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(54) **BEVERAGE DISPENSER FOR PREPARING COLD BEVERAGES**

(57) The invention concerns a device (1) for cooling water comprising :

- a water inlet (11) and a cold water outlet (12),
- a first tank (2) comprising the water inlet,
- a second tank (3) smaller than the first tank and positioned inside the first tank so that the content of the first tank is able to overflow at least one wall of the second tank and to fill said second tank,

- a refrigeration circuit (4) having a refrigerant circulating therein and comprising a compressor (41), a condenser (42), an expansion valve (43) and an evaporator, at least a part (441) of the evaporator being positioned in the internal volume of the second tank,
- a pump (5) for pumping cold water from a water outlet (31) of the second tank,
- means for agitating water in the second tank (3).

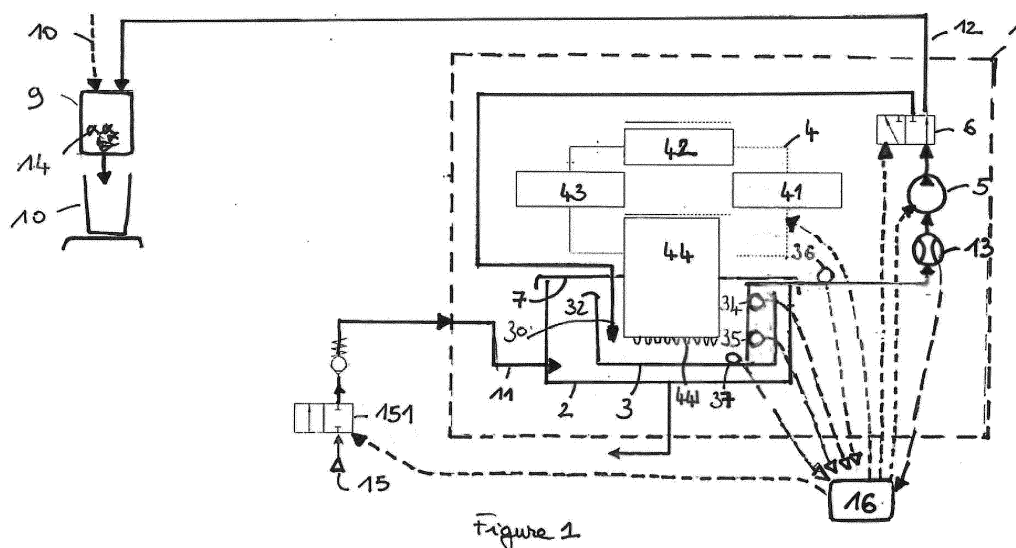


Figure 1

Description

Field of the invention

[0001] The present invention relates to a device for cooling water and its use in a beverage dispenser preparing cold beverages.

Background of the invention

[0002] Beverage dispensers preparing cold beverages are known from the prior art. These dispensers usually comprise a cold water production fluid system treating water and delivering cold water to a device configured for receiving cold water and a beverage ingredient and for preparing a beverage therefrom (mixing chamber, brewing chamber, ...). One problem of some existing cold beverage dispensers is that the time for starting the dispenser and having cold water at the right temperature is generally long because they require the preparation of an ice bank. For example generation of an ice bank requires at least three hours.

[0003] Another problem of some other existing dispensers is that they do not enable the dispensing of a high number of cold beverages in a short dispensing time, in particular when the dispensers do not comprise a cold water reservoir like dispensers using ice bank or thermoblock technologies. With these dispensers the last beverages of a series of ordered beverages are less cold than the first beverages.

[0004] There is a need for improving the preparation of cold beverages with a cooling device.

[0005] It would be advantageous to provide a cooling device starting up in short time.

[0006] It would be advantageous to provide a cooling device delivering cold water at high flow rate and for a long period.

Summary of the invention

[0007] In a first aspect of the invention, there is provided a device for cooling water comprising :

- a water inlet and a cold water outlet,
- a first tank comprising the water inlet,
- a second tank smaller than the first tank and positioned inside the first tank so that the content of the first tank is able to overflow at least one wall of the second tank and to fill said second tank,
- a refrigeration circuit having a refrigerant circulating therein and comprising a compressor, a condenser, an expansion means and an evaporator, a part of the evaporator being positioned in the internal volume of the second tank,
- a pump for pumping cold water from a water outlet of the second tank,
- means for agitating water in the second tank.

[0008] The device comprises two tanks, the second tank being positioned within the first tank.

[0009] The first tank is connected to a supply through a water inlet. The water inlet is generally a pipe emerging in the first tank. Generally the pipe emerges close to the top of the tank, essentially to facilitate the disconnection of the tank for cleaning or maintenance.

[0010] The second tank is smaller than the first tank in width, length and height and is positioned inside the first tank so that the content of the first tank is able to overflow inside the second tank and to fill said second tank when the first tank is filled with water.

[0011] Accordingly the path of water entering the cooling device consists in :

- entering the first tank,
- filling the space between the first tank and the second tank,
- then, when this space is full, overflowing at least one of the walls of the second tank and filling that second tank,
- leaving the second tank through the second tank outlet.

[0012] The device comprises a refrigeration circuit having a refrigerant circulating therein. The circuit comprises a compressor, a condenser, an expansion means and an evaporator. A part of the evaporator is positioned in the internal volume of the second tank so that when the second tank is filled with water, said part of the evaporator contacts and cools water. Preferably the part of the evaporator that contacts water is not traversed by the refrigerant so that there is no risk that refrigerant may leak in water accidentally.

[0013] Preferably both tanks are covered by a lid.

[0014] The lid can support the evaporator so that the part of the evaporator to be positioned in the internal volume of the second tank extends downwardly from the lid.

[0015] The lid can comprise a first dipping tube forming the water inlet in the first tank, a second dipping tube forming the water outlet in the second tank and optionally a third dipping tube forming the water inlet in the second tank for recirculated water.

[0016] The first dipping tube is configured for being connected to a water supply and carries water from said water supply to the bottom of the first tank.

[0017] The second dipping tube takes water from the bottom of the second tank and carries cold water to the water outlet of the device.

[0018] The optional third dipping tube is configured for recirculating water from the second tank back to the first or second tank.

[0019] Preferably the part of the evaporator positioned in the internal volume of the second tank comprises fingertips, said fingertips of the evaporator extending from the top of the second tank inside the second tank.

[0020] According to a first mode the device can comprise :

- a valve for dispensing pumped cold water from the second tank to the cold water outlet or back to the first or second tank,
- internal walls in the second tank for inducing the circulation of water between the fingertips. Accordingly the recirculation of water out from and back to the second tank enables the movement of water around the fingertips and achieves more rapid and efficient cooling of water.

[0021] According to a second mode the device can comprise a stirrer inside the second tank.

[0022] The stirrer can comprise a blade positioned at the bottom of the second tank and rotated by a shaft extending transversally through the lid.

[0023] Accordingly distribution of water along the surface of the evaporator is improved and more rapid and efficient cooling of water is obtained.

[0024] Generally the second tank comprises at least one upper water level sensor, said sensor being configured for detecting an overflow of water from the tanks.

[0025] Accordingly both tanks can be filled with water until an optimised part of the evaporator contacts water with no risk that water overflows the tanks, said upper water level sensor providing an alert when water level has reached the overflow limit.

[0026] Said upper water level sensor also enables an optimised cooling of water since it guarantees that highest possible part of the evaporator is in contact with water.

[0027] Generally the second tank comprises at least one lower water level sensor, said sensor being configured for detecting the position of the level of water relatively to the evaporator. Accordingly, when cold water is dispensed, this sensor guarantees that the tanks are always refilled with water so that a part of the evaporator is immersed in water.

[0028] Generally, the second tank comprises at least one temperature sensor near the water outlet of the second tank.

[0029] Preferably the device comprises one first temperature sensor configured for providing information about the building of ice within the second tank.

[0030] Actually although, according to the principle of the cooling fluid system, ice grows from the surface of the evaporator in contact with water, the volume of ice shall not grow to such an extent that water would not be able to circulate any longer. Consequently the first temperature sensor guarantees that ice has not grown up to said outlet. It is preferably positioned near the water outlet of the second tank.

[0031] Preferably the device comprises one second temperature sensor configured for providing information about the temperature of water at the outlet of the second tank.

[0032] By means of this second temperature sensor it is possible to check if water has reached the desired cold temperature and can be dispensed at the cold water outlet.

[0033] According to a second aspect, there is provided a process for cooling water to a defined temperature with a device such as described above, said device comprising :

- a first temperature sensor for measuring water temperature at the outlet of the second water tank, and
- a second temperature sensor for measuring ice building on the evaporator close to the outlet of the second water tank,

and said process comprising the steps of:

- introducing water from a water supply in the first tank to fill the first tank and the second tank and switching on the cooling fluid system for generating cold, then
- stopping the introduction of water when the second tank is full or at least a part of the evaporator is immersed in water, then
- agitating water in the second tank until the defined temperature is reached at the water outlet of the second tank, and
- monitoring the agitation and the cooling fluid system based on the values of the first and second temperature sensors in order to maintain water at the defined temperature at the outlet of the second water tank and in order to avoid ice building in the second water tank.

[0034] According to the process, water is cooled in two steps in the first and in the second tanks, the second tank being cooler than the first tank since it is in direct contact with the evaporator of the cooling fluid system.

[0035] First water is cooled in the first tank : actually since the first tank surrounds the second tank, said first tank is cooled by heat exchange with the second tank walls. A temperature of 3-7°C can be reached in the first tank when the process is stabilised. Accordingly water introduced in the first tank is pre-cooled before entering the second tank, which decreases the time for cooling tap water.

[0036] Secondly water is further cooled down when it is introduced in the second tank. In this second tank, water is in direct contact with a part of the evaporator of the cooling fluid system. A part of water freezes along the surface of the evaporator and the rest of water is cooled down by contact with ice. A temperature of 0-1 °C can be reached in the second tank when the process is stabilised.

[0037] The fact of agitating cold water - by recirculation of water or with a stirrer - within the second tank creates a flow of water along the surface of the evaporator and increases heat exchange in-between ; rapid cooling of water is obtained.

[0038] All along the process the first temperature sensor measures the temperature of water at the water outlet of the second tank.

[0039] If the water temperature at the outlet of the sec-

ond water tank is greater than the defined temperature :

- water is agitated within the second tank,
- the cooling fluid system remains switched on.

[0040] If the water temperature at the outlet of the second water tank is lower than the defined temperature, the cooling fluid system is switched off, but preferably agitation is maintained. All along the process the second temperature sensor measures the temperature in the second tank near from the water outlet of the second tank. If the temperature becomes too low, meaning that thickness of ice is too important within the second tank, the cooling fluid system is switched off to let temperature increases and ice melts. For example a temperature of - 8°C can be set to decide to switch off the cooling fluid system.

[0041] Preferably the device comprises at least one lower water level sensor, said sensor detecting the position of the water level relatively to the evaporator, and water is introduced in the first tank again when a pre-set lower level is reached.

[0042] According to a third aspect, the invention provides a beverage dispenser preparing beverage with cold water comprising :

- a device for cooling water such as described above,
- a supply of water,
- at least one device for preparing beverage from a beverage ingredient and cold water, said device being connected to the cold water outlet of the device for cooling water.

[0043] The device for preparing beverage from a beverage ingredient and cold water can be comprised in the list of: a mixing bowl, a whipper bowl, a brewing chamber, a jet(s) head. The jet(s) head can be a nozzle delivering at least one jet of cold water. Preferably it delivers at least two jets of cold water and even more preferably the jets head is able to rotate during the delivery of the cold water through the nozzle.

[0044] The mixing bowl can be a chamber configured to receive cold water and a soluble beverage ingredient. It can be designed so as to make an efficient contact of the beverage ingredient and cold water and improve the dissolution of soluble beverage ingredient. The whipper bowl usually comprises a first part which is a mixing chamber configured to receive cold water and a soluble food ingredient and a second part comprising a whipper configured to make the mixture of cold water and the food ingredient foam. The soluble beverage ingredient can be a soluble beverage powder or a beverage concentrate. It can be comprised in the list of : instant coffee powder, milk power, tea powder, chocolate powder, fruit or juice powder, coffee concentrate, milk concentrate, chocolate concentrate, juice concentrates, syrups. The brewing chamber can be a chamber configured to receive an infusable beverage ingredient and cold water. In the brew-

ing process, water infuses and extracts flavours from the brewing ingredient. The brewing chamber can contain a filter to allow beverage to drain from the infused beverage ingredient and hot water mixture. It can be configured to be hermetically closed to receive and cold water and to retain the infusable beverage ingredient. The infusable beverage ingredient can be roast and ground coffee, tea leaves, herbs, botanicals, as well as other substances.

[0045] The dispenser can comprise a container for storing at least one beverage ingredients and configured for delivering one dose of beverage ingredient in the at least one device for preparing a beverage.

[0046] Alternatively the at least one device for preparing beverage can be configured for receiving a pre-packed dose of beverage ingredient like a capsule.

[0047] In the present application the terms "internal", "external", "bottom", "top" and "downwardly" are used to describe the relational positioning of features of the invention. These terms should be understood to refer to the tanks in their normal orientation when positioned in a beverage preparation dispenser for the production of a beverage as shown in the figures.

[0048] The above aspects of the invention may be combined in any suitable combination. Moreover, various features herein may be combined with one or more of the above aspects to provide combinations other than those specifically illustrated and described. Further objects and advantageous features of the invention will be apparent from the claims, from the detailed description, and annexed drawings.

Brief description of the drawings

[0049] The characteristics and advantages of the invention will be better understood in relation to the following figures :

- Figure 1 illustrates a dispenser comprising a water cooling device according to the first mode of the invention,
- Figures 2a to 2f illustrate the process of cooling water in the water cooling device according to the first mode of the invention,
- Figure 3 illustrates the tanks of a water cooling device according to the first mode of the invention,
- Figure 4 illustrates the tanks of a water cooling device according to the second mode of the invention.

Detailed description of the drawings

[0050] **Figure 1** illustrates a dispenser comprising a water cooling device.

[0051] The beverage dispenser comprises a device 9 for preparing beverage from a beverage ingredient 14 and cold water. The beverage dispenser can comprise a supply 10 of beverage ingredient like a container of beverage powder or beverage concentrate or the device 9 for preparing beverage can be configured for receiving

a single dose package of ingredient. The device 9 for preparing beverage delivers the beverage issued from the contact of the ingredient with cold water in a cup 10. Cold water introduced in the device 9 for preparing beverage is dispensed from the cold water outlet 12 of a device 1 for cooling water. The cold water outlet 12 is connected to the device 9.

[0052] The device 1 for cooling water cools water from a supply of water 15, like tap water or water stored in a tank. Water from the supply of water 15 is at ambient temperature or at the temperature of fresh tap water.

[0053] The device 1 for cooling water comprises a first tank 2 with a water inlet 11 connected to the water supply 15 by means of a valve 151.

[0054] The device 1 for cooling water comprises a second tank 3 smaller than the first tank and positioned inside the first tank 2 so that the content of the first tank is able to overflow upper wall edge 32 of the second tank and to fill said second tank.

[0055] The device 1 for cooling water comprises a refrigeration circuit 4 having a refrigerant circulating therein for generating cold and generally comprising a compressor 41, a condenser 42, an expansion means 43 (expansion valve or capillarity tubes) and an evaporator 44 for treating the refrigerant. These devices are well known in the art, as is their operation, and therefore, these elements are not described in detail for purposes of the invention.

[0056] In the illustrated embodiment the part of the evaporator immersed inside the second tank comprises fingertips extending downwardly from the surface of the evaporator coil, that is to say configured for dipping in the second water tank 3. As the expanding gas passes through the coil, the evaporator and the fingertips drop in temperature. As the fingertips are immersed into water, water stored in the second water tank 2 can be cooled down by direct heat exchange with the bottom surface of the fingertips. Progressively ice forms around fingertips.

[0057] Fingertips 441 extending downwardly from of the evaporator are positioned in the internal volume of the second tank so as to contact water present inside that second tank 3. But the tube of the evaporator circulating the refrigerant remains out of the tank and does not contact water.

[0058] The tanks 2, 3 are covered by a lid 7. The lid 7 is configured for holding the evaporator 44 and positioning only a part of the evaporator 44 inside the second water tank 3, like the fingertips 441.

[0059] The second tank 3 comprises a water outlet 31 connected to a pump 5 for evacuating water from the second tank. The cooling device comprises a valve 6 downstream to the pump 5 either for dispensing cold water to the device for preparing beverage 9 or for recirculating water to the second water tank 3, preferably through a feedback water inlet 30.

[0060] The dispenser comprises a control unit 16 collecting information from the water level sensor 34, 35 on

the water level in the second water tank 3 and from the temperature sensors 36, 37 on the temperature in the second water tank 3 and at the water outlet 31 in order to actuate the valve 151 of the water supply, the pump 5, the cooling fluid system 4 and the valve 6.

[0061] The pump 5 for recirculating water of the second water tank is also used to pump cold water for preparing a beverage in the device 9 for preparing beverage. A flowmeter 13 enables the control of the quantity of cold water to be dispensed.

[0062] Figure 2 illustrates the process of cooling water in the water cooling device according to the invention.

[0063] The second water tank 2 comprises several sensors to control the cooling process :

- one first water level sensor 34 is configured for detecting an upper water level in the second tank 2,
- one second water level sensor 35 is configured for detecting a lower water level in the second tank 2,
- one first temperature sensor 36 is configured for measuring the temperature of water dispensed at the water outlet 31 of the second tank 2,
- one second temperature sensor 37 is configured for measuring the temperature in the second tank 2 near from the fingertips.

[0064] Figures 2a-2d illustrate the steps of initiating cooling before the desired temperature is obtained.

[0065] In Figure 2a, water to be cooled is supplied from water supply in the first tank 2 through the water inlet 11. Water is supplied to fill the space the first water until water overflows the edge 32 of the second tank, as illustrated in Figure 2b, and fills the second tank 3 up to the upper level detected by the water level sensor 34, as illustrated in Figure 2c. Once this level is reached, the supply of water is stopped (by closing valve 151). Simultaneously to these steps, the cooling fluid system is switched on so that the evaporator 44 becomes cold.

[0066] Then pump 5 is activated and valve 6 is positioned so that water is pumped from the second water tank 3 and recirculated to the second tank 3 through the water inlet 30 ; this recirculation guarantees that water is agitated in the second tank 3. Meanwhile temperature is measured in the water outlet 31. When the expected temperature is reached, the cooling fluid system is switched off but recirculation is preferably maintained, except when cold water is dispensed by pumping with the pump 6 and by positioning the valve 6 so as to open the cold water outlet 12, as illustrated in Figure 2e.

[0067] Progressively the second tank 2 is emptied. When the water level sensor 35 detects that the lower water level has been reached, as illustrated in Figure 2f, water is supplied again and the cooling fluid system is switched on as illustrated in Figure 2a.

[0068] During the whole process, temperature sensor 37 measures the temperature in the tank near from the fingertips 441 and the water outlet of the second tank 31. If said temperature become too low and is a signal that

the thickness of ice on the fingertips 441 is too important, the cooling fluid system is switched off.

[0069] Figure 3 illustrates the tanks of a water cooling device according to the first mode of the invention. Both tanks 2, 3 are covered by a lid 7. The lid 7 covers the evaporator 44 too and comprises two holes 442, 443 enabling the connection of the evaporator inlet and outlet tubes to the expansion valve and the compressor respectively. Metal rods 441, known as fingertips, are attached to the evaporator tubes and extend downwardly in the second tank 2. Several fingertips 441 are present and positioned in order to be globally uniformly distributed in the volume of the second tank. Fingertips improve heat-exchange between water and the evaporator.

[0070] The lid 7 comprises a first dipping tube 71 configured for being connected to the water supply and that carries water from said water supply to the bottom of the first tank 2.

[0071] The lid 7 comprises a second dipping tube 72 that takes water from the bottom of the second tank 3 and carries cold water to the water outlet.

[0072] The lid 7 comprises a third dipping tube that introduces recirculating water to the bottom of the second tank 3.

[0073] The second tank comprises walls for inducing the circulation of water between the fingertips. Walls are designed and positioned relatively to the second and third dipping tubes 72, 73 so that recirculating water from the third dipping tube 73 is forced to contact most of the fingertips 441 before being pumped through the second dipping tube 72. Accordingly heat exchange is more efficient and cooling of water is rapidly achieved.

[0074] Figure 4 illustrates the tanks of a water cooling device according to the second mode of the invention. Both tanks 2, 3 are covered by a lid 7. The lid 7 covers the evaporator 44 too and comprises two holes 442, 443 enabling the connection of the evaporator inlet and outlet tubes to the expansion valve and the compressor respectively. Metal fingertips 441 are attached to the evaporator tubes and extend downwardly in the second tank 2. Several fingertips 441 are present and positioned in order to be globally uniformly distributed in the volume of the second tank. Fingertips improve heat-exchange between water and the evaporator.

[0075] The lid 7 comprises a first dipping tube 71 configured for being connected to the water supply and that carries water from said water supply to the bottom of the first tank 2.

[0076] The lid 7 comprises a second dipping tube 72 that takes water from the bottom of the second tank 3 and carries cold water to the water outlet.

[0077] The lid 7 presents comprises a hole 74 in which the shaft 81 of a motor 82 is slid. A stirrer 8 is attached at the end of the shaft 81. This stirrer enables water agitation in the second tank 3 and increases heat exchange between water and fingertips 441.

[0078] In this second mode, the stirrer enables the agitation of water in the second tank.

[0079] Whatever the mode used for the cooling device, with the dispenser of the present invention, it is possible :

- to prepare beverages presenting an in-cup temperature of 5 ± 2 °C while dispensing 15 beverages of 350 ml in 15 minutes,
- to cool down water in the second tank to a temperature of less than 5 °C in 15 minutes starting from water at 30°C.

[0080] Although the invention has been described with reference to the above illustrated embodiments, it will be appreciated that the invention as claimed is not limited in any way by these illustrated embodiments.

[0081] Variations and modifications may be made without departing from the scope of the invention as defined in the claims. Furthermore, where known equivalents exist to specific features, such equivalents are incorporated as if specifically referred in this specification.

[0082] As used in this specification, the words "comprises", "comprising", and similar words, are not to be interpreted in an exclusive or exhaustive sense. In other words, they are intended to mean "including, but not limited to".

List of references in the drawings :

device for cooling water	1
first tank	2
second tank	3
feedback water inlet	30
water outlet	31
upper walls edge	32
internal walls	33
first water level sensor	34
second water level sensor	35
first temperature sensor	36
second temperature sensor	37
refrigeration circuit	4
compressor	41
condenser	42
expansion valve	43
evaporator	44
fingertips	441
pump	5
valve	6
lid	7
dipping tubes	71,72,73
hole	74
stirrer	8
shaft	81
motor	82
device for preparing beverage	9
supply of beverage ingredient	10
water inlet	11

(continued)

cold water outlet	12
flowmeter	13
beverage ingredient	14
water supply	15
valve	151
control unit	16

Claims**1.** Device (1) for cooling water comprising :

- a water inlet (11) and a cold water outlet (12),
- a first tank (2) comprising the water inlet,
- a second tank (3) smaller than the first tank and positioned inside the first tank so that the content of the first tank is able to overflow at least one wall of the second tank and to fill said second tank,
- a refrigeration circuit (4) having a refrigerant circulating therein and comprising a compressor (41), a condenser (42), an expansion means (43) and an evaporator (44), a part (441) of the evaporator being positioned in the internal volume of the second tank,
- a pump (5) for pumping cold water from a water outlet (31) of the second tank,
- means for agitating water in the second tank (3).

2. Device according to Claim 1 wherein the evaporator (44) comprises fingertips, the fingertips of the evaporator extending downwardly inside the second tank.**3.** Device according to Claim 2 wherein it comprises :

- a valve (6) for dispensing pumped cold water from the second tank (3) to the cold water outlet (12) or back to the first or the second tank (2, 3),
- internal walls (33) in the second tank (3) for inducing the circulation of water between the fingertips.

4. Device according to Claim 1 or 2, wherein said device comprises a stirrer (34) inside the second tank (3).**5.** Device according to any one of the precedent claims, wherein both tanks are covered by a lid (7), the lid supporting the evaporator (44).**6.** Device according to the precedent claim, wherein the lid (7) comprises a first dipping tube (71) forming the water inlet in the first tank and a second dipping tube (72) forming the water outlet in the second tank.**7.** Device according to any one of the precedent claims wherein the second tank (3) comprises at least one upper water level sensor (34), said sensor detecting an overflow of water from the tanks.**8.** Device according to any one of the precedent claims wherein the second tank comprises at least one lower water level sensor (35), said sensor detecting the position of the level water relatively to the evaporator.**9.** Device according to any one of the precedent claims wherein the second tank comprises at least one temperature sensor (36, 37) near the water outlet of the second tank.**10.** Process for cooling water to a defined temperature with a device according to any one of Claims 1 to 9, said device comprising :

- a first temperature sensor (36) for measuring water temperature at the outlet of the second water tank, and
- a second temperature sensor (37) for measuring ice building on the evaporator close to the outlet of the second water tank,

and said process comprising the steps of:

- introducing water from a water supply in the first tank (2) to fill the first tank and the second tank and switching on the cooling fluid system (4) for generating cold,
- stopping the introduction of water when the second tank (3) is full or at least a part of the evaporator (44) is immersed in water,
- agitating water in the second tank (3) until the defined temperature is reached at the water outlet of the second tank,
- monitoring the agitation and the cooling fluid system (4) based on the values of the first and second temperature sensors in order to maintain water at the defined temperature at the outlet of the second water tank and in order to avoid ice building up in the second water tank.

11. Process for cooling water according to Claim 10 wherein the device comprises at least one lower water level sensor, said sensor detecting the position of the water level relatively to the evaporator, and water is introduced in the first tank again when a preset lower level is reached.**12.** Beverage dispenser preparing beverage with cold water comprising :

- a device for cooling water according to any one of Claim 1 to 9,
- a supply of water,

- at least one device (9) for preparing beverage from a beverage ingredient and cold water, said device being connected to the cold water outlet of the device for cooling water.

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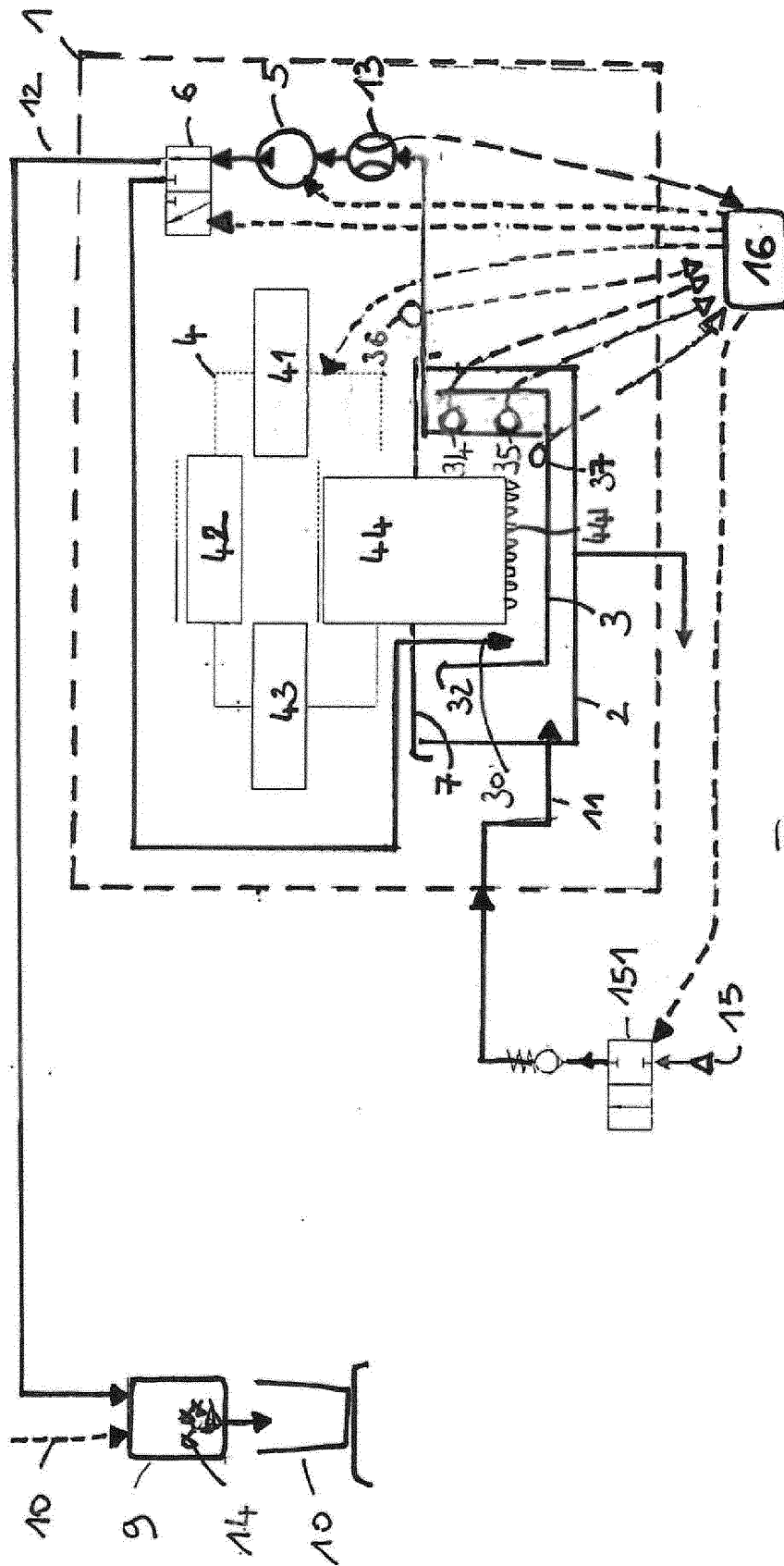


Figure 1

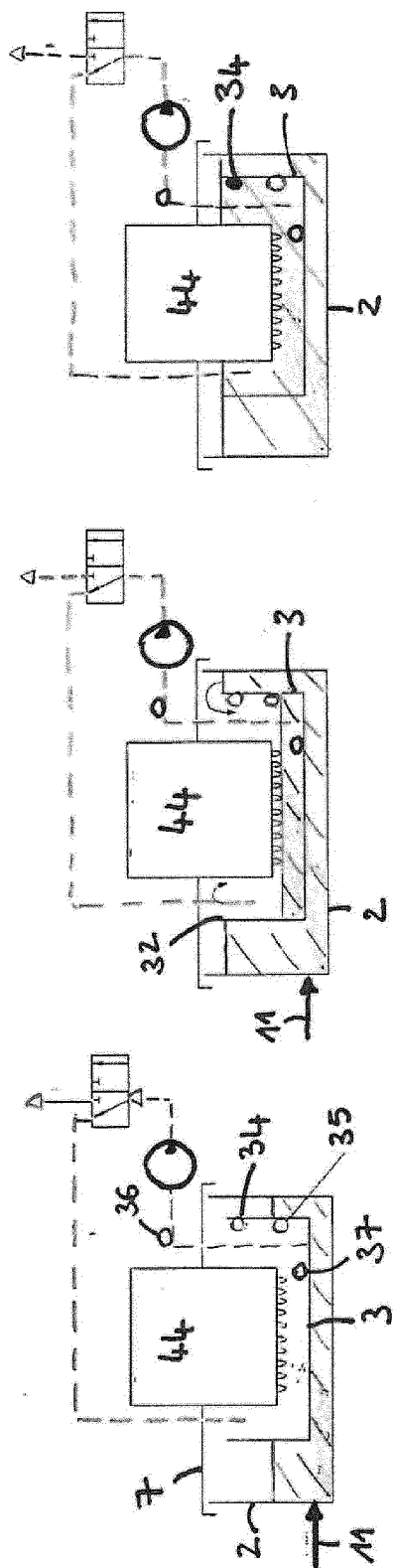


Fig. 2a

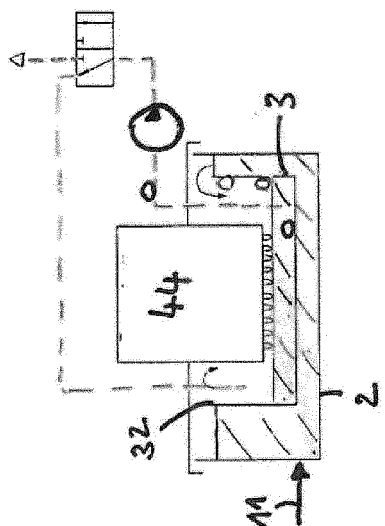


Fig. 2b

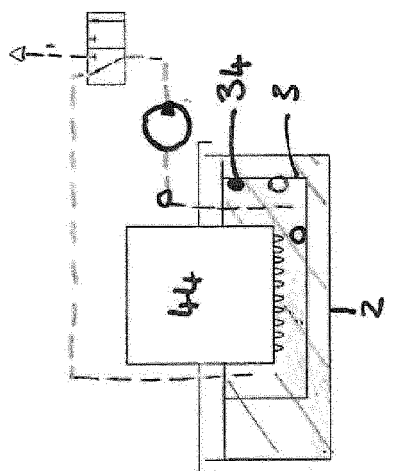


Fig. 2c

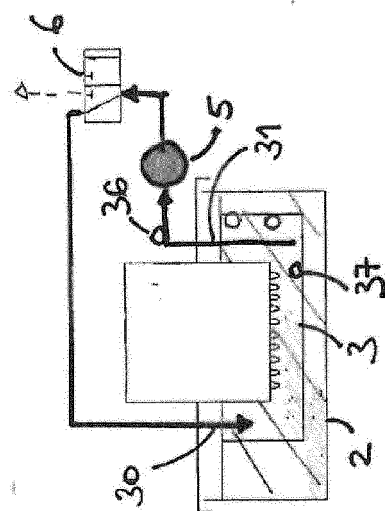


Fig. 2d

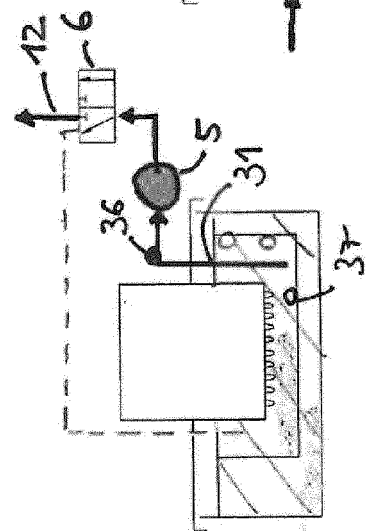


Fig. 2e

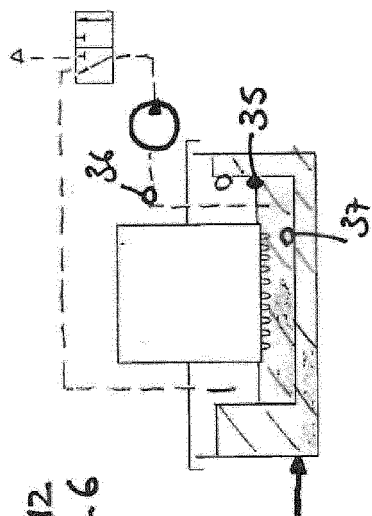


Fig. 2f

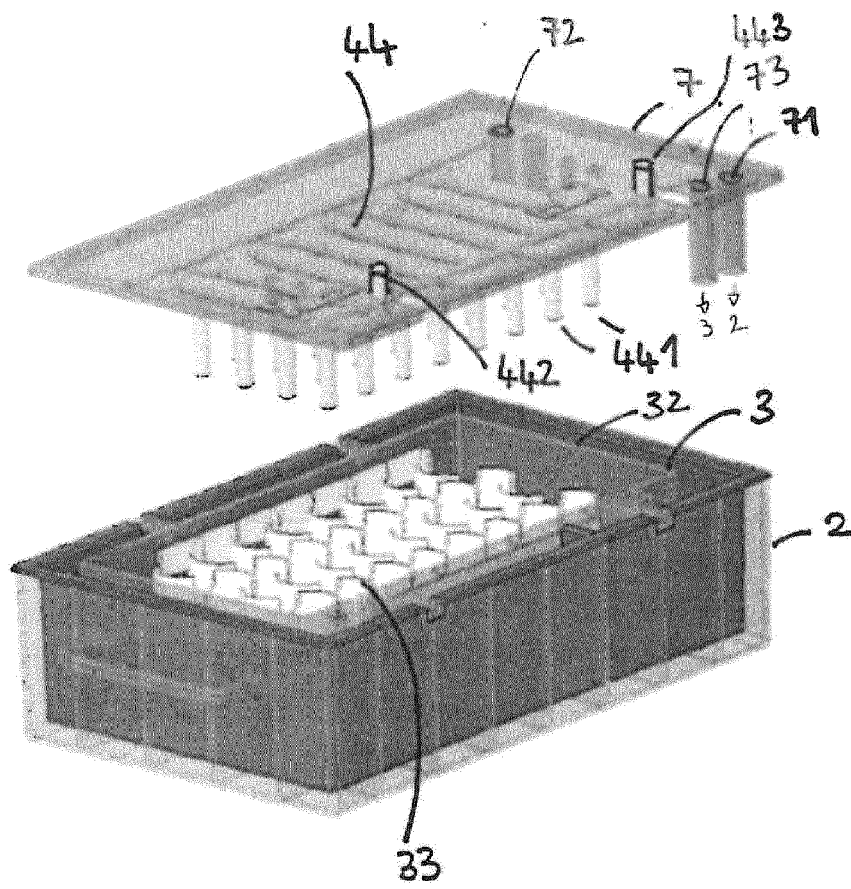


Figure 3

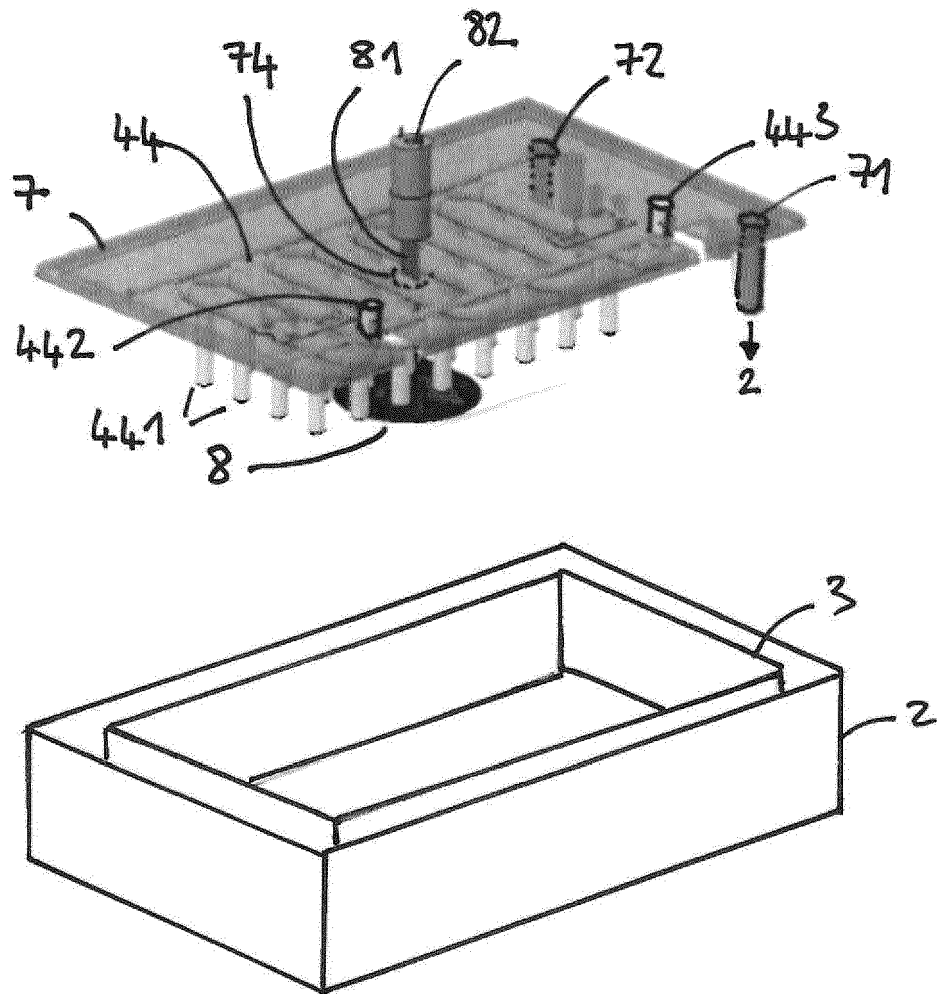


Figure 4



EUROPEAN SEARCH REPORT

Application Number
EP 15 15 7418

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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Place of search Munich		Date of completion of the search 11 August 2015	Examiner Schultz, Tom
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