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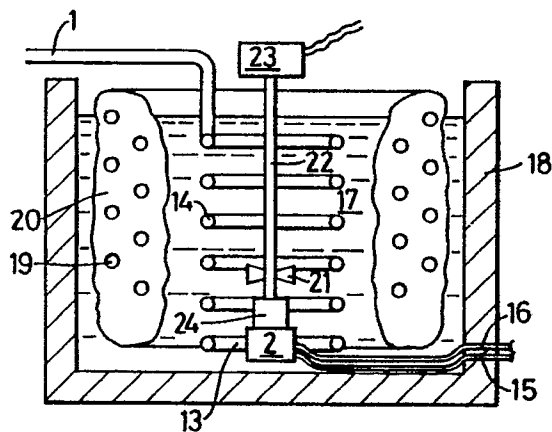
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Witton Birmingham B6 7BA(GB)(54) **Beverage cooling system incorporating magnetic coupling between the agitator and the pump.**

(57) An ice bank cooling system incorporating an electrically driven agitator (21) in which the pump (2) to pump a beverage component around a beverage circuit is immersed in the coolant (17) and is magnetically coupled (24) to be driven by the agitator motor (23).

**Fig. 2****EP 0 445 457 A1**

This invention relates to beverage or beverage component and pumping systems and has particular, but not exclusive, reference to such pumping systems intended to pump carbonated water around a soda circuit.

Ice bank cooling systems are well known. Such systems incorporate a reservoir containing water and two sets of coils. The first coil comprises the expansion portion of a refrigeration circuit and the second coil is a heat exchanger for cooling beverage or a beverage component such as a concentrate or diluent. The operation of the refrigeration system builds up a layer of ice on the refrigerant coils which acts as a store of cold and enables a smaller refrigeration unit running for longer time periods to cool beverages where the demand occurs in peaks throughout the day. Normally, such systems incorporate an agitator in the form of a paddle rotated by an electric motor which agitates water within the reservoir to wash it over the ice bank to keep the water cold and prevent temperature stratification within the reservoir. A motor may be connected directly via a shaft to the paddle or agitator or may be connected indirectly utilising a magnetic coupling system as is for example described in UK patent application 2 167 845.

A coil or other form of heat exchanger for the beverage or beverage component is immersed in the coolant and cools the beverage or beverage component which passes through the coil.

In some cases the beverage or beverage component is passed through the coil under pressure from an external source. In some cases however, a pump is used to pump a beverage or beverage component through the coil.

In a particular type of system, namely a soda circuit system, there is provided a loop for a soda circuit in which carbonated water is continuously pumped around a loop and is tapped off at locations around the loop for supply to a beverage mixing apparatus. The carbonated water is pumped by means of a conventional electrical pump which therefore has to handle the cold soda water. Such pumps normally operate 24 hours a day and continuously circulate chilled water through the soda circuit.

By the present invention there is provided a beverage or beverage component cooling and pumping system including a reservoir of coolant liquid, an agitator for agitating liquid in the reservoir, power means located above the reservoir and connected to the agitator to rotate the agitator, a pump for pumping the beverage or beverage component through a circuit, characterised in that the pump is driven by the same power means as the agitator and in that the pump is magnetically coupled to the power means, the magnetic coupling being located between the agitator and the pump.

The pump may be immersed in the coolant liquid or may be located exteriorly of the reservoir which is formed at least in part of a non-ferromagnetic material permitting coupling magnetically through the wall. The pump, when mounted in an exterior position may be thermally insulated from the external atmosphere.

The circuit may include a heat exchanger immersed at least in part in the coolant liquid. The pump may have two feeds and a single outlet, one feed for a return from the circuit and the other feed for a circuit top up from a carbonator.

The motor may be an electric motor and may be a two-pole electric motor. The liquid coolant may be water and there may be provided means to freeze part of the water in the reservoir. The system may incorporate a carbonator for carbonating water.

The present invention further provides a beverage or beverage component cooling system including a reservoir of coolant liquid, an electric motor located above the reservoir, a shaft dependant from the motor and having agitator means therein within the reservoir, a magnetic coupling at the end of the shaft interengaging the shaft and a pump for pumping the beverage or beverage component through a circuit.

By way of example embodiments of the present invention will now be described with reference to the accompanying drawings of which

FIGURE 1 is a schematic view of the said circuit,

FIGURE 2 is a schematic cross-sectional view of a coolant reservoir, and

FIGURE 3 is a side elevational view of a recirculating pump and agitator system.

Referring to Figure 1, this shows a circuit 1 in the form of a loop which extends from and to a pump 2 and incorporates a 'T' lead off 3. The 'T' lead off heads towards a valve 4 which controls the flow of said water to an exit point or nozzle 5. It will be understood that the system beyond the 'T' lead off is perfectly conventional and the valve 4 may be part of a system for mixing carbonated water with a drink concentrate or may be a simple control valve.

The pump 2 has a pair of inlets 6, 7. The inlet 6 is for the return from the circuit 1 and the inlet 7 is for replenishment of soda water from a carbonator 8. The pump 2 runs continuously and would normally circulate water around the circuit 1. However, in the event of carbonated water being drawn through valve 4 top up for the circuit is provided by carbonator 8. The carbonator 8 is supplied by a carbon dioxide line 9 and a water line 10 incorporating valves 11 and 12. The remote carbonator 8 is of conventional form.

The circuit 1 incorporates a heat exchanger to maintain the carbonated water at a low temperature and the circuit itself is normally insulated.

The pump 2 and its cooling system is shown in more detail in Figure 2. The pump 2 has an output through line 13 into a heat exchanger 14 which forms part of the circuit 1. Feed line 15 leads to port 7 and feed line 16 leads to port 6. The pump 2 is immersed in water 17 contained within an insulated reservoir 18. Also within the reservoir is a refrigeration coil 19 shown surrounded by an ice bank 20 in a conventional manner. The water within the reservoir is agitated by agitator paddle 21 fixed to shaft 22 and driven by electric motor 23. A magnetic coupling 24 interconnects the shaft 22 and the pump 2.

The agitator pump and motor system are shown in more detail in Figure 3. The electric motor 23 which forms the power means for the system comprises a two-pole motor having a cooling fan 25 and being supported on a frame 26 to which is mounted a pump head 27 being part of the pump 2. The agitator paddle 21 is mounted on the shaft 22 and the end of the shaft terminates in a magnetic coupling 24 which couples to a corresponding portion of a magnetic coupling in the pump head. The outlet line 13, the pump itself 2 and the inlet lines, one of which 15 is shown in Figure 3, are all immersed in the coolant water. Because the magnetic coupling avoids the need for seals, the pump can be completely sealed from the water 17 in the reservoir. There is therefore no danger of leakage through the seals which could contaminate the beverage carbonated water with water 17 from the reservoir 18 which might be contaminated. The absence of seals also ensures that the friction of the seals is not present and therefore the motor 23 can be of the smallest size practicable. Furthermore, because the pump is immersed in the coolant and is not in the open air, there is no risk of condensation which might otherwise lead to condensation affecting the electric motor and causing damage to the motor.

In an alternative embodiment the pump 2 has a single inlet and the top up line from the carbonator 8 is fed into the loop 1. This means that there is only a single seal for the inlet to the pump and a single seal for the outlet. In a further alternative, the feed line or lines to the pump may be led over the top of the wall 18 of the reservoir so as to avoid the need for seals in the wall of the reservoir.

It will be appreciated that the pump 2 could be located outside the reservoir 18 which could have a pocket for the pump provided that the wall of the reservoir was not ferromagnetic for the region where the magnetic coupling was to make the connection. However, such a system would require insulation to prevent condensation from the pump

damaging the container or its surroundings.

Claims

- 5 1. A beverage or beverage component cooling and pumping system including a reservoir (18) of coolant liquid, an agitator (21) for agitating liquid in the reservoir (18), power means (23) located above the reservoir (18) and connected to the agitator (21) to rotate the agitator (21), a
10 pump (2) for pumping the beverage or beverage component through a circuit (1), characterised in that the pump (2) is driven by the same power means (23) as the agitator (21) and in that the pump (2) is magnetically coupled to the power means (23), the magnetic coupling (24) being located between the agi-
15 tator (21) and the pump (2).
- 20 2. A system as claimed in Claim 1 in which the pump (2) is immersed in the coolant liquid (17).
- 25 3. A system as claimed in Claim 1 in which the pump (2) is located exteriorly of the reservoir (18), which is formed at least in part of a non-ferromagnetic material permitting coupling magnetically through the wall.
- 30 4. A system as claimed in Claim 3 in which the pump (2) is thermally insulated from the external atmosphere.
- 35 5. A system as claimed in any one of Claims 1 to 4 in which the circuit (1) includes a heat exchanger (14) immersed at least in part in the coolant liquid (17).
- 40 6. A system as claimed in any one of Claims 1 to 5 and including a carbonator (8) for carbonating the beverage in which the pump (2) has two feeds (6, 7) and a single outlet, one feed (6) for a return from the circuit (1) and the other feed (7) for a circuit top-up from the carbonator (8).
- 45 7. A system as claimed in any one of Claims 1 to 6 in which the power means is an electric motor (23).
- 50 8. A system as claimed in Claim 7 in which the motor (23) is a two-pole electric motor.
- 55 9. A system as claimed in Claim 1 in which the cooling liquid is water and there is provided means to freeze part of the water (17) in the reservoir (18).

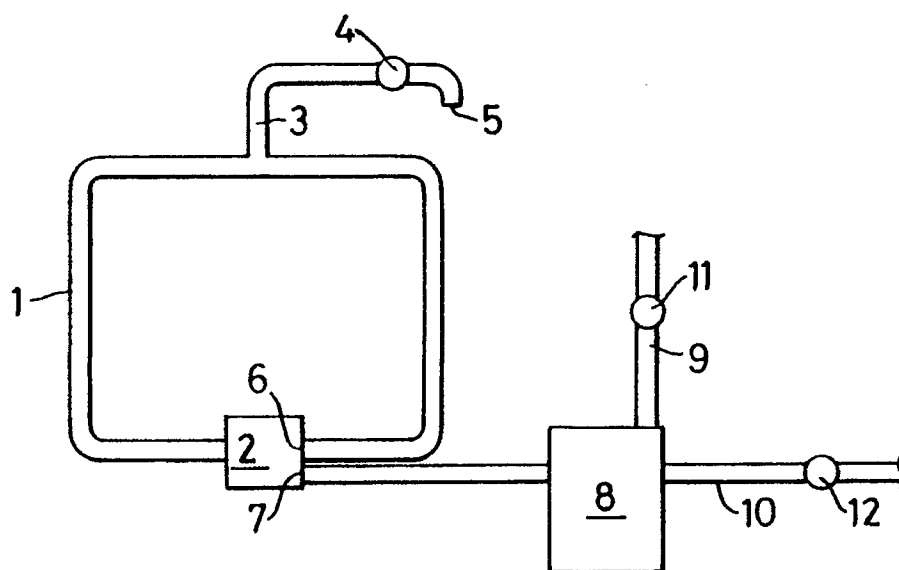


Fig. 1

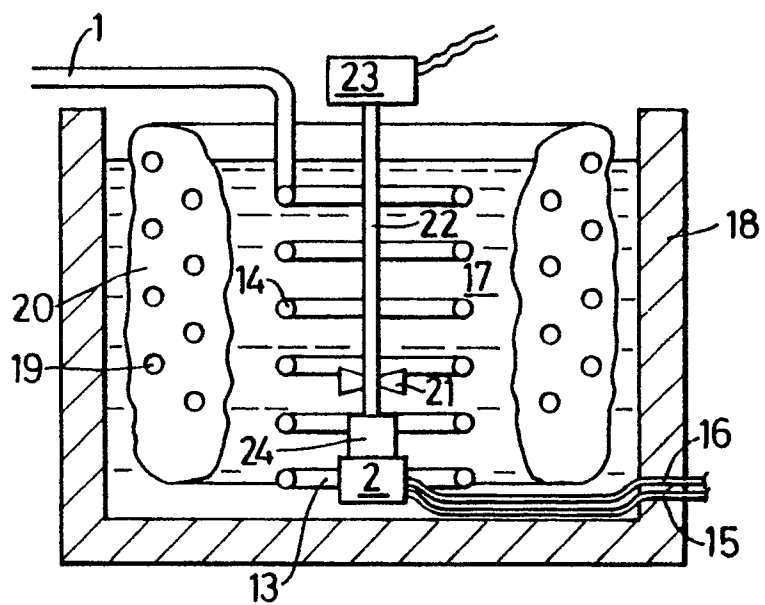


Fig. 2

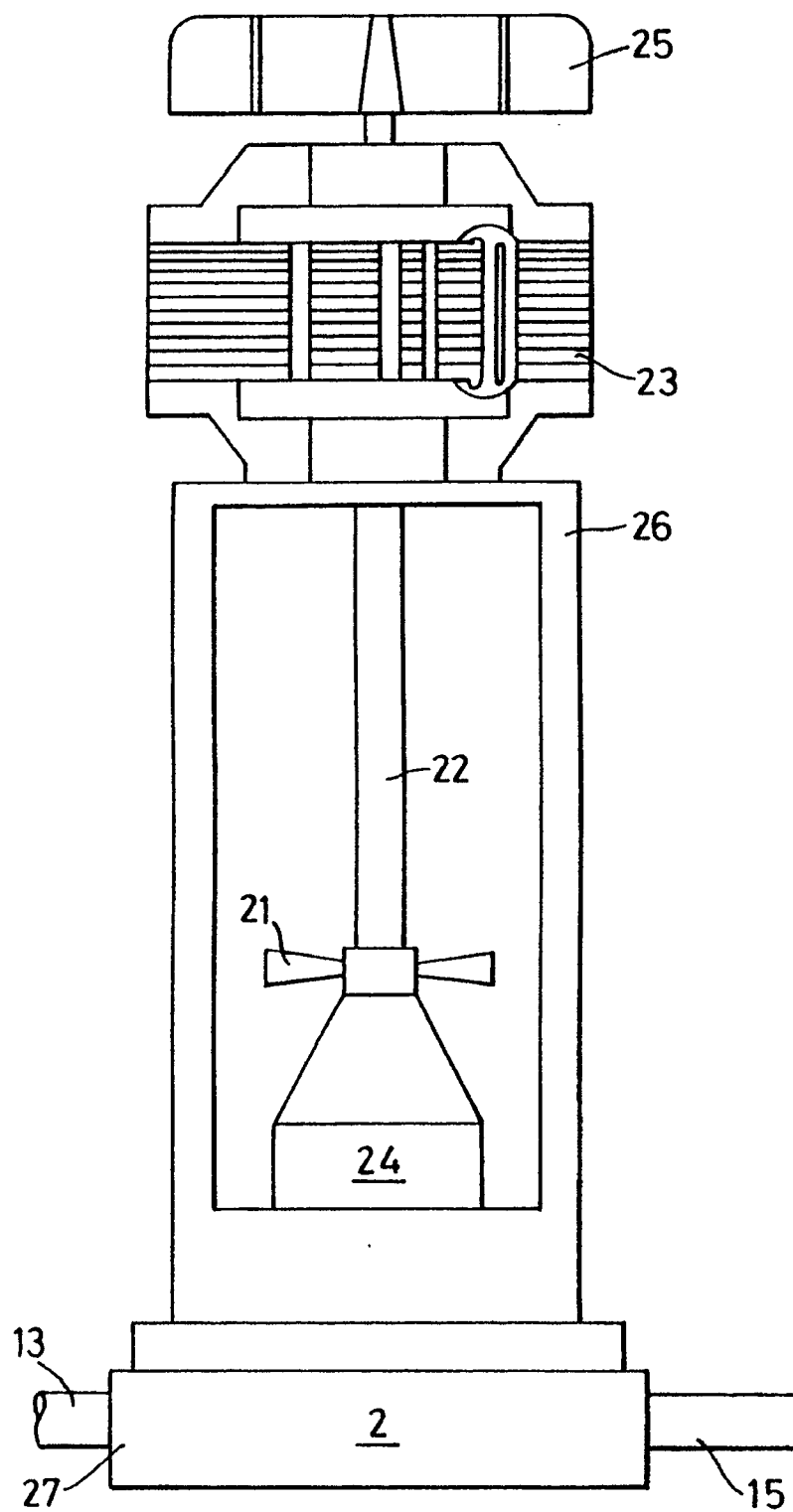


Fig. 3



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EUROPEAN SEARCH REPORT

Application Number

EP 90 30 2572

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)
D,A	GB-A-2 167 845 (FILMER) * Figures 1,4; page 2, lines 103-125 * ---	1	B 67 D 1/08 B 67 D 1/10
A	GB-A-2 208 536 (COOK & LAMB) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B 67 D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 05-10-1990	Examiner DEUTSCH J.P.M.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			