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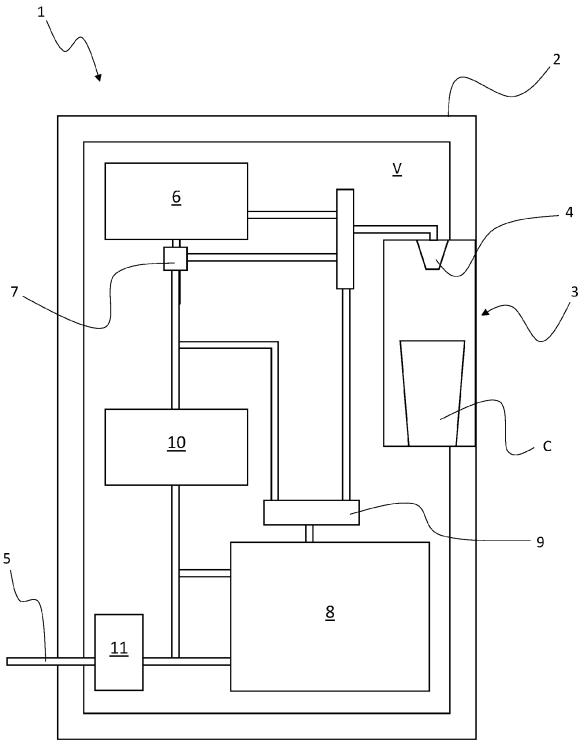
(54) A DISPENSING APPARATUS FOR DISPENSING A BEVERAGE, PREFERABLY HYDROGENATED WATER

(57) A dispensing apparatus (1) for dispensing a beverage, preferably hydrogenated water comprises a containment body (2) on which a dispensing compartment (3) is obtained, a dispensing nozzle (4) arranged at the dispensing compartment (3), a conveying conduit (5) for conveying a water flow connected to the dispensing nozzle (4) and connectable to a water source, a hydrogenation device (6) interposed between the conveying conduit (5) and the dispensing nozzle (4) and configured to generate a predetermined quantity of gaseous hydrogen, at least one distributor valve (7), normally closed, arranged upstream of the hydrogenation device (6) and configured to distribute a first part of the water flow towards the dispensing nozzle (4) and, at the same time, a second part through the hydrogenation device (6), an activation device configured to generate a dispensing signal to configure the distributor valve (7) in an open position and, at the same time, to enable the hydrogenation device (6) to generate the predetermined quantity of gaseous hydrogen so as to mix it at the dispensing nozzle (4) with the first part of the water flow to dispense a hydrogenated water flow.

Fig. 1



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Description

Technical field

[0001] The present invention is applied to the field of dispensing apparatuses.

[0002] In particular, the invention relates to a dispensing apparatus for dispensing one or more beverages, preferably hydrogenated water.

[0003] The invention preferably also relates to a method for dispensing hydrogenated water.

Prior art

[0004] The process of electrolysis of water allows it to be broken down into its main components, namely gaseous oxygen (O_2) and gaseous hydrogen (H_2). Such a division occurs thanks to two different chemical reactions which occur at the electrodes of the electrolytic cell: the reduction and oxidation of water. More precisely, on the surface of the cathode, the negative electrode, water reduction occurs, i.e. the H^+ protons present in the water and attracted towards the cathode receive an electron from the latter so as to generate the formation of gaseous hydrogen molecules (H_2). The H_2 molecules dissolved in water act as antioxidants capable of selectively neutralising free radicals. This behaviour can induce a number of benefits: a detox effect thanks to the stimulation of diuresis; an anti-ageing effect; a maintenance effect of the correct balance of intestinal bacterial flora; a reduction effect of the production of lactic acid at the muscular level.

[0005] Currently, the known hydrogenated water dispensers comprise a tank (of variable volume depending on need) configured to contain a predefined quantity of hydrogenated water previously prepared with the electrolysis process described above.

[0006] Therefore, as long as the tank contains hydrogenated water, a user can proceed with its dispensing. At a later point in time, e.g., at the end of the quantity of hydrogenated water or between two different dispensings, the dispensing apparatuses in accordance with the state of the art can generate a new quantity of hydrogenated water which can be dispensed at a later point in time.

[0007] Therefore, it follows that such dispensing apparatuses are not configured and configurable to produce hydrogenated water on demand, i.e., instantaneously and at the same time as the user requests it.

[0008] This results in the pre-prepared hydrogenated water remaining stagnant in the tank in which it has been stored, allowing the proliferation of bacterial loads which are harmful to health. In addition, such tanks cannot even be emptied completely, leading to an easier proliferation of the aforesaid bacterial loads.

Summary

[0009] In this context, the technical task underlying the present invention is to propose a dispensing apparatus for dispensing a beverage, preferably hydrogenated water, which the drawbacks in the prior art as described above.

[0010] In particular, an object of the present invention is to provide a dispensing apparatus which is capable of guaranteeing a considerable level of purity of the hydrogenated water to be dispensed.

[0011] Another object of the present invention is to provide a dispensing apparatus which is capable of dispensing hydrogenated water having a neutral pH substantially equal to that of the water used as a base to be hydrogenated. Specifically, therefore, the object of the invention is to generate hydrogenated water which has a non-acidic pH value on a par with the hydrogenated water produced by the known dispensing apparatuses. A further object of the present invention is to also provide a method for dispensing hydrogenated water which is optimised with respect to the methods known in the state of the art and applied by the known dispensing apparatuses.

[0012] The stated technical task and specified objects are substantially achieved by a dispensing apparatus for dispensing a beverage, preferably hydrogenated water, which comprises the technical features disclosed in the independent claim. The dependent claims correspond to further advantageous aspects of the invention.

[0013] It should be appreciated that this summary introduces a selection of concepts in simplified form, which will be further elaborated on in the detailed description provided below.

[0014] The invention relates to a dispensing apparatus for dispensing a beverage, preferably hydrogenated water, comprising a containment body defining a main volume thereof and on which a dispensing compartment is obtained in which at least one fillable container is positionable. A dispensing nozzle arranged at the dispensing compartment is configured to dispense a drink, while a conveying conduit for conveying a water flow is arranged in the main volume and, furthermore, is connected to the dispensing nozzle and is connectable to a water source, preferably mains water. The dispensing apparatus also comprises a hydrogenation device configured to generate a predetermined quantity of gaseous hydrogen and is interposed between the conveying conduit and the dispensing nozzle. At least one distributor valve, normally in a closed position, is arranged along the conveying conduit upstream of the hydrogenation device. In particular, the distribution valve is configured to distribute a first part of the water flow towards the dispensing nozzle and, at the same time, a second part of the water flow through the hydrogenation device. In addition, an activation device controllable by a user and configured to generate a dispensing signal to configure the distributor valve in an open position and, at the

same time, to enable the hydrogenation device to generate the predetermined quantity of gaseous hydrogen so as to mix it at the dispensing nozzle with the first part of the water flow to dispense a hydrogenated water flow.

[0015] Advantageously, therefore, the aforesaid dispensing apparatus 1 is configured to generate hydrogenated water at the user's request, in real time, so that no storage tank of previously prepared hydrogenated water, in which bacteria potentially dangerous to human health could proliferate, is required.

[0016] The invention also relates to a method for dispensing hydrogenated water on demand. Preferably, the aforesaid method involves arranging a dispensing apparatus as described above.

[0017] In particular, the method comprises the following operating steps:

- conveying a water flow along a conveying conduit towards a dispensing nozzle;
- distributing a first part of the water flow towards a dispensing nozzle and a second part of the water flow through a hydrogenation device configured to produce a predetermined quantity of gaseous hydrogen;
- mixing the quantity of gaseous hydrogen with the first part of the water flow at the dispensing nozzle so as to dispense a predetermined quantity of hydrogenated water,

in which the aforesaid steps are performed following the generation of a dispensing signal by a user by means of a special activation device.

Brief description of the drawings

[0018] Further features and advantages of the present invention will become more apparent from the approximate and thus non-limiting description of a preferred, but not exclusive, embodiment of a dispensing apparatus for dispensing a beverage, preferably hydrogenated water, as illustrated in the accompanying drawings, in which:

- figure 1 illustrates, according to a schematic view, a dispensing apparatus for dispensing a beverage, preferably hydrogenated water;
- figure 2 illustrates, according to a perspective view, a first embodiment of the dispensing apparatus in which the containment body has been removed to make the internal components more visible;
- figure 3 illustrates, according to a perspective view, a second embodiment of the dispensing apparatus in which the containment body has been removed to make the internal components more visible.

[0019] With reference to the figures, they serve solely to illustrate embodiments of the invention with the aim of better clarifying, in combination with the description, the inventive principles on which the invention is based.

Detailed description of at least one embodiment

[0020] The present invention relates to a dispensing apparatus for dispensing a beverage, preferably hydrogenated water which, with reference to the figures, has been generically indicated with the number 1.

[0021] Any modifications or variants which, in the light of the description, are evident to the person skilled in the art must be considered to fall within the scope of protection established by the present invention, according to considerations of technical equivalence.

[0022] Figure 1 shows a schematization of a dispensing apparatus 1 for dispensing a beverage, preferably hydrogenated water.

[0023] In particular, the dispensing apparatus 1 comprises a containment body 2 defining a main volume V thereof and on which a dispensing compartment 3 is obtained in which at least one fillable container C is positionable. A dispensing nozzle 4 arranged at the dispensing compartment 3 is configured to dispense at least one beverage.

[0024] The dispensing apparatus 1, therefore, also comprises a conveying conduit 5 for conveying a water flow arranged in the main volume V connected to the dispensing nozzle (at its first end) and connectable to a water source, preferably mains water (at its second end).

[0025] The dispensing apparatus 1, moreover, comprises a hydrogenation device 6 configured to generate a predetermined quantity of gaseous hydrogen and interposed between the conveying conduit 5 and the dispensing nozzle 4. At least one distributor valve 7, normally in a closed position, is arranged along the conveyor line 5 upstream of the hydrogenation device 6. In detail, the distributor valve 7 is configured to distribute a first part of the water flow towards the nozzle 4 and, at the same time, a second part of the water flow through the hydrogenation device 6.

[0026] A user-controllable trigger device, e.g. via a control panel, is configured to generate a dispensing signal to configure the distributor valve 7 in an open position and, at the same time, to enable the hydrogenation device 6 to generate the predetermined quantity of gaseous hydrogen. Thus, the dispensing apparatus 1 is advantageously capable of mixing at the dispensing nozzle 4 the quantity of gaseous hydrogen with the first part of the water flow so as to dispense a hydrogenated water flow in real time, on demand.

[0027] Even more advantageously, therefore, the aforesaid dispensing apparatus 1 is configured to generate hydrogenated water at the user's request, in real time, so that no storage tank of previously prepared hydrogenated water, in which bacteria potentially dangerous to human health could proliferate, is required.

[0028] That is, the hydrogenated water is only produced when it is requested by the user and, therefore, only the quantity which the user intends to consume is produced. Preferably, the distributor valve 7 is configured to distribute a percentage of water flow varying between

5% and 20%, preferably comprised between 7% and 15% through the hydrogenation device.

[0029] Thereby, only a small quantity of the entire water flow is used to obtain the necessary quantity of gaseous hydrogen useful for making the hydrogenated water.

[0030] In addition, using the aforesaid percentage of water to obtain gaseous hydrogen useful for hydrogenation allows to obtain a hydrogen concentration in the range of 800-2,000 ppb. Such a concentration, advantageously, maintains the initial pH value of the water flow withdrawn from the water source substantially unchanged.

[0031] That is, the hydrogenation device 6 is advantageously configured to hydrogenate the correct quantity of water so as to obtain the correct quantity of gaseous hydrogen to be mixed to obtain hydrogenated water with a neutral pH (i.e., not acidic due to the addition of gaseous hydrogen).

[0032] In accordance with an aspect of the invention, the hydrogenation device 6 comprises at least one electrolytic cell which, in turn, comprises at least one proton interchange membrane interposed between a pair of platinum electrodes.

[0033] Preferably, the hydrogenation device comprises membranes made of PEM ('Polymer Electrolyte Membrane') material so as to ensure the formation of gaseous hydrogen with a high purity, generally above 99.9%, and without it also tending to interact/combine with other molecules which could be present in the system as a whole (e.g., molecules deriving from the materials present that constitute the system components and which, if ingested, could be toxic above certain percentages).

[0034] Even more preferably, the hydrogenation device 6 comprises a plurality of electrolytic cells arranged in series and/or in parallel with each other.

[0035] Advantageously, as mentioned above, the electrolysis process allows to generate gaseous hydrogen having a degree of purity equal to at least 99.9%.

[0036] In accordance with an aspect of the invention, the hydrogenation device 6 comprises a filter (not visible in the accompanying figures) configured to mechanically filter the quantity of incoming water in the same hydrogenation device 6.

[0037] Advantageously, the filter allows to maintain a high level of purity by filtering out any impurities in the water flow, which will therefore not be assimilated by the user.

[0038] In accordance with another aspect of the invention illustrated in figure 2, the dispensing apparatus 1 comprises at least one reverse osmosis device 8 arranged along the conveying conduit 5 and upstream of said hydrogenation device 6.

[0039] Thereby, conveying the water flow through the reverse osmosis device 8 allows to perform a desalination treatment and, in addition, to remove any traces of phosphates, calcium and heavy metals, pesticides, radioactive materials and other possible polluting molecules.

[0040] Preferably, the dispensing apparatus 1 comprises a two-way valve 9 arranged downstream of the reverse osmosis device 8 and configured to completely divert the water flow towards the dispensing nozzle 4 or completely through the hydrogenation device 6.

[0041] Thereby, therefore, the user is advantageously capable of selecting whether to dispense a quantity of hydrogenated water or a quantity of osmotic and hydrogenated water.

[0042] in fact, by means of a special control device (e.g., a specific button on a control panel of the dispensing apparatus 1), the user is easily able to select which drink is to be dispensed. Consequently, the selection of the specific control device generates a corresponding dispensing signal with which the various components of the dispensing apparatus 1, e.g., the two-way valve 9, the reverse osmosis device 8, the hydrogenation device 6, are correctly enabled and/or controlled so as to obtain the dispensing of the desired beverage.

[0043] In accordance with a further aspect (not illustrated) of the invention, the dispensing apparatus 1 comprises a carbonation device configured to receive a predetermined quantity of carbon dioxide, preferably fed from a suitably connected cylinder, to be added to the first part and/or to the second part of the water flow so as to allow the dispensing of carbonated and hydrogenated water.

[0044] That is, the carbonation device can be connected upstream or downstream of the hydrogenation device 6 to carbonate, respectively, the first part of the water flow (plain, not yet altered with respect to what was recovered from the mains), the second part of the water flow (already hydrogenated), or both.

[0045] Preferably, the carbonation device is immersed in a refrigeration tank suitably placed inside the containment body 2 of the dispensing apparatus 1 so that cold carbonated water (possibly also hydrogenated) can be supplied to the consumer. Advantageously, in fact, the dispensing apparatus 1 can have a dispensing conduit and a corresponding dispensing nozzle configured to allow the dispensing of only carbonated water, possibly chilled but not hydrogenated. That is, only the first part of the water flow, which has been carbonated and possibly chilled, is dispensed in this case.

[0046] In accordance with an aspect of the invention illustrated in figure 3, the dispensing apparatus 1 comprises a heat exchanger 10 arranged upstream of the hydrogenation device 6. In particular, the heat exchanger 10 is configured at least to lower the temperature of the water flow to a preset temperature. In detail, the heat exchanger 10 comprises at least one temperature sensor configured to detect the temperature of the incoming water flow in the same heat exchanger.

[0047] Preferably, the heat exchanger 10 comprises a cooling coil through which the water flow is capable of flowing in order to be cooled to a specific temperature before it is conveyed through the hydrogenation device 6.

[0048] Even more preferably, the heat exchanger comprises several temperature sensors so that at least the inlet and outlet temperatures of the water flow from the heat exchanger 10 itself can be monitored so that the latter can be appropriately configured to cool the water flow to the desired temperature.

[0049] The heat exchanger can also have different embodiments with respect to the aforesaid coil and, moreover, can also be appropriately configured to heat the water flow temperature.

[0050] In accordance with another aspect of the invention, the dispensing apparatus 1 comprises a preliminary filter 11 arranged along the conveying conduit, preferably at an initial section thereof connectable to the water source, upstream of any component arranged along the same conveying conduit 5.

[0051] Thereby, the preliminary filter 11 is advantageously capable of blocking and retaining possible pollutants which could be present in the water flow withdrawn from the water source.

[0052] Preferably, the preliminary filter 11 is of the mechanical type.

[0053] In accordance with a further aspect of the invention, the activation device comprises a mechanical or electromechanical component associated with the hydrogenation device 6 in that it is configured to activate the latter after a specific action has been performed and, thus, a condition for which it is regulated has been met.

[0054] In accordance with a first embodiment example, an electromechanical control directly connected to the heat exchanger 10 and the hydrogenation device 6 is configured to activate the latter as long as an operator keeps the aforesaid electromechanical control active, that is, as long as the operator controls the dispensing of the desired quantity of hydrogenated water.

[0055] In accordance with a second embodiment example, the reverse osmosis device 8 comprises a tap which can normally be configured between an open and closed condition to generate a pressure difference which can be detected by a special component, e.g., a pressure switch. Depending on the aforesaid pressure gradient detection inside the system - i.e., when the tap is opened - the hydrogenation device 6 is activated. Consequently, when the aforesaid tap is closed, the hydrogenation device 6 is also simultaneously disabled, and is therefore only operational for the time required to hydrogenate the water to be dispensed.

[0056] In accordance with an alternative and/or additional aspect of the invention, the dispensing apparatus 1 comprises at least one pressure switch (not illustrated) arranged downstream of the distributor valve 7 and, in addition, connected with the hydrogenation device 6. In particular, the pressure switch is configured to enable the hydrogenation device 6 when the distributor valve 7 is in an open position in relation to the dispensing signal.

[0057] Advantageously, following the selection of the activation device and, thus, the consequent opening of the distributor valve 7, the pressure switch is advantageously configured to detect the water flow therethrough. Such a detection results in the generation of an enabling signal sent by the same pressure switch to the hydrogenation device 6 for the activation of the latter, and therefore the generation of the required quantity of gaseous hydrogen.

[0058] That is, therefore, the pressure switch acts as a control element advantageously configured to enable the corresponding internal component with which it is connected, in this case the hydrogenation device 6, only for the useful time interval and only if a corresponding water flow being conveyed is present (i.e., according to a detected pressure gradient value and/or in the presence of a conveyed volume of water - i.e., volumetric control).

[0059] That is, the internal component is enabled to operate only for the strictly necessary temperature range so as to limit consumption, waste and wear of the component itself. The dispensing apparatus 1 can comprise further pressure switches arranged downstream of other components, e.g., the reverse osmosis device, to always perform the aforesaid control functions (whether a water flow is actually conveyed following a user selection) and activation (of the component of the dispensing apparatus 1 useful for generating the type of beverage selected by the user by means of the activation device).

[0060] The dispensing apparatus 1 in accordance with the invention also has further possible embodiments listed below:

- a plurality of dispensing nozzles 4, each for a corresponding beverage; and/or
- a plurality of activation devices, each related to a corresponding beverage, and/or
- further conduits, e.g., intermediate connecting conduits, and related multi-way valves configured to connect the previously described components to each other so as to increase the types of beverages which can be dispensed: hydrogenated cold water, hydrogenated osmotic water, hydrogenated osmotic cold water ...
- a control unit connected with each activation device and with each pressure switch (if present) and/or component of the dispensing apparatus 1. In fact, the control unit is advantageously configured to generate the dispensing signals according to the selection of an activation device. In addition, the control unit is advantageously configured to send such dispensing signals to the components of the dispensing apparatus 1 so as to enable, disable, adjust or maintain them unchanged in their condition/position.

[0061] The present invention also relates to a method for dispensing hydrogenated water on demand.

[0062] In particular, the aforesaid method comprises the following steps:

- conveying a water flow along a conveying conduit 5 towards a dispensing nozzle 4;

- distributing a first part of the water flow towards a dispensing nozzle 4 and a second part of the water flow through a hydrogenation device 6 configured to produce a predetermined quantity of gaseous hydrogen;
- mixing said quantity of gaseous hydrogen with the first part of the water flow at the dispensing nozzle 4 to dispense a predetermined quantity of hydrogenated water. The aforesaid steps are performed following the generation of a dispensing signal by a user by means of a special activation device.

[0063] Advantageously, the aforesaid method allows hydrogenated water to be generated in real time, depending on the user's demand, without having to draw from a previously filled tank.

[0064] That is, the method allows only the quantity of hydrogenated water which the user intends to consume to be prepared in real time.

[0065] Preferably, the aforesaid method is applied by means of a dispensing apparatus 1 of the type described above and made and prepared in advance for its use.

Claims

1. A dispensing apparatus (1) for dispensing a beverage, preferably hydrogenated water, comprising:

- a containment body (2) defining a main volume (V) thereof and on which a dispensing compartment (3) is obtained in which at least one fillable container (C) is positionable;
- a dispensing nozzle (4) arranged at said dispensing compartment (3) and configured to dispense a beverage;
- a conveying conduit (5) for conveying a water flow arranged in said main volume connected to said dispensing nozzle (4) and to a water source, preferably mains water, **characterised in that** it further comprises:
- a hydrogenation device (6) interposed between said conveying conduit (5) and said dispensing nozzle (4) and configured to generate a predetermined quantity of gaseous hydrogen;
- at least one distributor valve (7), normally in a closed position, arranged along said conveying conduit (5) upstream of said hydrogenation device (6), said distributor valve (7) being configured to distribute a first part of said water flow towards said dispensing nozzle (4) and, at the same time, a second part of said water flow through said hydrogenation device (6);
- an activation device controllable by a user and configured to generate a dispensing signal to configure said distributor valve (7) in an open position and, at the same time, to enable said hydrogenation device (6) to generate the predetermined quantity of gaseous hydrogen so as to mix it at said dispensing nozzle (4) with said first part of said water flow to dispense a hydrogenated water flow.

2. The dispensing apparatus (1) according to claim 1, wherein said distributor valve (7) is configured to distribute a percentage of water flow varying between 5% and 20% through said hydrogenation device (6).

3. The dispensing apparatus (1) according to claim 1 or 2, wherein said hydrogenation device (6) comprises at least one electrolytic cell comprising at least one proton exchange membrane interposed between a pair of platinum electrodes.

4. The dispensing apparatus (1) according to claim 3, wherein said hydrogenation device (6) comprises a plurality of said electrolytic cells arranged in series and/or in parallel with each other.

5. The dispensing apparatus (1) according to any one of the preceding claims, wherein said hydrogenation device (6) comprises a filter configured to mechanically filter the quantity of incoming water in the same hydrogenation device (6).

6. The dispensing apparatus (1) according to any one of the preceding claims, comprising at least one reverse osmosis device (8) arranged along said conveying conduit (5) and upstream of said hydrogenation device (6).

7. The dispensing apparatus (1) according to claim 6, comprising a two-way valve (9) arranged downstream of said reverse osmosis device (8) and configured to completely divert the water flow towards said dispensing nozzle (4) or completely through said hydrogenation device (6).

8. The dispensing apparatus (1) according to any one of the preceding claims, comprising a heat exchanger arranged upstream of said hydrogenation device (6), said heat exchanger being configured at least to lower the temperature of the water flow to a preset temperature, said heat exchanger comprising at least one temperature sensor configured to detect the temperature of said incoming water flow in the same heat exchanger.

9. The dispensing apparatus (1) according to any one of the preceding claims, comprising a preliminary filter arranged along said conveying conduit (5), at an initial section connectable to the water source, upstream of any component arranged along said conveying conduit (5).

10. The dispensing apparatus (1) according to any one of the preceding claims, comprising at least one pressure switch arranged downstream of said distributor valve (7) and connected with said hydrogenation device (6), said pressure switch being configured to enable said hydrogenation device (6) when said distributor valve (7) is in an open position in relation to the dispensing signal.

11. A method for dispensing hydrogenated water on demand, comprising the following steps:

- arranging a dispensing apparatus (1) according to any one of claims 1 to 10;
- conveying a water flow along said conveying conduit (5) towards said dispensing nozzle (4);
- distributing a first part of said water flow towards said dispensing nozzle (4) and a second part of said water flow through said hydrogenation device (6) configured to produce a predetermined quantity of gaseous hydrogen;
- mixing said quantity of gaseous hydrogen with said first part of said water flow at said dispensing nozzle (4) to dispense a predetermined quantity of hydrogenated water,

wherein said steps are performed following the generation of a dispensing signal by a user by means of a special activation device.

Fig. 1

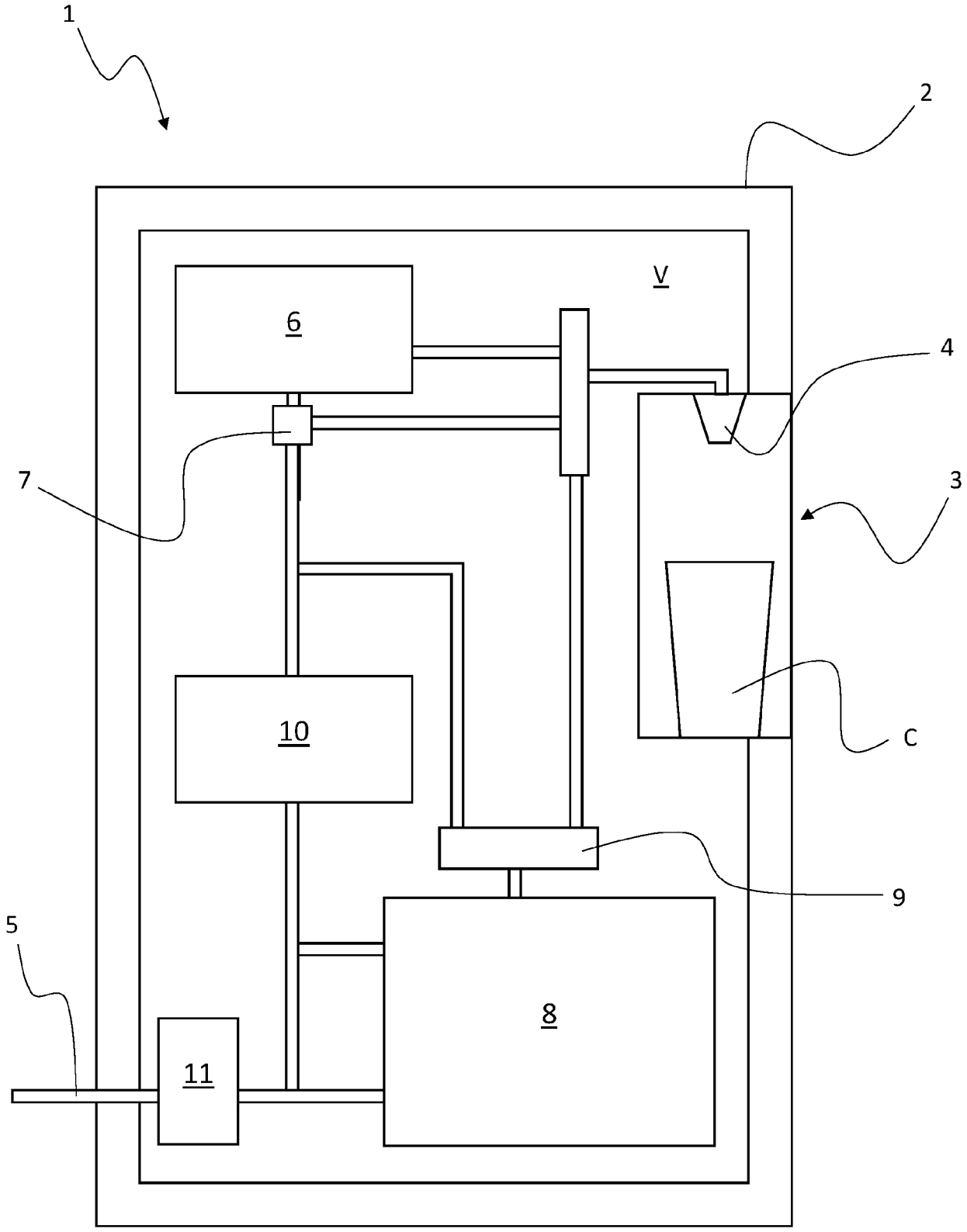


Fig. 2

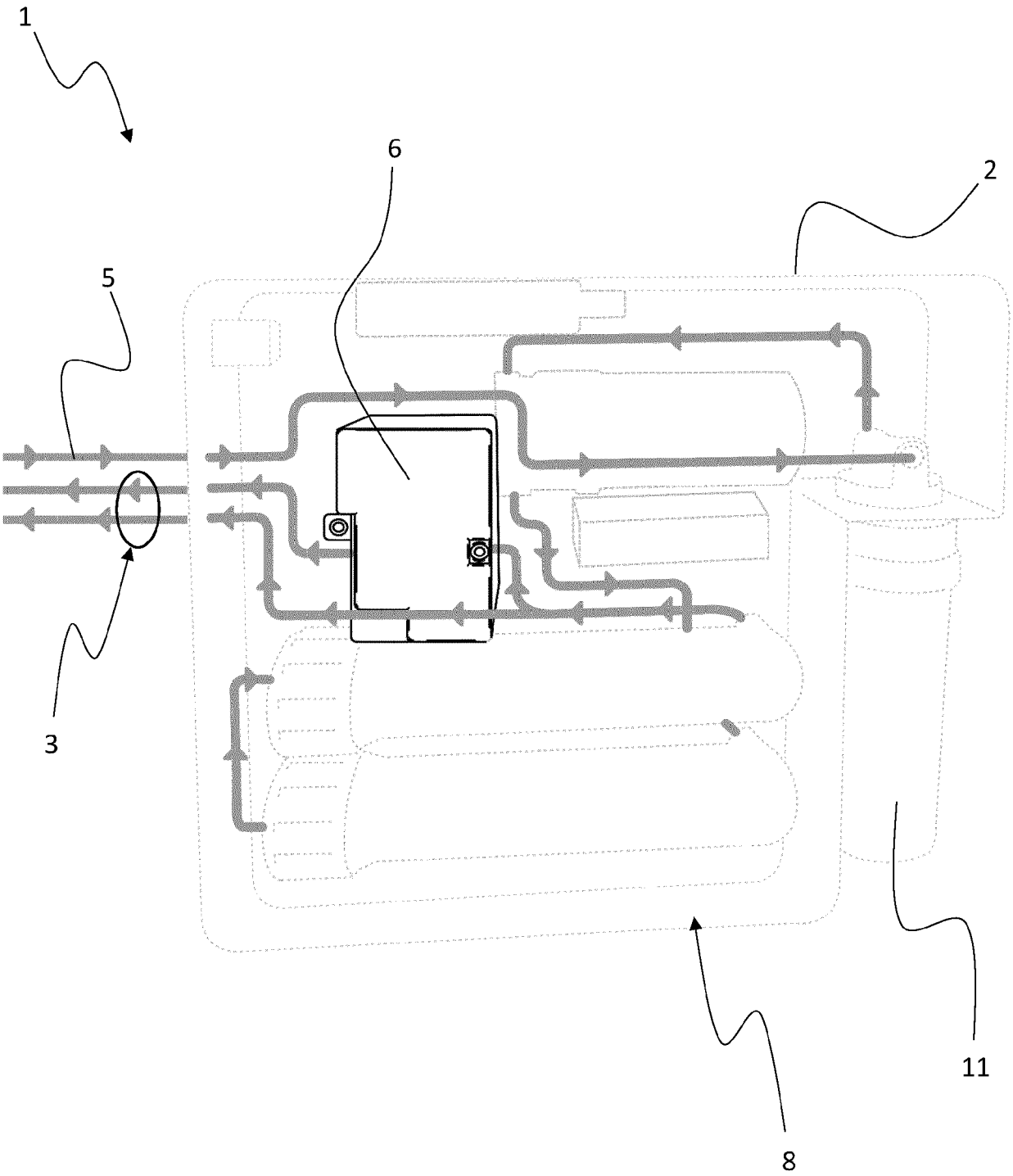
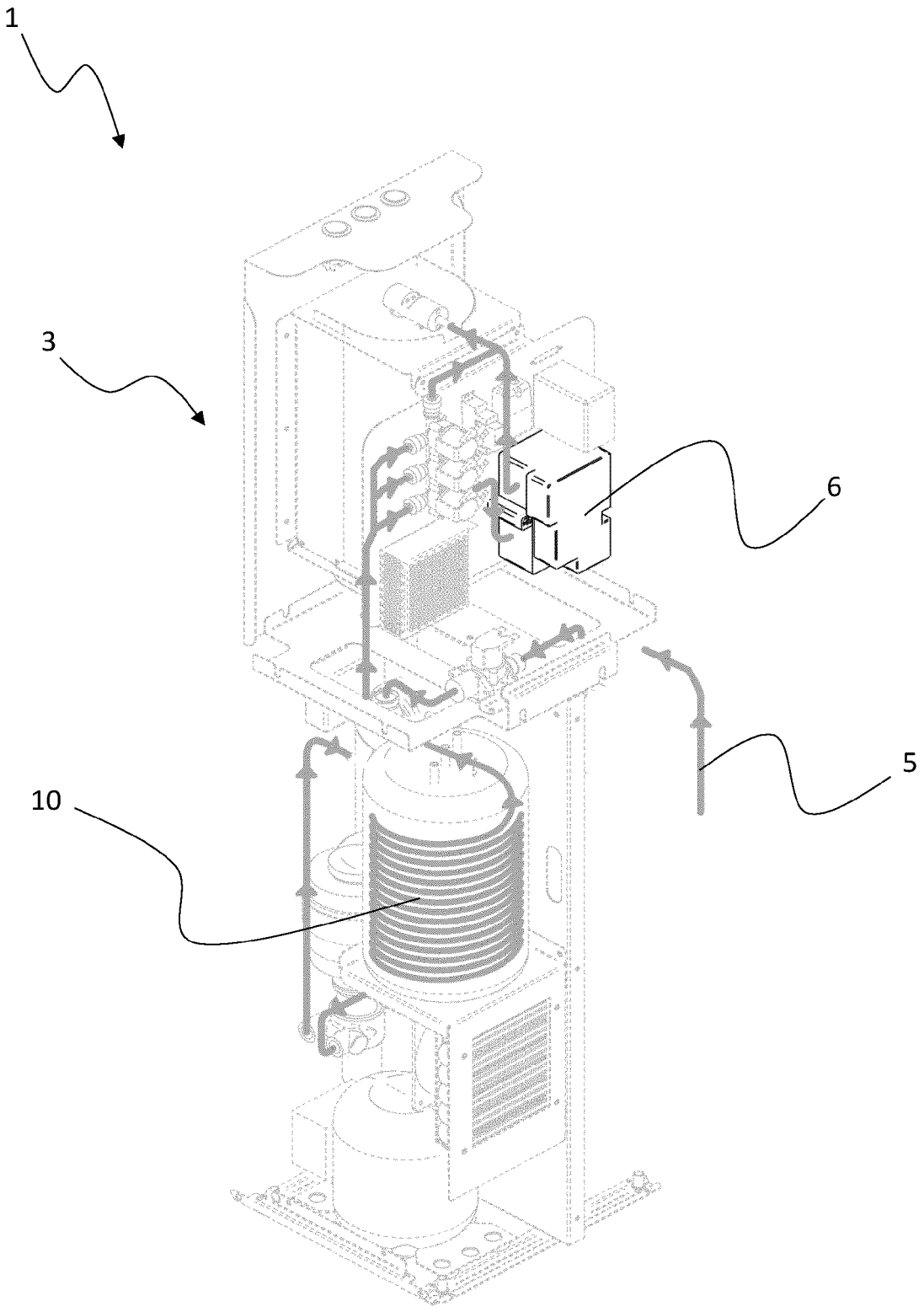


Fig. 3



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EUROPEAN SEARCH REPORT

Application Number
EP 24 18 6849

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2023/065625 A1 (MILLS BRIAN P [US] ET AL) 2 March 2023 (2023-03-02) * paragraphs [0026], [0029], [0045]; figures *	1-11	INV. B67D1/00 B67D1/08
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A	US 2020/339404 A1 (CAROTI MARCO [IT] ET AL) 29 October 2020 (2020-10-29) * paragraphs [0105], [0114]; figures *	1-11	

TECHNICAL FIELDS SEARCHED (IPC)

B67D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	20 December 2024	Müller, Claus

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 24 18 6849

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20-12-2024

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