



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
26.11.2003 Bulletin 2003/48

(51) Int Cl.7: **B67D 1/00, B67D 1/04**

(21) Application number: **03011454.0**

(22) Date of filing: **20.05.2003**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PT RO SE SI SK TR**
Designated Extension States:
AL LT LV MK

(30) Priority: **20.05.2002 GB 0211514
29.05.2002 GB 0212363**

(71) Applicant: **Whitlenge Drink Equipment Limited
Halesowen, West Midlands B62 8SE (GB)**

(72) Inventors:
• **Belcham, Robert**
Suttin Coldfield West Midlands B76 1JJ (GB)
• **Harris, David**
Stourbridge West Midlands DY8 4RP (GB)
• **Jones, Tony**
West Midlands B63 3QG (GB)

(74) Representative: **Lucking, David John
FORRESTER & BOEHMERT
Pettenkoferstrasse 20-22
80336 München (DE)**

(54) **Cooled carbonated potable liquid supply apparatus**

(57) An apparatus 1 for supplying cooled carbonated potable liquid, the apparatus 1 including a cooling chamber 2, a carbonating chamber 8 and a dispensing

head 4, and pumping means 26 which is operative to circulate carbonated potable liquid around a circuit which includes the cooling chamber 2, the dispensing head 4, and the carbonating chamber 8.

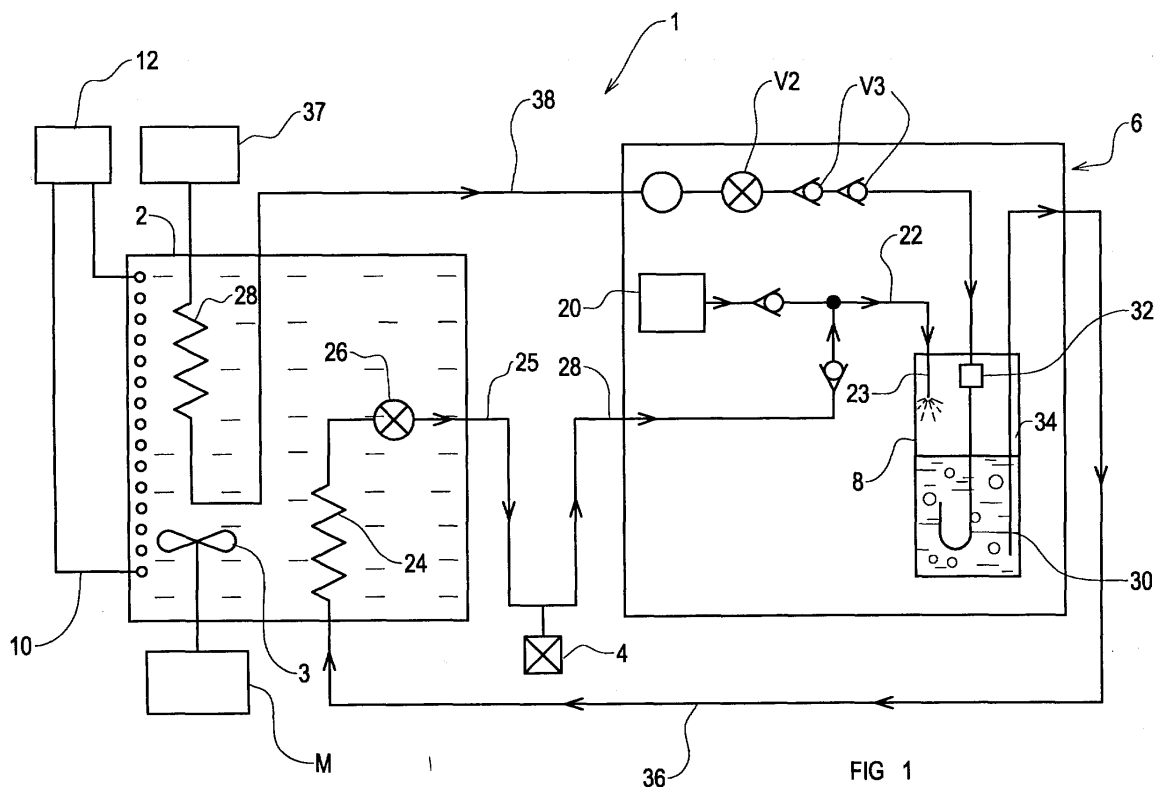


FIG 1

Description

Description of Invention

[0001] This invention relates to a potable liquid supply apparatus and more particularly but not exclusively to such an apparatus for the supply of cooled carbonated water, to be drawn off for consumption purposes via a dispensing head, either with or without the addition of additional liquids, such as flavourings.

[0002] A conventional such apparatus includes a cooling device for cooling the potable liquid, the cooling device including a cooling chamber in which a cooling liquid having a low freezing point is contained. Located in the chamber is a refrigeration coil, through which a cold refrigerant is pumped, to reduce the temperature of the cooling liquid. The potable liquid (water) is fed through a cooling coil in the cooling chamber, which cooling coil is in contact with the cooling liquid, so that the potable liquid flowing through the cooling coil is cooled by the cooling liquid.

[0003] Conventionally to ensure a relatively constant temperature within the cooling liquid, a mechanical "stirrer" is provided in the cooling chamber.

[0004] Conventionally to ensure that potable liquid at an appropriately low temperature is available for drawing off at the dispensing head on demand, the potable liquid is continuously pumped around a circuit of the apparatus, which circuit contains the cooling coil and the dispensing head. Fresh, uncooled potable liquid is introduced into the circuit upstream of the cooling coil, to replace the potable which has been drawn off.

[0005] Where it is desired to dispense carbonated water, the apparatus includes a carbonating device for carbonating the potable liquid, the fresh uncooled potable liquid which is introduced into the circuit being carbonated liquid provided by the carbonating device.

[0006] Conventionally such a carbonating device is at ambient temperature, and includes a carbonating chamber to which carbon dioxide at a relatively high pressure and in which the potable liquid becomes carbonated.

[0007] It has been proposed to combine the carbonating and cooling chambers, as is disclosed in the specification of our previous European application EP-A-1152975. In this way, the provision of pipework from the carbonating chamber to the cooling chamber may be dispensed with. Importantly though, since the potable liquid in the carbonating device is carbonated at a lower temperature than ambient, that is the low temperature of the cooling liquid in the cooling chamber, a lower pressure carbon dioxide gas system may be utilised.

[0008] However, such a combined cooling and carbonating chamber system whilst advantageous in some ways, suffers from a disadvantage, that where high levels of carbonated potable liquid are drawn off, ensuring that desired cooled temperature of the potable liquid dispensed, may be problematical.

[0009] According to one aspect of the invention we

provide an apparatus for supplying cooled carbonated potable liquid, the apparatus including a cooling chamber, a carbonating chamber and a dispensing head, and pumping means which is operative to circulate carbonated potable liquid around a circuit which includes the cooling chamber, the dispensing head, and the carbonating chamber.

[0010] In one embodiment of the invention, the pumping means is operative to circulate potable liquid around a circuit which extends from the cooling chamber to the dispensing head, from the dispensing head to the carbonating chamber, and from the carbonating chamber back to the cooling chamber.

[0011] In this manner potable liquid will be circulated through the carbonating chamber at a temperature lower than ambient temperature, thus reducing the load on the cooling device when high levels of carbonated potable liquid are drawn off from the dispensing head.

[0012] In one example, the pumping means is a pump which is provided in the circuit, for example in the cooling chamber so that the pump is cooled by the cooling liquid, but the pump may be provided exteriorly of the cooling chamber. In either case, the circuit may include a cooling coil within the cooling chamber, and the pump may be provided between the cooling coil and the dispensing head.

[0013] The carbonating chamber may include an inlet which is connected, via a gas supply conduit, to a supply of carbonating gas, and potable liquid may flow along the circuit, from the dispensing head to the carbonating chamber, along the gas supply conduit.

[0014] Fresh potable liquid to make up for cooled carbonated potable liquid drawn off at the dispensing head, may be introduced into the carbonating chamber via a fresh potable liquid inlet.

[0015] In a second embodiment of the invention, the pumping means is operative to circulate potable liquid around a circuit which extends from the cooling chamber to the dispensing head, and back to the cooling chamber, and then to the carbonating chamber, and from the carbonating chamber back to the cooling chamber.

[0016] Thus within the cooling chamber there may be first and second cooling coils, the first coil being upstream of the dispensing head, and the second coil downstream of the dispensing head.

[0017] In this embodiment, the pumping means may be a pump provided exteriorly of the cooling chamber, the pump being provided in the circuit between the cooling chamber and the carbonating chamber.

[0018] The carbonating chamber may include an inlet which is connected, via a gas supply conduit, to a supply of carbonating gas, and an inlet which is connected, via a fresh potable liquid supply conduit, to a fresh potable liquid supply, to make up for cooled carbonated potable liquid drawn off at the dispensing head.

[0019] The potable liquid may flow along the circuit, from the cooling chamber and dispensing head to the carbonating chamber, along the a fresh potable liquid

supply conduit to the carbonating chamber. Conveniently the pump is provided in the fresh potable liquid supply conduit.

[0020] In each embodiment, preferably the temperature of the potable liquid water in the carbonating chamber is close to the temperature at which it is desired to dispense the carbonated potable liquid, i.e. preferably less than 15°C, and more preferably less than 10°C, and typically at a temperature of about 5°C.

[0021] Thus the apparatus enjoys the advantage of the previously proposed combined carbonating and cooling chamber system mentioned above, i.e. since the carbonation is taking place in the carbonating chamber at a lower temperature than ambient, a lower pressure gas system may be utilised.

[0022] Moreover, the carbonating chamber may be located remotely from the cooling chamber so that for example, the cooling chamber may be located adjacent to the dispensing head or heads, and the carbonating chamber may be located in a remote room such as a cellar.

[0023] In this way a single, large carbonating device may be utilised which may be operative to carbonate potable liquid for use in a plurality of otherwise distinct potable liquid supply apparatus.

[0024] According to a second aspect of this invention, we provide a system including at least one cooling chamber, a carbonating chamber and a plurality of dispensing heads, and pumping means which is operative to circulate carbonated potable liquid around a plurality of circuits each of which includes the or a cooling chamber, one of the dispensing heads, and the carbonating chamber.

[0025] The system may include any of the features of the apparatus according to the first aspect of the invention. Thus a common carbonating chamber may be provided for each of the circuits.

[0026] In a first embodiment of the system of the second aspect of the invention, a pumping means for each circuit may be required, although for a second embodiment of the second aspect of the invention, a common pumping means for each of the apparatus may be provided in a fresh potable liquid supply conduit which leads to a fresh potable liquid inlet to the carbonating chamber.

[0027] Embodiments of the invention will now be described with reference to the accompanying drawings in which:-

FIGURE 1 is a schematic diagram showing a potable liquid dispensing apparatus in accordance with a first aspect of the invention;

FIGURE 2 is a view similar to figure 1, but of a second embodiment;

FIGURE 3 is a schematic diagram of an example of a system according to the second aspect of the invention.

[0028] Referring to figure 1, an apparatus 1 for sup-

plying cooled potable and carbonated liquid is shown.

[0029] The apparatus 1 includes a cooling chamber 2, which is filled with low freezing point cooling liquid such as brine, a dispensing head 4 and a carbonating chamber 8 of a carbonating device 6.

[0030] Located in the cooling chamber 2, immersed in the cooling liquid, is a refrigeration coil 10, which extends to and from a remote refrigeration unit 12, through which coil 10 cold refrigerant is passed, to cool and maintain the cooling liquid in the cooling chamber 2 at a low temperature.

[0031] The apparatus 1 includes a supply 20 of carbon dioxide gas under pressure, from which a gas supply conduit 22 extends to a gas inlet 23 of the carbonating chamber 8, so that carbon dioxide under pressure is maintained in the chamber 8. In the gas supply conduit 22 there is a non-return valve V1 to prevent gas flowing back to the supply 20.

[0032] Located in the cooling chamber 2 are two cooling coils 24 and 28, and a "stirrer" provided by an impeller 3 driven by motor M, which mixes the cooling fluid thus to maintain a constant temperature therein, and to encourage the flow of the cooling liquid in the chamber over the various coil surfaces.

[0033] A circuit for the potable liquid includes one of the coils, namely the coil indicated at 24, a first conduit 25, which may be in the form of a python, which extends from the cooling coil 24 to the dispensing head 4, and a second conduit 28 which may also be in the form of a python which extends from the dispensing head 4 into the carbonation chamber 8 conveniently extending into the gas supply conduit 22, at which carbon dioxide is admitted to the chamber 8, causing the circulating potable liquid to become admixed with the carbon dioxide, and entering the carbonation chamber 8 at the gas inlet 23, above the level of liquid therein, in the form of a fine spray.

[0034] The potable liquid circuit also includes a third conduit 36 extending from a lower part of the chamber 8, back to the cooling chamber 2 where the third conduit 36 is connected to the cooling coil 24.

[0035] Associated with the potable liquid circuit is a pumping means provided by a pump 26, by which cooled the potable liquid may be caused to flow around the circuit, flowing through the first conduit 25 to the dispensing head 4, through the second conduit 28 from the dispensing head 4 into the carbonation chamber 8, and through the third conduit 36 from the carbonation chamber 8 back to the cooling coil 24.

[0036] In this way potable liquid within the carbonation chamber 8 is maintained at a temperature less than ambient, conveniently at a low temperature similar to that at which it is desired to dispense potable liquid from the dispensing head 4, and so, the potable liquid in the carbonation chamber 8, achieves a high level of carbonation whilst the gas system, i.e. the supply 20 may be a lower pressure supply than would be required if the liquid in the carbonating chamber 8 was at ambient tem-

perature.

[0037] When cooled carbonated potable liquid is drawn from the dispensing head 4, which typically includes an outlet valve (not shown), the level of liquid in the carbonation chamber 8 falls, and this is sensed by a controller to allow fresh potable liquid to flow from a fresh potable liquid supply 37, through the other cooling coil 28 located in the cooling chamber 2, by operating a fresh potable liquid inlet valve V2, which may be a solenoid operated valve, the liquid thus flowing to the carbonating chamber 8 via one or more one-way valves V3, and passing through a venturi device 32 in the carbonating chamber 8, whereby the fresh liquid entrains carbon dioxide from a space 34 in the carbonating chamber 8 above the liquid level, and through a J-tube 30.

[0038] The pressure of carbon dioxide in the space 34 in the carbonating chamber 8 above the liquid in the chamber 8 ensures that adequate carbonation of the liquid is achieved, although by virtue of the liquid being at a lower temperature than ambient, the gas pressure may be lower than has previously been utilised.

[0039] By the use of appropriately insulated conduits, the cooling chamber 2 may be located adjacent the dispensing head 4, so that cooled water is delivered to the dispensing head 4 without any significant increase in temperature, whilst the carbonation chamber 8 may be at a remote location, such as in a cellar.

[0040] In this way, a single carbonation chamber 8 may be utilised to carbonate liquid for delivery via any one of a plurality of dispensing heads 4 which may each be provided in an associated potable liquid circuit, thus reducing the expense of such a system compared to providing a plurality of apparatus 1 each with its own carbonating device 6. Such a system may include one or a plurality of cooling chambers 2, and the common carbonating device 6 may have a single one, or a plurality of carbonating chambers 8.

[0041] Referring now to figure 2 an alternative embodiment is described. Similar parts to those present in the embodiment of figure 1 are labelled with the same reference identifiers. In figure 2, for clarity only, the refrigeration circuit including the refrigerating unit 12, and refrigerating coil 10 are omitted.

[0042] In the figure 2 embodiment, the circuit for the potable liquid extends from a first coil 24a in the cooling chamber 2, to the dispensing head 4, and then back to the cooling chamber 2 where the liquid passes through a second cooling coil 24b where it is further cooled. Thereafter the potable liquid flows to the carbonating chamber 8, but in this example, instead of being fed along the gas supply conduit 22, the potable liquid flows to the carbonating chamber 8 along the fresh potable liquid feed conduit 38, downstream of the solenoid supply valve V2 and the non-return valves V3. The pump 26 is in this example provided in the fresh potable liquid feed conduit 38 and thus "pulls" liquid along the circuit from the cooling chamber 2.

[0043] Moreover, a solenoid operated valve V4 is pro-

vided to permit gas from the gas supply conduit 22 to pass into the fresh potable liquid feed conduit 38 at a position 91 downstream of the pump 57 when required to assist in maintaining the level of carbonation of the circulating potable liquid.

[0044] Various modifications may be made without departing from the scope of the invention. For example in the figure 1 embodiment, the pump 26 is located in the cooling liquid of the cooling chamber 2, but may be provided exteriorly to the cooling chamber 2 as desired, for example otherwise between the cooling coil 24 and the dispensing head 4, or downstream of the dispensing head 4 along the conduit 28 to the gas supply inlet conduit 22.

[0045] In each embodiment, preferably the temperature of the potable liquid water in the carbonating chamber is close to the temperature at which it is desired to dispense the carbonated potable liquid, i.e. preferably less than 15°C, and more preferably less than 10°C, and typically at a temperature of about 5°C.

[0046] The potable liquid may be water, and may be dispensed with a flavouring which may be introduced into the potable liquid prior to or subsequent to carbonation, or preferably at the dispensing head 4

[0047] The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

Claims

1. An apparatus (1) for supplying cooled carbonated potable liquid, the apparatus (1) including a cooling chamber (2), a carbonating chamber (8) and a dispensing head (4), and pumping means (26) which is operative to circulate carbonated potable liquid around a circuit which includes the cooling chamber (2), the dispensing head (4), and the carbonating chamber (8).
2. An apparatus according to claim 1 **characterised in that** the pumping means (26) is operative to circulate potable liquid around a circuit which extends from the cooling chamber (2) to the dispensing head (4), from the dispensing head (4) to the carbonating chamber (8), and from the carbonating chamber (8) back to the cooling chamber (2).
3. An apparatus according to claim 1 or claim 2 **characterised in that** the pumping means (26) is a pump which is provided in the circuit, in the cooling chamber (2) so that the pump (26) is cooled by the cooling liquid.

4. An apparatus according to claim 2 or claim 3 **characterised in that** wherein the circuit includes a cooling coil (24) within the cooling chamber (2), and the pump (26) is provided between the cooling coil (24) and the dispensing head (4). 5
5. An apparatus according to any one of the preceding claims **characterised in that** the carbonating chamber (8) includes an inlet (23) which is connected, via a gas supply conduit (22), to a supply (20) of carbonating gas, and potable liquid flows along the circuit, from the dispensing head (4) to the carbonating chamber(8), along the gas supply conduit (22). 10
6. An apparatus according to any one of the preceding claims **characterised in that** fresh potable liquid to make up for cooled carbonated potable liquid drawn off at the dispensing head (4), is introduced into the carbonating chamber (8) via a fresh potable liquid inlet (32, 30). 15 20
7. An apparatus according to claim 1 **characterised in that** the pumping means (26) is operative to circulate potable liquid around a circuit which extends from the cooling chamber (2) to the dispensing head (4), and back to the cooling chamber (2), and then to the carbonating chamber (8), and from the carbonating chamber (8) back to the cooling chamber (2). 25 30
8. An apparatus according to claim 7 **characterised in that** within the cooling chamber (2) there are first and second cooling coils (24a, 24b), the first coil (24a) being upstream of the dispensing head (4), and the second coil (24b) being downstream of the dispensing head (4). 35
9. An apparatus according to claim 7 or claim 8 **characterised in that** the pumping means (26) is a pump provided exteriorly of the cooling chamber (2), the pump (26) being provided in the circuit between the cooling chamber (2) and the carbonating chamber (8). 40 45
10. An apparatus according to any one of claims 7 to 9 **characterised in that** the carbonating chamber (8) includes an inlet (23) which is connected, via a gas supply conduit (22), to a supply (20) of carbonating gas, and an inlet (32, 30) which is connected, via a fresh potable liquid supply conduit (38), to a fresh potable liquid supply (37), to make up for cooled carbonated potable liquid drawn off at the dispensing head (4). 50 55
11. An apparatus according to claim 11 **characterised in that** the potable liquid flows along the circuit, from the cooling chamber (2) and dispensing head (4) to the carbonating chamber (8), along the a fresh potable liquid supply conduit (38) to the carbonating chamber (8), and the pumping means (26) is a pump provided in the fresh potable liquid supply conduit (38).
12. An apparatus according to any one of the preceding claims **characterised in that** the carbonating chamber (8) is located remotely from the cooling chamber (2) with the cooling chamber (2) located adjacent to the dispensing head (4) or heads, and the carbonating chamber (8) located in a remote room.
13. A system including at least one cooling chamber (2), a carbonating chamber (8) and a plurality of dispensing heads(4), and pumping means (26) which is operative to circulate carbonated potable liquid around a plurality of circuits each of which includes the or a cooling chamber (2), one of the dispensing heads (4), and the carbonating chamber (8).
14. A system according to claim 13 **characterised in that** a pumping means (26) for each circuit is provided, or a common pumping means (26) for each of the apparatus is provided in a fresh potable liquid supply conduit (38) which leads to a fresh potable liquid inlet (32, 30) to the carbonating chamber (8).

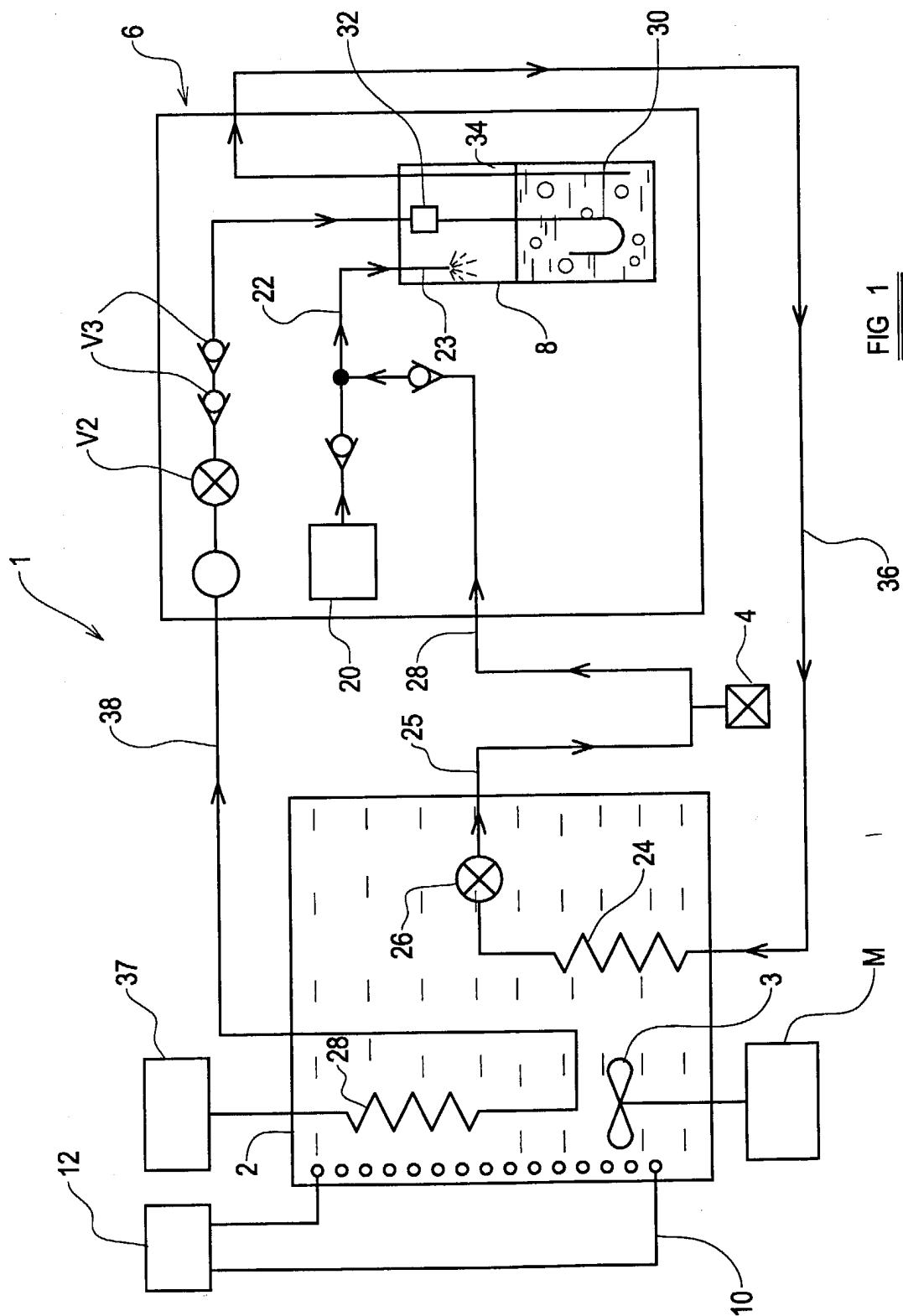


FIG 1

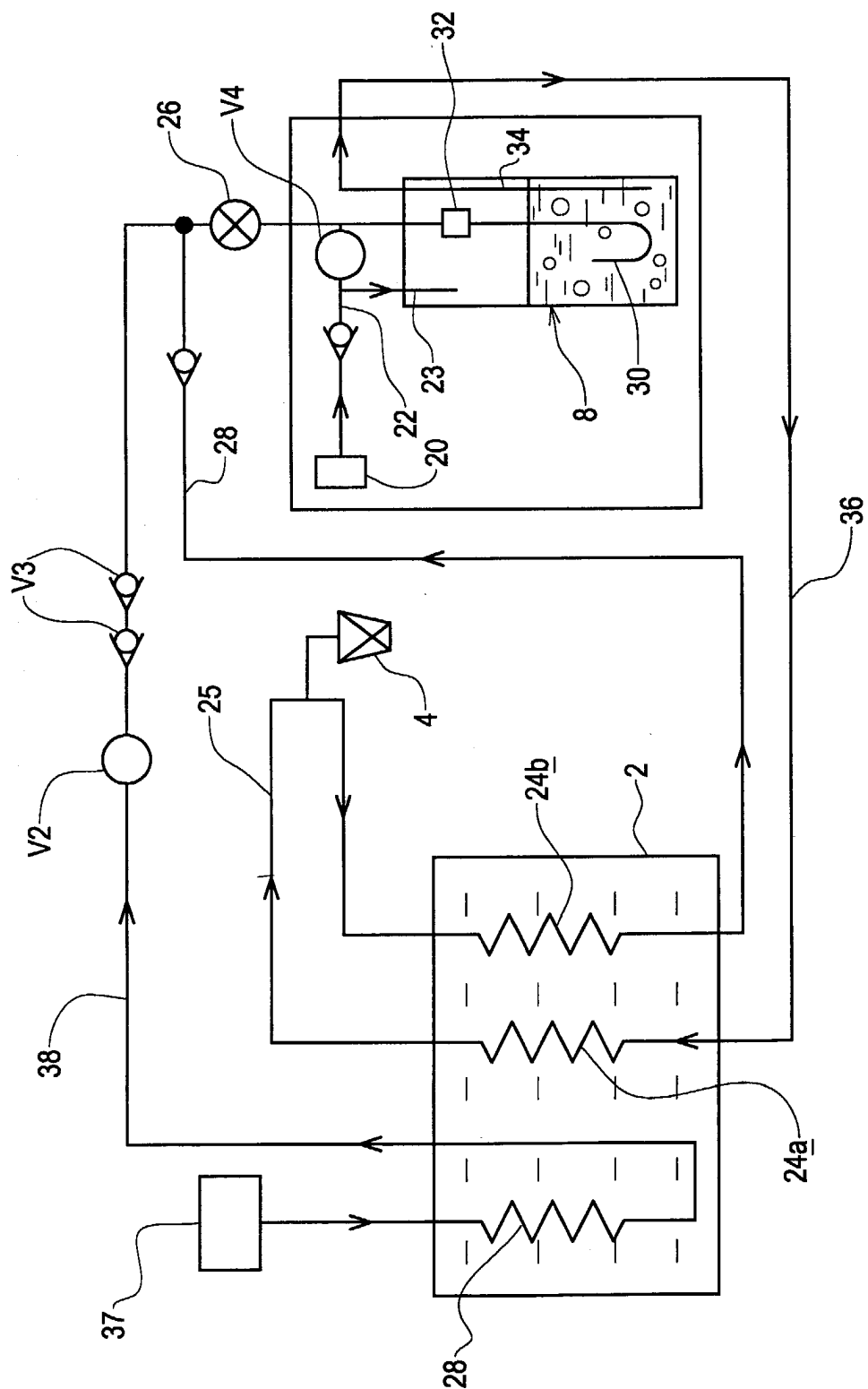


FIG 2



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 01 1454

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.7)
X	WO 00 25904 A (COOK CHRISTOPHER MICHAEL ;IMI CORNELIUS UK LTD (GB)) 11 May 2000 (2000-05-11) * figure 2 *	1,2,5,6	B67D1/00 B67D1/04
A	---	3	
X	US 3 259 273 A (KROMER WALLACE R) 5 July 1966 (1966-07-05) * column 4, line 67 - column 5, line 73; figures 3,5 *	1,2,6	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			B67D
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 27 August 2003	Examiner Desittere, 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			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 03 01 1454

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

27-08-2003

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 0025904 A	11-05-2000	AU 6480499 A	22-05-2000
		WO 0025904 A1	11-05-2000
		GB 2347093 A ,B	30-08-2000
US 3259273 A	05-07-1966	GB 1137281 A	18-12-1968