the concentrate lines 5 through the python 19 or the cooler 15.

[0034] The syrup cooling requirement in the cooling chamber 33 is dependent on a number of factors including the ambient temperature and beverage dispense while heat gain in the carbonated water circuit is dependent on a number of factors including the ambient temperature, the python (length, insulation, number of tubes etc) and beverage dispense.

[0035] Existing beverage dispense systems are typically designed to meet the higher cooling demand that arises during periods when beverages are being dispensed (dispense mode) than in periods when no bev-

erages are being dispensed (stand-by mode). Many dispense systems, however, are only operable in the dispense mode for about 20% of the day (less than 4 hours) and for the remaining 80% of the day (more than 20 hours) the system is in the stand-by mode. As a result, designing the system to meet the cooling demand in the dispense mode leads to a significant waste of energy in the stand-by mode.

[0036] To reduce this heat gain, the present invention provides temperature sensors 20 and 39 to monitor the temperature of the return flows of carbonated water in the diluent re-circulation loop 9 from the manifold valve block 1 to the carbonator tank 11 and of still water in the coolant re-circulation loop 21 from the cooling chamber 33 to the cooler 15. The temperatures detected by the sensors 20,39 are used to control operation of the re-circulation pumps 13,23 respectively. In this embodiment both pumps 13,23 are twin-speed pumps driven by electric motors 14,40 respectively that are switched from low speed, for example 800 rpm, to high speed, for example 1400 rpm, when the temperature of detected by the associated sensor 20,39 rises above a pre-set temperature, for example 2°C for the carbonated water and 2°C for the still water. It will be understood, however, that other motor speeds and/or temperatures may be employed to take account of factors such as the cooling requirement, and other design parameters of the system.

[0037] More specifically, the system is designed so that, in periods of low cooling demand when the temperatures of the carbonated water and still water in the re-circulation loops 9,21 are below the pre-set temperatures such as in the stand-by mode or in periods of low dispense, the re-circulation pumps 13,23 are switched to the low speed to reduce energy consumption and, in periods of high cooling demand, if the temperatures of the carbonated water or still water in the re-circulation loops 9,21 rise above the pre-set temperatures, such as in the dispense mode or at higher ambient temperatures, the associated re-circulation pump 13,23 is switched to the high speed to meet the increased cooling demand. In this way, operation of the re-circulation pumps 13,23 is more energy efficient leading to cost savings.

[0038] It will be understood that the pumps 13,23 may be a twin-speed pumps for selection of high or low speeds as described or one or both pumps may be a variable speed pump such that the pump speed can be adjusted to provide high and low speeds and any intermediate speeds as desired.

[0039] Where a variable pump speed is permitted, this may be controlled by a suitably programmed microprocessor or other control system responsive to the temperature detected by the sensors 20,39.

[0040] In a modification (not shown), the coolant re-circulation loop 21 is also connected to the manifold valve block 1 which can be designed so that each dispense valve can selectively dispense a mixture of concentrate and either carbonated water from re-circulation loop 9 or still water from re-circulation loop 21 or a mixture of both

carbonated water and still water. In this way, carbonated drinks, or still drinks or drinks with a variable carbonation level can be dispensed. Alternatively, the manifold valve block 1 may be designed so that one or more dispense valves can dispense the carbonated water and the or each of the remaining dispense valves can dispense the still water. In another modification (not shown), one or more dispense valves may be configured to dispense diluent only, for example to dispense still or carbonated water without any concentrate. Other arrangements that can be employed will be apparent to those skilled in the art.

[0041] Referring now to Figure 3, a modification of the above-described system is shown in which like reference numerals are used to indicate corresponding parts.

[0042] In this modification, the still water re-circulation line or loop 21 in Figure 1 is omitted and the coolant chamber 33 is connected to the diluent re-circulation line or loop 9. In this way, the chilled carbonated water supplied to the manifold valve block 1 also passes through the coolant chamber 33 to cool the syrup supplied to the manifold valve block 1 in the concentrate supply lines (not shown in Figure 3 for clarity). In this way, one re-circulation loop can be used both to supply diluent to the manifold valve block and to cool the concentrate. The operation of this modified system is similar to that of Figure 1 and will be understood from the description already provided. With this arrangement, the system only dispenses carbonated drinks. It will be understood, that the system of Figure 1 could be adapted so as to dispense only still drinks by omitting the carbonated water re-circulation loop 9 in Figure 1 and connecting the still water loop 21 to the manifold valve block 1.

[0043] Referring now to Figure 4, the arrangement of the ice bank cooler 15 is shown in more detail. Known ice bank coolers typically comprise a bath containing water that is cooled by placing an evaporator of a refrigeration circuit in the bath so that ice forms on the evaporator during periods of low cooling demand to provide a thermal reserve for periods of high cooling demand during which the ice melts to provide additional cooling. A sub-zero ice bank may be produced by the use of an additive that suppresses the freezing point of water. For example an aqueous mixture of water with glycol, a salt, antifreeze or other suitable material added to the water in the bath.

[0044] Usually, the evaporator is situated close to the side wall of the bath and the water in the bath is circulated by an agitator driven by an electric motor to wash across the surface of the ice bank on the inwardly facing side of the evaporator to melt the ice during periods of high demand. Washing across one side of the ice bank reduces the available surface area for cooling during periods of high demand which reduces efficiency.

[0045] Also many systems employ an agitator and motor combination that is designed to circulate the water to meet the cooling requirement during periods of high cooling demand. As previously mentioned, this is wasteful of energy as the high cooling demand mainly arises during

the dispense mode which is only in operation for about 20% of the day with the remainder being the stand-by mode when the cooling demand is much lower.

[0046] To improve cooling efficiency, the present invention provides the ice bank cooler 15 with an evaporator coil 41 spaced away from the side wall of the bath so that water circulated by the agitator 43 washes across both sides of the coil 41 as shown by the arrows thereby doubling the available surface area of the ice bank 44 that forms on the coil 41 for the additional cooling required during periods of high demand.

[0047] To obtain the benefit of the larger available surface area of the ice bank 44, the circulation of the water within the bath requires improved performance of the agitator 43. As a result, more power is required to operate the agitator 43 during periods of high demand and the present invention employs a temperature sensor 45 to monitor the temperature of the water in the bath and control operation of a motor 47 driving the agitator 43 in response to the water temperature.

[0048] In this embodiment, the motor 47 is a twin-speed motor that is switched from low speed, for example 1500 rpm, to high speed, for example 3000 rpm, when the temperature of the water detected by the sensor 45 rises above a pre-set temperature, for example 1°C. It will be understood, however, that other motor speeds may be employed to take account of factors such as the cooling requirement, the capacity of the cooler and other design parameters of the system.

[0049] In this way, in periods of low cooling demand when the temperature of the water in the water bath is below the pre-set temperature such as in the stand-by mode or in periods of low dispense, the motor 47 is switched to the low speed to reduce energy consumption and, in periods of high cooling demand when the temperature of the water in the water bath circuit rises above the pre-set temperature such as in the dispense mode, the motor 45 is switched to the high speed to operate the agitator 43 to meet the increased cooling demand. In this way, operation of the agitator and motor combination is more energy efficient leading to cost savings.

[0050] It will be understood that the agitator 43 may be driven with a twin-speed motor for selection of high or low agitation speeds as described or a variable speed motor may be employed such that the agitator speed can be adjusted to provide high and low speeds and any intermediate speeds as desired. Where a variable agitator speed is permitted, this may be controlled by a suitably programmed microprocessor or other control system responsive to the temperature detected by the temperature sensor 45.

[0051] Referring now to Figures 5 and 6, there is shown an alternative python design. In the traditional python design, the diluent lines, concentrate lines and coolant lines are bundled together within an insulated sheath. The diameter of the python is dependent on the number and size of individual lines that are wrapped within the sheath. The diameter of the python increases with increased

number of lines with the result that construction, handling and installation of the python becomes more difficult and the available surface area of the python for heat transfer from ambient increases.

[0052] In the alternative design the python construction is simplified by removing the concentrate lines through the provision of cooling for the concentrate in the dispense tower and forming lines 49,51 for the diluent and coolant respectively as a single extrusion 53 that can be cut to the required length, formed into an annular configuration as shown by the arrows, surrounded with insulation 55 and provided with quick-fit connectors (not shown) at both ends for attaching the diluent and coolant lines 49 and 51 respectively to matching connectors on the cooler 15 and the dispense tower.

[0053] In this way, pythons having any desired length can be made from a common extrusion and provided with the appropriate fluid connections at each end for connection to matching connectors on the cooler 15 and dispense tower 1 when the python is installed. This is easier than bundling several separate fluid lines together within an insulation sheath. Also, the overall diameter of the python can be reduced thereby reducing the weight of the python making handling and installation easier and reducing the surface area for heat exchange with the environment. Alternatively or additionally, the python can have insulation of increased thickness to reduce heat exchange with the environment without increasing the overall diameter of the python compared to existing python designs.

[0054] As will be appreciated, the above-described system has a number of advantages and benefits. For example lower energy consumption by reducing the heat gain and controlling the speed of the motors driving the re-circulation pumps and agitator in response to the temperature of the water in the re-circulation loops and water bath respectively. Also easier sanitisation of the concentrate lines and less wastage of concentrate in the concentrate lines can be achieved by removing the concentrate lines from the python and providing shorter concentrate lines from the concentrate sources to the dispense tower. This also allows easier replacement of the concentrate sources by enabling the concentrate sources to be placed below the dispense tower within the serving area. Also reduced installation time may be possible by the use of a customised python that can be connected to the diluent and coolant lines by multi-port block connectors during installation.

[0055] While the invention has been described with particular reference to the dispense of soft drinks, it will be understood that the invention is not limited to such application and the invention could be employed for the dispense of alcoholic drinks such as cocktails.

Claims

1. A beverage dispense system for a post-mix beverage

age obtained by mixing a concentrate with still or carbonated water, the system employing a cooling loop (9;21) in which still or carbonated water is circulated between an ice bank cooler (15) and a beverage dispenser at a dispense location remote from the cooler (15), the cooler (15) comprising a chilled water bath and the cooling loop (9; 21) including a cooling coil (17;35) immersed in the chilled water bath, a pump (13;23) for circulating the still or carbonated water in the loop (9;21), **characterized in that** the system further employs a temperature sensor (20; 39) for monitoring the temperature of the return flow of the still or carbonated water, wherein the pump speed is controlled in response to the temperature of the still or carbonated water, a manifold valve block (1) having a plurality of dispense valves (3) and a cooling module comprising a coolant chamber (33) are contained in the beverage dispenser, the manifold valve block (1) is connected to the cooling loop (9;21) for supplying still or carbonated water to each of the dispense valves (3), the coolant chamber (33) is insulated and has an inlet and an outlet connected to the cooling loop (9;21), and the dispense valves are connected to concentrate lines (5) passing through the coolant chamber (33), wherein concentrate in the concentrate lines (5) is cooled by heat exchange with still or carbonated water within the coolant chamber (33) prior to mixing the concentrate with still or carbonated water supplied to the dispense valves (3) to dilute the concentrate and produce a post-mix beverage.

2. A beverage dispense system according to claim 1 wherein, the pump (13;23) is a twin-speed pump driven by an electric motor (14;40) and switched between an upper speed when the temperature of the still or carbonated water detected by the temperature sensor (20; 39) is above a pre-determined temperature and a lower speed when the temperature of the still or carbonated water detected by the temperature sensor (20; 39) is below the pre-determined temperature.
3. A beverage dispense system according to claim 1 wherein, the pump (13;23) is a variable speed pump and the pump speed is adjustable in response to the temperature of the still or carbonated water detected by the temperature sensor (20;39).
4. A beverage dispense system according to claim 2 or claim 3 wherein, the pump speed is controlled in response to the temperature of still or carbonated water detected by the temperature sensor (20; 39) returning to the cooler (15).
5. A beverage dispense system according to claim 4 wherein, the cooler (15) is provided with an evaporator coil (41), an agitator (43), a temperature sensor

(45) for monitoring temperature of coolant in the cooler, and a motor (47) for driving the agitator (43) in response to temperature of coolant detected by the temperature sensor (45).

6. A beverage dispense system according to claim 5 wherein, the motor (47) is a twin-speed motor or a variable speed motor.

7. A method of controlling the pump speed in a beverage dispense system according to any of claims 1 to 6, whereby the temperature sensor (20, 39) monitors the temperature of the still or carbonated water and controls the pump speed in response to the temperature of the still or carbonated water, and wherein pump speed and circulation of still or carbonated water in the cooling loop by the pump is increased in response to an increase in cooling demand.

Patentansprüche

1. Eine Getränkeabgabevorrichtung für ein Postmixgetränk hergestellt aus der Vermischung eines Konzentrats mit stillem oder kohlenensäurehaltigem Wasser, die Vorrichtung verwendet dabei einen Kühlkreislauf (9;21), in dem das stille oder kohlenensäurehaltige Wasser zwischen einem Eisspeicherkühler (15) und einem Getränkespender an einer Abgabestelle zirkuliert, die vom Kühler (15) entfernt liegt, der Kühler (15) weist dabei ein Kühlwasserbad auf und der Kühlkreislauf (9; 21) schließt eine Kühlspirale (17;35) ein, die ins Kühlwasserbad eingetaucht ist, eine Pumpe (13;23) für die Zirkulation des stillen oder kohlenensäurehaltigen Wassers im Kreislauf (9;21), **dadurch gekennzeichnet, dass** die Vorrichtung darüberhinaus einen Temperatursensor (20;39) für die Temperaturüberwachung des Rückflusses des stillen oder kohlenensäurehaltigen Wassers verwendet, wobei die Pumpengeschwindigkeit, als Reaktion auf die Temperatur des stillen oder kohlenensäurehaltigen Wassers, gesteuert wird, ein Mehrwegeventilblock (1) mit einer Vielzahl von Abgabeventilen (3) und einem Kühlmodul, das eine Kühlkammer (33) aufweist, sind im Getränkespender enthalten, der Mehrwegeventilblock (1) ist mit dem Kühlkreislauf (9;21) für die Zufuhr des stillen oder kohlenensäurehaltigen Wassers an jedes der Abgabeventile (3) verbunden, die Kühlkammer (33) ist isoliert und verfügt über einen Einlass und Auslass, die mit dem Kühlkreislauf (9;21) verbunden sind, und die Abgabeventile sind mit den Konzentratleitungen (5) verbunden, die durch die Kühlkammer (33) verlaufen, wobei das Konzentrat in den Konzentratleitungen (5) durch Wärmeaustausch mit dem stillen oder kohlenensäurehaltigen Wasser in der Kühlkammer (33) gekühlt wird, vor dem Mischen des Konzentrats mit stillem oder kohlenensäurehaltigem Was-

ser, das zu den Abgabeventilen (3) geleitet wird, um das Konzentrat zu verdünnen und ein Postmixgetränk herzustellen.

2. Eine Getränkeabgabevorrichtung gemäß Anspruch 1, wobei die Pumpe (13;23) eine Doppelgeschwindigkeitspumpe ist, die von einem Elektromotor (14;40) angetrieben wird und zwischen einer höheren Geschwindigkeit, wenn die Temperatur des stillen oder kohlensäurehaltigen Wassers, die vom Temperatursensor (20;39) erfasst wird, über einer vorher festgelegten Temperatur liegt, und einer niedrigeren Geschwindigkeit, wenn die Temperatur des stillen oder kohlensäurehaltigen Wassers, die vom Temperatursensor (20;39) erfasst wird, unter einer vorher festgelegten Temperatur liegt, hin- und herschaltet. 5 10 15
3. Eine Getränkeabgabevorrichtung gemäß Anspruch 1, wobei die Pumpe (13; 23) eine Verstellpumpe ist und die Pumpengeschwindigkeit, als Reaktion auf die Temperatur des stillen oder kohlensäurehaltigen Wassers, die vom Temperatursensor (20;39) erfasst wird, einstellbar ist. 20 25
4. Eine Getränkeabgabevorrichtung gemäß Anspruch 2 oder Anspruch 3, wobei die Pumpengeschwindigkeit, als Reaktion auf die Temperatur des zum Kühler (15) zurückfließenden stillen oder kohlensäurehaltigen Wassers, die vom Temperatursensor (20;39) erfasst wird, einstellbar ist. 30
5. Eine Getränkeabgabevorrichtung gemäß Anspruch 4, wobei der Kühler (15) mit einer Verdampferschlang (41), einem Mischer (43), einem Temperatursensor (45) für die Überwachung der Kühlmitteltemperatur im Kühler, und einem Motor (47) für den Antrieb des Mixers (43), als Reaktion auf die Kühlmitteltemperatur, die vom Temperatursensor (45) erfasst wird, ausgestattet ist. 35 40
6. Eine Getränkeabgabevorrichtung gemäß Anspruch 5, wobei der Motor (47) ein Doppelgeschwindigkeitsmotor oder ein Verstellmotor ist. 45
7. Ein Verfahren für die Steuerung der Pumpengeschwindigkeit in einer Getränkeabgabevorrichtung gemäß eines der vorhergehenden Ansprüche 1 bis 6, wobei der Temperatursensor (20, 39) die Temperatur des stillen oder kohlensäurehaltigen Wassers überwacht und die Pumpengeschwindigkeit, als Reaktion auf die Temperatur des stillen oder kohlensäurehaltigen Wassers, steuert, und wobei die Pumpengeschwindigkeit und die Zirkulation des stillen oder kohlensäurehaltigen Wassers im Kühlkreislauf durch die Pumpe, als Reaktion auf eine Zunahme des Kühlbedarfs, erhöht wird. 50 55

Revendications

1. Un système de distribution de boissons pour une boisson post-mélange obtenue par le mélange d'un concentré avec de l'eau plate ou gazeuse, le système employant une boucle de refroidissement (9, 21) dans laquelle de l'eau plate ou gazeuse est circulée entre un refroidisseur à accumulation de glace (15) et un distributeur de boissons à un emplacement de distribution à l'écart du refroidisseur (15), le refroidisseur (15) comprenant un bain d'eau fraîche et la boucle de refroidissement (9, 21) comprenant un serpentin de refroidissement (17, 35) immergé dans le bain d'eau fraîche, une pompe (13, 23) destinée à la circulation de l'eau plate ou gazeuse dans la boucle (9, 21), **caractérisé en ce que** le système emploie en outre un capteur de température (20, 39) destiné à la surveillance de la température du flux de retour de l'eau plate ou gazeuse, où la vitesse de la pompe est commandée en réponse à la température de l'eau plate ou gazeuse, un bloc robinet collecteur (1) possédant une pluralité de robinets de distribution (3) et un module de refroidissement comprenant une chambre de liquide de refroidissement (33) sont contenus dans le distributeur de boissons, le bloc robinet collecteur (1) est raccordé à la boucle de refroidissement (9, 21) de façon à fournir de l'eau plate ou gazeuse à chacun des robinets de distribution (3), la chambre de liquide de refroidissement (33) est isolée et possède une admission et une sortie raccordées à la boucle de refroidissement (9, 21), et les robinets de distribution sont raccordés à des conduits de concentré (5) passant au travers de la chambre de liquide de refroidissement (33), où le concentré dans les conduits de concentré (5) est refroidi par un échange thermique avec l'eau plate ou gazeuse à l'intérieur de la chambre de liquide de refroidissement (33) avant le mélange du concentré avec l'eau plate ou gazeuse fournie aux robinets de distribution (3) de façon à diluer le concentré et à produire une boisson post-mélange.
2. Un système de distribution de boissons selon la Revendication 1, où la pompe (13, 23) est une pompe bi-vitesse entraînée par un moteur électrique (14, 40) et commutée entre une vitesse supérieure lorsque la température de l'eau plate ou gazeuse détectée par le capteur de température (20,39) est supérieure à une température prédéterminée et une vitesse inférieure lorsque la température de l'eau plate ou gazeuse détectée par le capteur de température (20, 39) est inférieure à la température prédéterminée.
3. Un système de distribution de boissons selon la Revendication 1, où la pompe (13, 23) est une pompe à vitesse variable et la vitesse de la pompe est ajustable en réponse à la température de l'eau plate ou

gazeuse détectée par le capteur de température (20, 39).

4. Un système de distribution de boissons selon la Revendication 2 ou 3, où la vitesse de la pompe est commandée en réponse à la température de l'eau plate ou gazeuse détectée par le capteur de température (20, 39) revenant vers le refroidisseur (15). 5

5. Un système de distribution de boissons selon la Revendication 4, où le refroidisseur (15) est équipé d'un serpentín évaporateur (41), d'un agitateur (43), d'un capteur de température (45) destiné à la surveillance de la température du liquide de refroidissement dans le refroidisseur, et un moteur (47) destiné à l'entraînement de l'agitateur (43) en réponse à la température du liquide de refroidissement détectée par le capteur de température (45). 10 15

6. Un système de distribution de boissons selon la Revendication 5, où le moteur (47) est un moteur bi-vitesse ou un moteur à vitesse variable. 20

7. Un procédé de commande de la vitesse d'une pompe dans un système de distribution de boissons selon l'une quelconque des Revendications 1 à 6, où le capteur de température (20, 39) surveille la température de l'eau plate ou gazeuse et commande la vitesse de la pompe en réponse à la température de l'eau plate ou gazeuse, et où la vitesse de la pompe et la circulation de l'eau plate ou gazeuse dans la boucle de refroidissement par la pompe sont augmentées en réponse à un accroissement de la demande de refroidissement. 25 30 35

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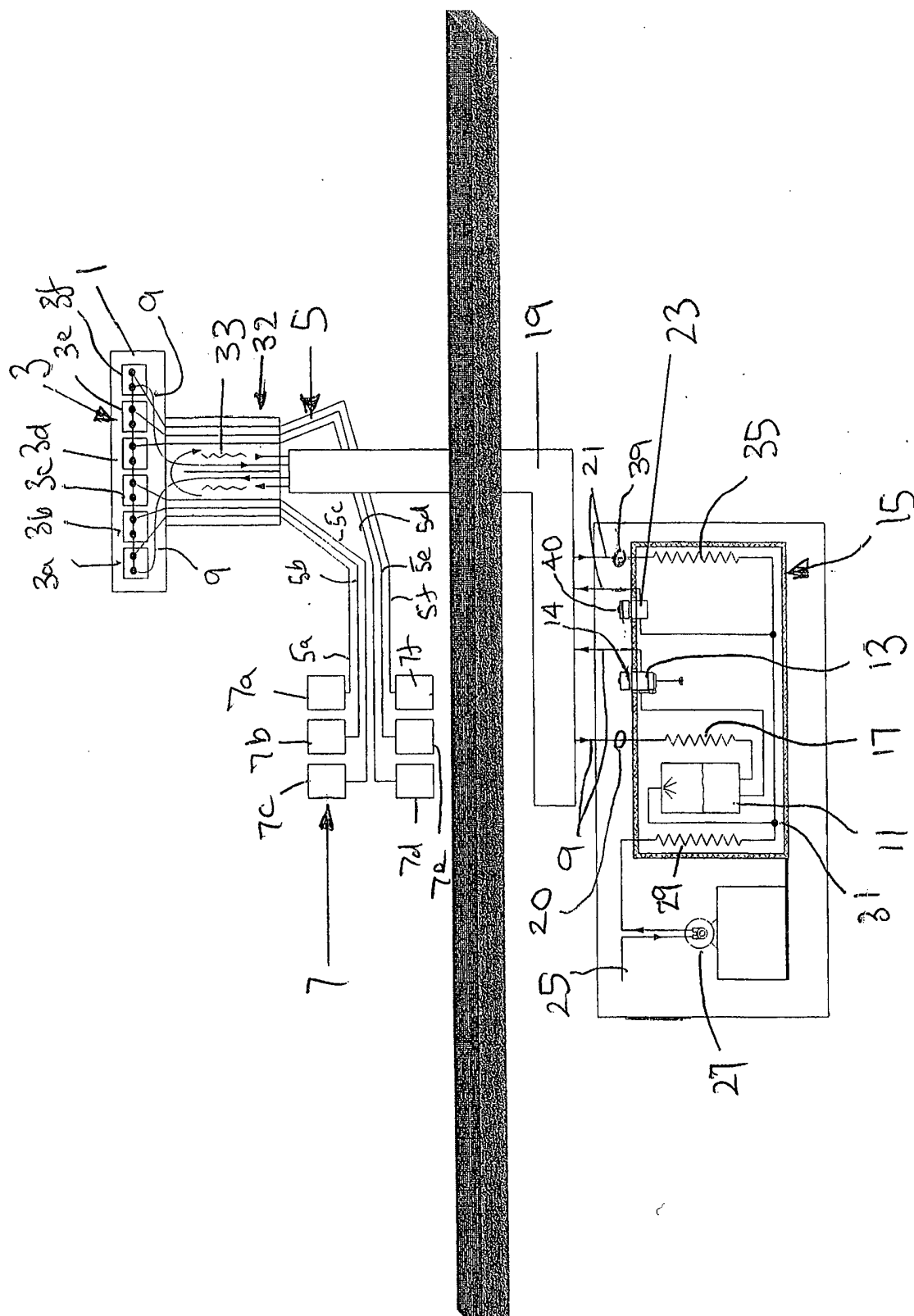


FIGURE 1

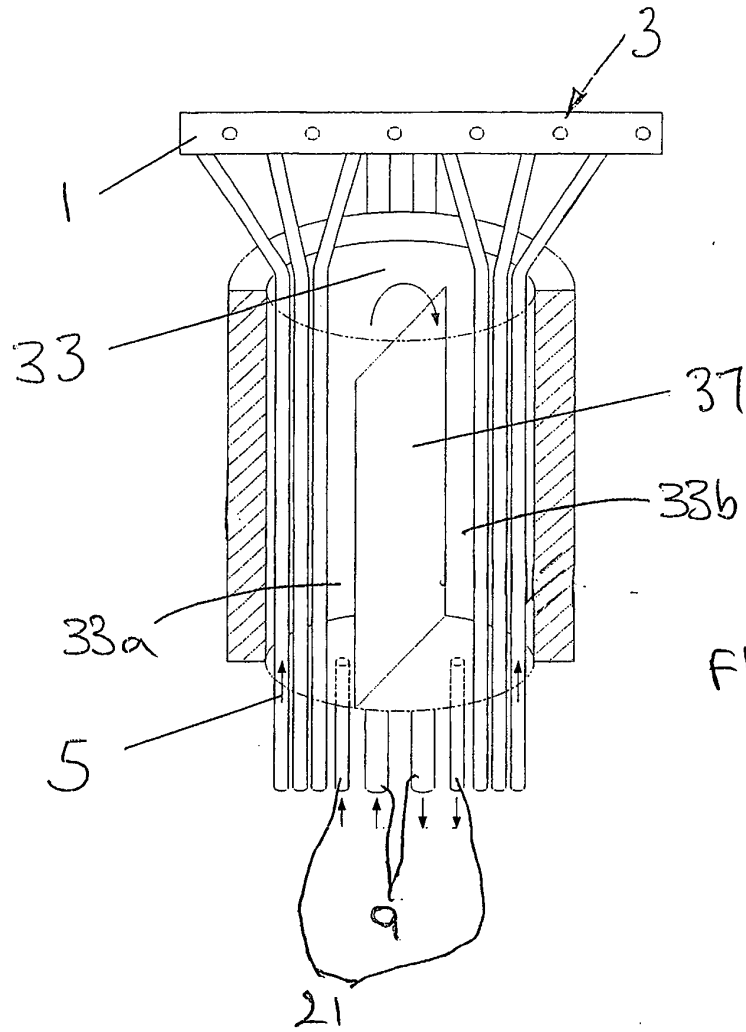


FIGURE 2

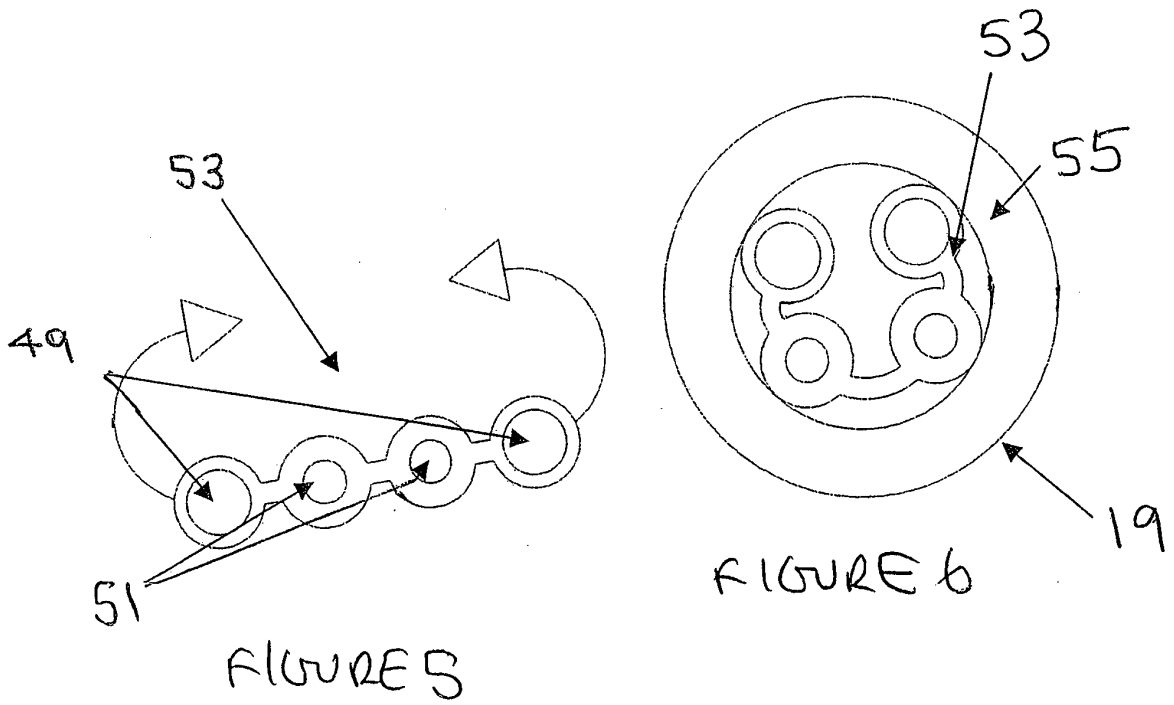


FIGURE 6

FIGURES 5

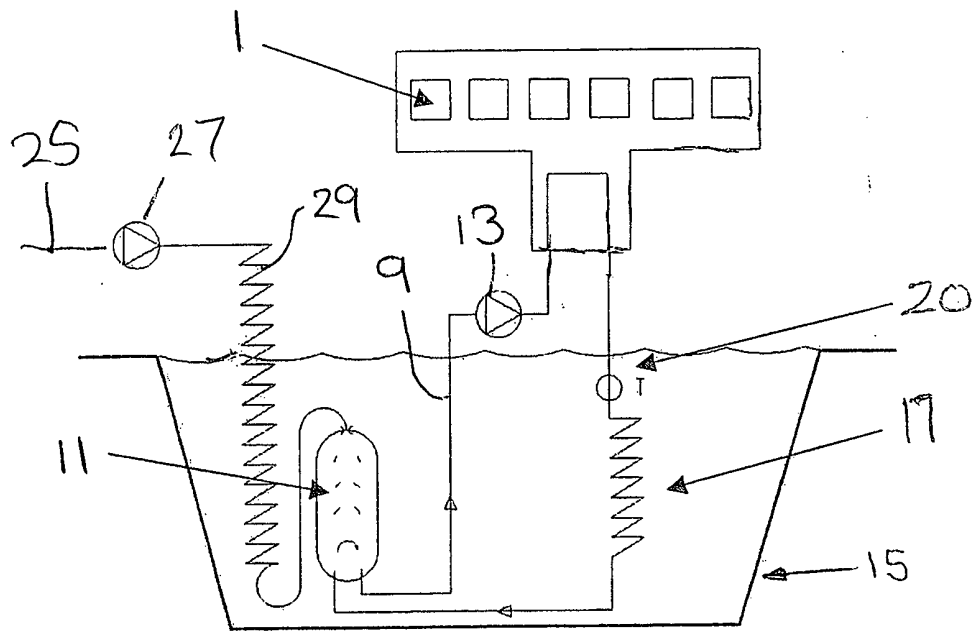


FIGURE 3

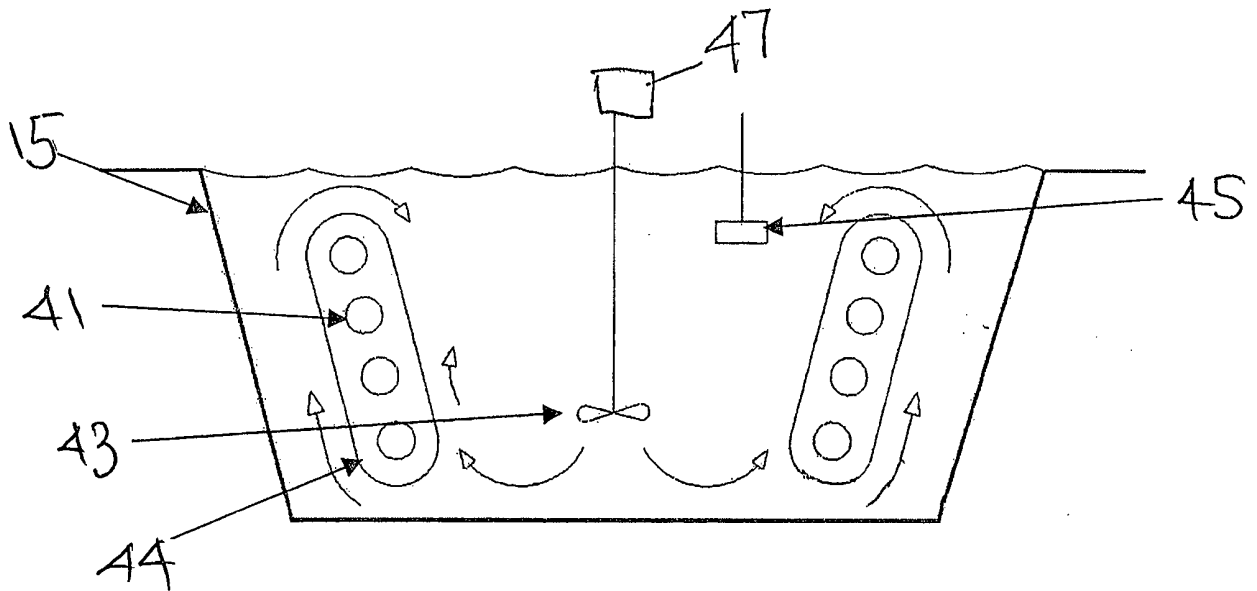


FIGURE 4

REFERENCES CITED IN THE DESCRIPTION

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