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(71) Applicant: **"AMII" Spolka Z Ograniczona Odpowiedzialnoscia**  
**92-518 Lodz (PL)**

(72) Inventor: **SINIARSKI, Jan**  
**92-518 Lodz (PL)**

(74) Representative: **Kancelaria Eupatent.pl Sp. z o.o**  
**Ul. Kilinskiego 185**  
**90-348 Lodz (PL)**

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(54) **A WATER SUPPLY SYSTEM**

(57) A water supply system comprising: a first main inlet connection (101); a first main valve (111) configured to control water flow from the first main inlet connection (101); a second main inlet connection (102); a second main valve (112) configured to control water flow from the second main inlet connection (102) and a main outlet connection (104) to which water from the first main inlet connection (101) and from the second main inlet connection (102) is supplied via a main flow conduit (C3). The system further comprises a controller (115) connected with the first main valve (111) via a first signal line (L1), with the second main valve (112) via a second signal line (L2) and with a flow sensor (113, 114) via a main measuring line (L3); wherein the controller (115) is configured to set the main valves (111, 112): to a first configuration (210) in which the first main valve (111) is open and the second main valve (112) is closed; and to a second configuration (206) in which the second main valve (112) is open and the first main valve (111) is closed; depending on the flow value indicated by the flow sensor (113, 114).

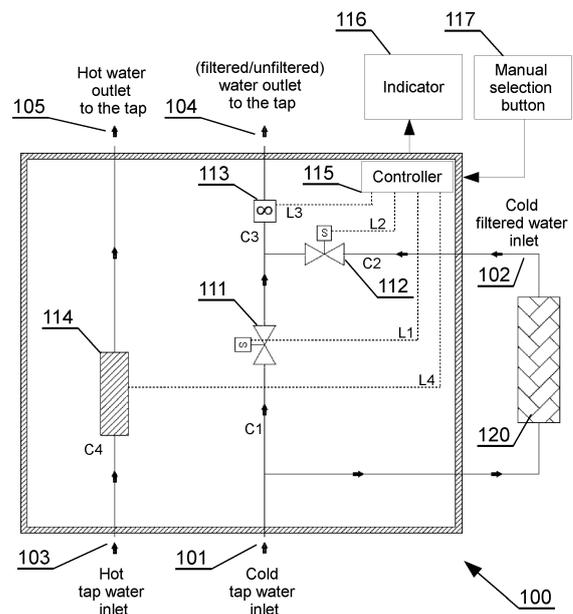


Fig. 1A

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## Description

### TECHNICAL FIELD

**[0001]** The present invention relates to a water supply system. In particular, the invention relates to the supply of filtered and unfiltered water to a common water outlet.

### BACKGROUND

**[0002]** There are known tap water filters wherein a filter outlet conduit is connected to a separate tap that is to be mounted on e.g. a kitchen sink. However, installing a separate tap is problematic, as it requires drilling a hole in a countertop or in a sink, which requires special tools and skills and typically involves a professional service.

**[0003]** Alternative solutions are known, such as a three-way mixer tap that allows to supply hot, cold, and filtered water via a single mixer tap, without having to make a dedicated hole in the countertop. Such a mixer tap has a built-in additional faucet with a valve and a connection conduit. However, the choice of such mixer taps is limited and their cost is high. This three-way mixer tap is typically installed in place of a typical mixer tap. For example, such three-way mixer tap is known from WO2004104306.

**[0004]** Therefore, there is a need to provide a system that could supply filtered and unfiltered water, which would not require installation of a dedicated additional tap, and which would also not require replacing the sink mixer tap with a special three-way mixer tap.

### SUMMARY OF THE INVENTION

**[0005]** The invention relates to a water supply system comprising: a first main inlet connection; a first main valve configured to control water flow from the first main inlet connection; a second main inlet connection; a second main valve configured to control water flow from the second main inlet connection and a main outlet connection to which water from the first main inlet connection and from the second main inlet connection is supplied via a main flow conduit. The system further comprises a controller connected with the first main valve via a first signal line, with the second main valve via a second signal line and with a flow sensor via a main measuring line; wherein the controller is configured to set the main valves : to a first configuration in which the first main valve is open and the second main valve is closed; and to a second configuration in which the second main valve is open and the first main valve is closed; depending on the flow value indicated by the flow sensor.

**[0006]** Preferably, the controller is configured to set the main valves depending on the flow value indicated by a main flow sensor installed in the main flow conduit.

**[0007]** Preferably, the controller is configured to set the main valves to the first configuration when the flow value indicated by the main flow sensor exceeds a threshold,

and to the second configuration when the flow value indicated by the main flow sensor does not exceed the threshold.

**[0008]** Preferably, the system further comprises a manual selection button connected to the controller, wherein when the button is activated, the controller is configured to set the main valves to a configuration that is assigned to this button regardless of the flow value indicated by the main flow sensor.

**[0009]** Preferably, the system further comprises an additional inlet connection connected via an additional flow conduit having an additional flow sensor with an additional outlet connection, wherein the controller is further connected with an additional flow sensor via an additional measuring line and is configured to set the main valves to the first configuration when the additional flow sensor indicates a non-zero flow value.

**[0010]** Preferably, the additional inlet connection is connected to hot water.

**[0011]** Preferably, the system further comprises an indicator, connected to the controller, for indicating the configuration that is set by the controller.

**[0012]** Preferably, the indicator is configured to delay the indication of change of the configuration from the first configuration to the second configuration.

**[0013]** Preferably, the delay of the configuration switching indication by the indicator depends on the flow value measured by the main flow sensor and/or the elapsed flow time since the configuration change.

**[0014]** Preferably, the first main valve and the second main valve are flow control valves.

**[0015]** Preferably, the first main inlet connection is connected to a tap cold water, and the second main inlet connection is connected to a filtered cold water.

**[0016]** Preferably, the system comprises a filter connected between the first main inlet connection and the second main inlet connection.

**[0017]** Preferably, the second main valve is installed between the first main inlet connection and the filter.

**[0018]** Preferably, the system further comprises a non-return valve installed between the filter and the main flow sensor.

### BRIEF DESCRIPTION OF DRAWINGS

**[0019]** The present invention is shown by means of preferable embodiments in a drawing, where in:

Fig. 1A presents schematically a structure of a system of the invention according to a first embodiment; Fig. 1B presents schematically the structure of a system of the invention according to a second embodiment;

Fig. 2 presents a functional diagram of the method of operation of the system according to the invention; Fig. 3 presents a signalling diagram of the system status.

## DETAILED DESCRIPTION

**[0020]** Fig. 1A presents schematically a structure of a system of the invention according to the first embodiment.

**[0021]** The system includes a flow control module 100. The module 100 comprises a first main inlet connection 101, to which a cold tap water intake may be connected. The flow of water from the first main inlet connection 101 is controlled by a first main valve 111. The module 100 further comprises a second main inlet connection 102, to which a filtered water intake (which is usually a cold water) may be connected. The flow of water from the second main inlet connection 102 is controlled by a second main valve 112. The filtered water can be supplied from a separate intake, or from a filter 120 that is installed in a branched-off flow conduit downstream of the first main inlet connection 101.

**[0022]** The water conduits from the first main inlet connection 101 (C1) and from the second main inlet connection 102 (C2) are connected together to form a main flow conduit C3 equipped with a main flow sensor 113. From the main flow conduit C3, water is supplied to a main outlet connection 104.

**[0023]** The system further comprises a controller 115 connected via a first signal line L1 with the first main valve 111, via a second signal line L2 with the second main valve 112, and via a main measuring line L3 with the main flow sensor 113. The controller sets the valves 111, 112 to one of at least two configurations, depending on the flow value indicated by the flow sensor 113 (or the flow sensor 114 as described later) present in the system:

- to the first configuration (according to an element 210 discussed in Fig. 2), in which the first main valve 111 is open and the second main valve 112 is closed; or
- to the second configuration (206), in which the second main valve 112 is open and the first main valve 111 is closed.

**[0024]** For example, the controller 115 may set the valves 111, 112 to the first configuration (210) when the flow value indicated by the main flow sensor 113 exceeds a threshold, and to the second configuration (206) when the flow value indicated by the main flow sensor 113 does not exceed said threshold. The flow value indicated by the main flow sensor 113 depends on the degree of the opening of the valve of the tap that supplies water from the main outlet connection 104.

**[0025]** The first main valve 111, which controls the flow of water in conduit C1 connected to the first inlet connection (for example, cold unfiltered water) may be a normally closed (NC) valve. The second main valve 112, which controls the flow of water in conduit C2 connected to the second inlet connection (for example, cold filtered water) may be a normally open (NO) valve. As a result, every time the water flow is opened via the main outlet

connection 104, water from the second inlet connection flows first.

**[0026]** Preferably, the main valves 111, 112 are control valves (i.e. flow regulating valves), for example, solenoid valves or electric ball valves.

**[0027]** Moreover, the system may further comprise an additional inlet connection 103, to which a hot tap water connection may be connected via an additional flow conduit C4 equipped with an additional flow sensor 114 with an additional outlet connection 105. In such embodiment, the controller 115 may be connected via an additional measuring line L4 with said additional flow sensor 114, and may set the main valves 111, 112 to the first configuration (207) when the additional flow sensor 114 indicates a non-zero flow value.

**[0028]** If the above-mentioned flow conduit C4 with the additional flow sensor 114 is used, then the controller 115 may also be set in such a way that it makes the configuration dependent on the indication of only the additional flow sensor 114 - in such embodiment, the first configuration may be set when the additional flow sensor 114 indicates a non-zero flow value, and the second configuration may be set only when the additional flow sensor 114 indicates a zero flow value (in other words, when only cold water is supplied, filtered water always comes out, and supply of unfiltered water is possible only with at least a small proportion of hot water).

**[0029]** The role of the flow sensors 113, 114 is to measure the flow of water. Therefore, flowmeters that indicate the value of flow may be used (for example, in L/min, or as a number of pulses at the flowmeter outlet). Pressure sensors may be used as well, that makes it possible to assess the degree of the opening of the tap and thus the water flow value by measuring the change in pressure due to the change in the degree of the opening of the tap downstream of the outlet connection 104, 105.

**[0030]** The system may further comprise a button 117, connected to the controller 115, for manually selecting the operating configuration of the system. When the button 117 is activated, i.e. when the manually specified mode is selected, the controller 115 sets the main valves 111, 112 to the configuration (208, 209) that is assigned to this button 117 regardless of the flow value indicated by the main flow sensor 113 or any other flow sensor.

**[0031]** The system may further comprise an indicator 116, connected to the controller 115, for indicating the configuration that is currently set by the controller 115. The indicator 116 can be a signal light, for example, a light-emitting diode (LED) that emits one colour when water flows from the first main inlet, and another type of light signal (e.g. other colour or may be turned off, or may be flashing) when water flows from the second main inlet. Alternatively or in addition, the indicator 116 may emit any other signal (e.g. sound signal or vibration).

**[0032]** The indicator 116 may switch the indication of the configuration from the first configuration to the second configuration with a delay, in order to allow the flow conduits to get flushed by the water from the second main

inlet before the indication of the second configuration is activated. This delay may depend on the flow value measured by the main flow sensor 113, i.e., only when a quantity of water corresponding to the volume of the plumbing system in which there is still water from the first main connection has flown through the main outlet connection. Alternatively, in a simplified solution, the delay can be indicated after a specific period of time has elapsed from switching to the second configuration.

**[0033]** Fig. 1B presents schematically the structure of the system of the invention according to the second embodiment. It differs from the first embodiment in that the second main valve 112 is installed between the first inlet connection 101 and the filter 120, and in that the system further comprises a non-return valve 118 installed between the filter 120 and the main flow sensor 113.

**[0034]** The button 117 and the indicator 116 may be located outside the flow control module 100, in a place that is easily accessible and visible to the user. The filter 120 should be located in a place where the filter can be easily accessed for periodic replacement.

**[0035]** Fig. 2 presents a schematic diagram of a method of operation of the controller of the invention in its most sophisticated version. However, if the system does not comprise certain elements described above as optional (e.g. the hot water system, the indicator, or the manual selection button), then the operational steps related to these elements can be omitted. In the first step 201, based on flow information from the main flowmeter 113, it is checked whether cold water is flowing through the system. If so, then, in step 202, based on the additional flowmeter 114, it is checked whether hot water is flowing through the system. If so, then, in step 207, the cold filtered water valve 112 is closed (or, if it is closed, then its status is maintained), and the cold unfiltered water valve 111 is opened (or, if it is open, then its status is maintained). Step 207 is intended to ensure proper operation of the system in the case of using a normally closed valve instead of the unfiltered water valve 111, and a normally open valve instead of the filtered water valve 112. Next, in step 211, a light signal is triggered to indicate that cold unfiltered water is flowing into the tap. If in step 202 no flow of hot water is detected, then, in step 203, it is checked whether the manual mode that forces the flow of filtered water has been selected using the button 117. If so, then, in step 208, the filtered water valve 112 is opened, and the unfiltered water valve 111 is closed. If in step 203, the manual mode of filtered water is not activated, then in step 204, it is checked whether the manual mode that forces the flow of unfiltered water has been selected using the button 117. If so, then, in step 209, the cold filtered water valve 112 is closed (or, if it is closed, then its status is maintained), and the cold unfiltered water valve 111 is opened (or, if it is open, then its status is maintained), and next, in step 211, a light signal is activated to indicate that cold unfiltered water is flowing into the tap. If in step 204 the manual mode of unfiltered water is not activated, then, in step 205, it is

checked whether the measured cold water flow value is greater than (or equal to) the pre-set flow threshold value. If so, then, in step 210, the cold filtered water valve 112 is closed (or, if it is closed, then its status is maintained), and the cold unfiltered water valve 111 is opened (or, if it is open, then its status is maintained), and next, in step 211, a light signal is activated to indicate that cold unfiltered water is flowing into the tap. If, in step 205, the measured cold water flow value is less than the pre-set threshold flow value, then, in step 206, the cold filtered water valve 111 is opened, and the cold unfiltered water valve 112 is closed. Next, after steps 206 and 208, in step 211, it is checked whether filtered water was supplied to the tap earlier. If not, then, in step 213, a certain amount (volume) of water is run in order to flush the unfiltered water from the tap and from the tube that supplies cold water to the tap. The amount of water for the flushing is determined based on the indications of the main flowmeter 113 or the pre-set time. If in step 211 an open/closed status of the valves 111, 112 is detected indicating that filtered water is reaching the tap, then, in step 212, it is checked whether the specific amount of filtered water (necessary to flush the unfiltered water from the tap and from the tube that supplies cold water to the tap) was supplied through the tap. If not, then the process returns to step 213. If, in step 212, the check determines that the amount of filtered water supplied to the tap is greater than the specified amount of water needed to flush the tap, then, in step 214, a light signal is triggered to inform the user that cold filtered water is already coming out of the tap. Optionally or in addition, in step 215, a sound signal is triggered to inform the user that cold filtered water is already coming out of the tap. Preferably, a separate light and/or sound signal is triggered during the flushing stage of the tap, which is basically the section of the system from the filtered water valve 112 to the tap outlet.

**[0036]** As a result, in the automatic mode, the user receives filtered or unfiltered water depending on the pre-set flow of water in the cold and/or hot water conduit.

**[0037]** Fig. 3 shows a diagram of an additional option of signalling the system status. The system may inform the user about the status of the filter, the need to replace it, and/or the occurrence of errors in the operation of the system - e.g. a valve closing/opening error (in such a case, the valves must have a circuit that allows to check their current status of switching), abnormal indications of flow sensors, etc. Fig. 3 shows an example of how the system may signal the filter status. In the first step 301, it is checked whether the pre-set time has elapsed after which the filter should be replaced, or whether the specific amount of filtered water has been exceeded (the amount of cold water that has flown through the filter). For example, these indications can be based on the total time of the filtered water valve 112 being open, which can be calculated from the feedback coming from the controller 115 or can be predetermined, e.g., 6 months after the last replacement, and they can be based on the total

water flow value measured by the main flow sensor 113 while the filtered water valve 112 is open. If the set time period or the set water quantity is exceeded, then, in step 303, a light signal (e.g. a flashing light signal) is triggered, preferably by means of a diode of a specific colour, and/or a sound signal indicating the need to replace the filter (wear or clogging). If, in step 301, the pre-set time period or the amount of filtered water are not exceeded, then, in step 302, it is checked whether the water flow is greater than the specified total flow value, e.g., it is checked whether the water flow is greater than 88%. If the measured flow value is less than the pre-set flow value, then, in step 304, a light signal is triggered, for example a flashing light signal, having a frequency different from that of the signal generated in step 303, preferably by means of a diode of a specific colour and/or a pulsating sound signal or a sound signal of a specific tone indicating that the filter is already partially clogged. If the measured water flow value is higher than the pre-set flow value, then, in step 305, a light and/or sound signal is triggered to indicate that filtered water is coming out of the tap and the filter is clean (does not need to be replaced yet).

[0038] The light and/or sound signals are generated by means of the indicator 116, which can have the form of a display with a speaker in which case the user information can be displayed via text, or which can have the form of a set of diodes with a speaker or a single diode / a multicoloured diode that will allow to display the above information by blinking (pulsating) and/or changing its colour. Further, in the case of a diode indicator, an information coding method may be used in which, for a specific system error or system status, there is assigned a specific number of diode flashes, or a specific flashing frequency in combination with the colour of the diode.

[0039] Furthermore, the presented supply system may be used to supply water sources other than unfiltered or filtered tap (municipal) water. The flow control module may comprise more than two water inlets and, for example, may be used as a beverage distributor in which, after selecting a type of beverage different than the last one poured, the final section of the beverage distribution system in the device is flushed, for example, from the source of the currently selected beverage to the outlet of the tap. As in the embodiment described above, the system comprising multiple inlets for various intakes, which are served through a single outlet, may further comprise a through conduit from the inlet to a separate outlet, for example, for heated drinking water.

[0040] The system according to the invention allows supplying filtered and unfiltered water via a standard mixer tap. Moreover, it informs the user when filtered water is supplied via the tap after the remaining unfiltered water is flushed out from the tap. By opening the cold water valve of the mixer tap to a certain extent, the user decides whether filtered or unfiltered water shall be supplied via the tap. Therefore, the system does not require installation of any additional or non-standard, expensive taps to supply filtered water.

## Claims

1. A water supply system comprising:

- 5 - a first main inlet connection (101);
- a first main valve (111) configured to control water flow from the first main inlet connection (101);
- 10 - a second main inlet connection (102);
- a second main valve (112) configured to control water flow from the second main inlet connection (102);
- 15 - a main outlet connection (104) to which water from the first main inlet connection (101) and from the second main inlet connection (102) is supplied via a main flow conduit (C3);

**characterized in that** it further comprises:

- 20 - a controller (115) connected with the first main valve (111) via a first signal line (L1), with the second main valve (112) via a second signal line (L2) and with a flow sensor (113, 114) via a main measuring line (L3);
- 25 - wherein the controller (115) is configured to set the main valves (111, 112):
  - to a first configuration (210) in which the first main valve (111) is open and the second main valve (112) is closed; and
  - to a second configuration (206) in which the second main valve (112) is open and the first main valve (111) is closed;
  - depending on the flow value indicated by the flow sensor (113, 114).

2. The system according to claim 1 **characterized in that** the controller (115) is configured to set the main valves (111, 112) depending on the flow value indicated by a main flow sensor (113) installed in the main flow conduit (C3).

3. The system according to claim 2 **characterized in that** the controller (115) is configured to set the main valves (111, 112) to the first configuration (210) when the flow value indicated by the main flow sensor (113) exceeds a threshold, and to the second configuration (206) when the flow value indicated by the main flow sensor (113) does not exceed the threshold.

4. The system according to any of the previous claims **characterized in that** it further comprises a manual selection button (117) connected to the controller (115), wherein when the button (117) is activated, the controller (115) is configured to set the main valves (111, 112) to a configuration (208, 209) that is assigned to this button (117) regardless of the flow value indicated by the main flow sensor (113).

5. The system according to any of the previous claims **characterized in that** it further comprises an additional inlet connection (103) connected via an additional flow conduit (C4) having an additional flow sensor (114) with an additional outlet connection (105), wherein the controller (115) is further connected with an additional flow sensor (114) via an additional measuring line (L4) and is configured to set the main valves (111, 112) to the first configuration (207) when the additional flow sensor (114) indicates a non-zero flow value. 5  
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6. The system according to claim 5 **characterized in that** the additional inlet connection (103) is connected to hot water. 15
7. The system according to any of the previous claims **characterized in that** it further comprises an indicator (116), connected to the controller (115), for indicating the configuration that is set by the controller (115). 20
8. The system according to claim 7 **characterized in that** the indicator (116) is configured to delay the indication of change of the configuration from the first configuration to the second configuration. 25
9. The system according to claim 8 **characterized in that** the delay of the configuration switching indication by the indicator (116) depends on the flow value measured by the main flow sensor (113) and/or the elapsed flow time since the configuration change. 30
10. The system according to any of the previous claims **characterized in that** the first main valve (111) and the second main valve (112) are flow control valves. 35
11. The system according to any of the previous claims **characterized in that** the first main inlet connection (101) is connected to a tap cold water, and the second main inlet connection (102) is connected to a filtered cold water. 40
12. The system according to claim 10 **characterized in that** it comprises a filter (120) connected between the first main inlet connection (101) and the second main inlet connection (102). 45
13. The system according to claim 12 **characterized in that** the second main valve (112) is installed between the first main inlet connection (101) and the filter (120). 50
14. The system according to claim 13 **characterized in that** it further comprises a non-return valve (118) installed between the filter (120) and the main flow sensor (113). 55

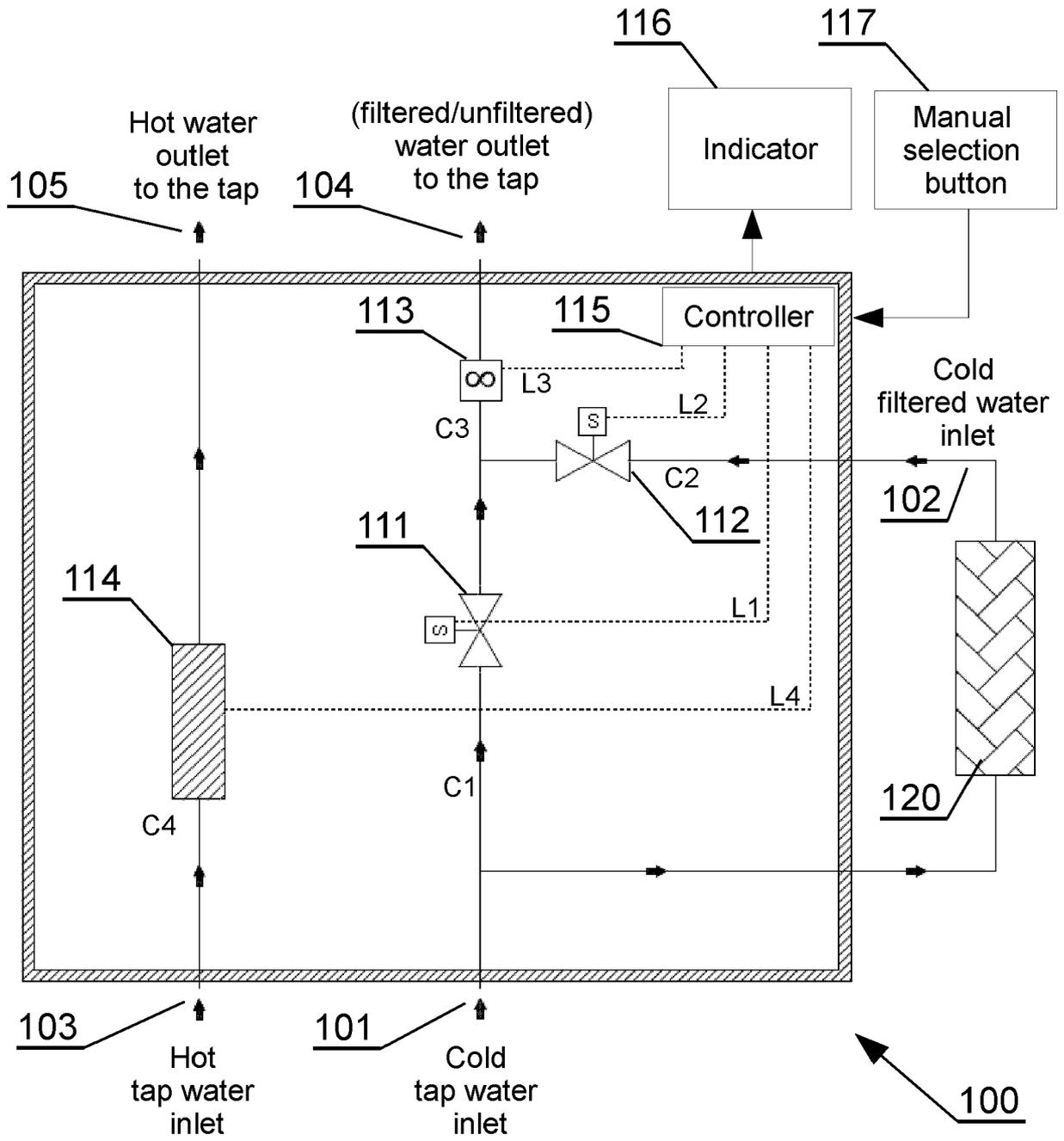


Fig. 1A

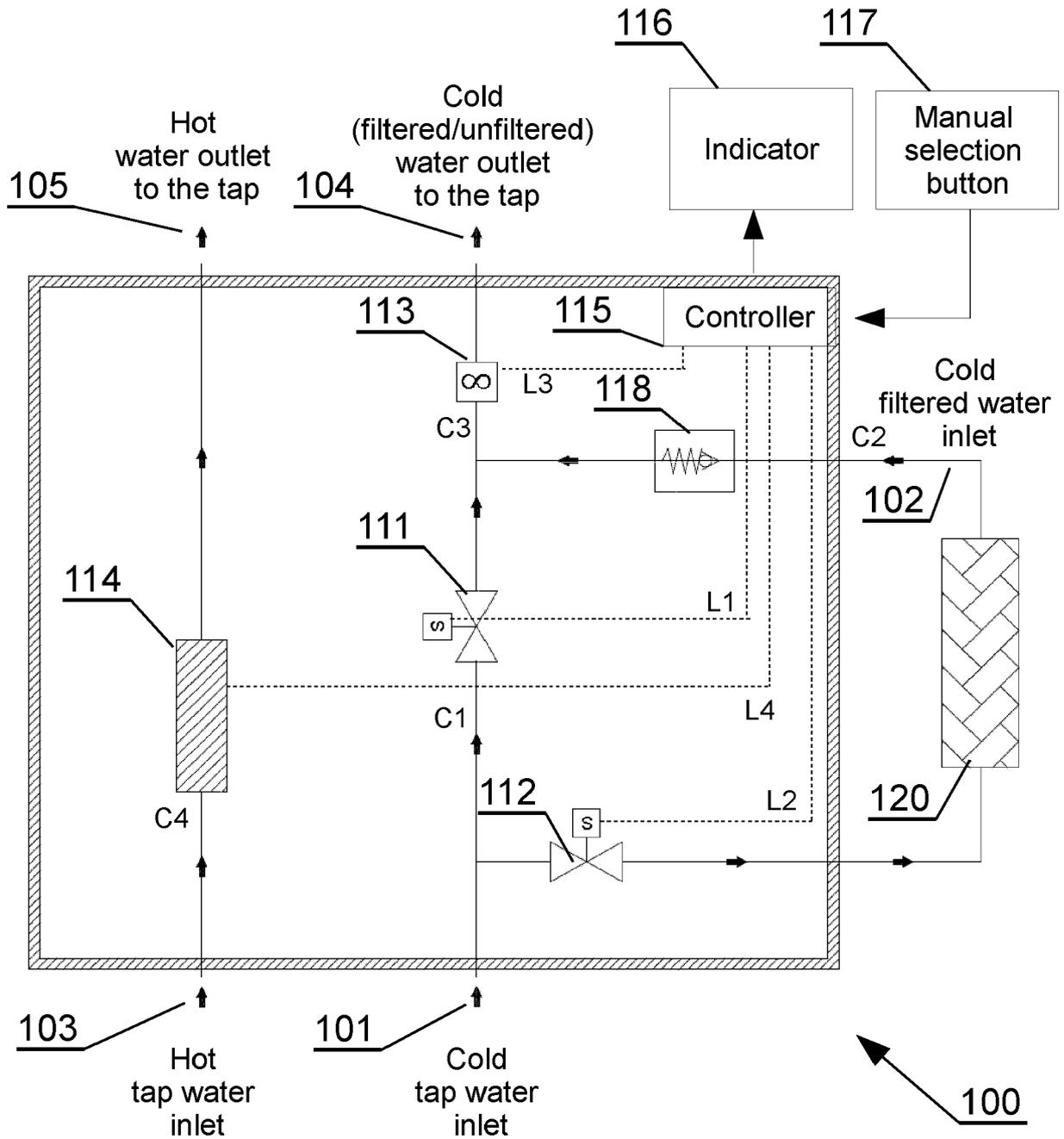


Fig. 1B

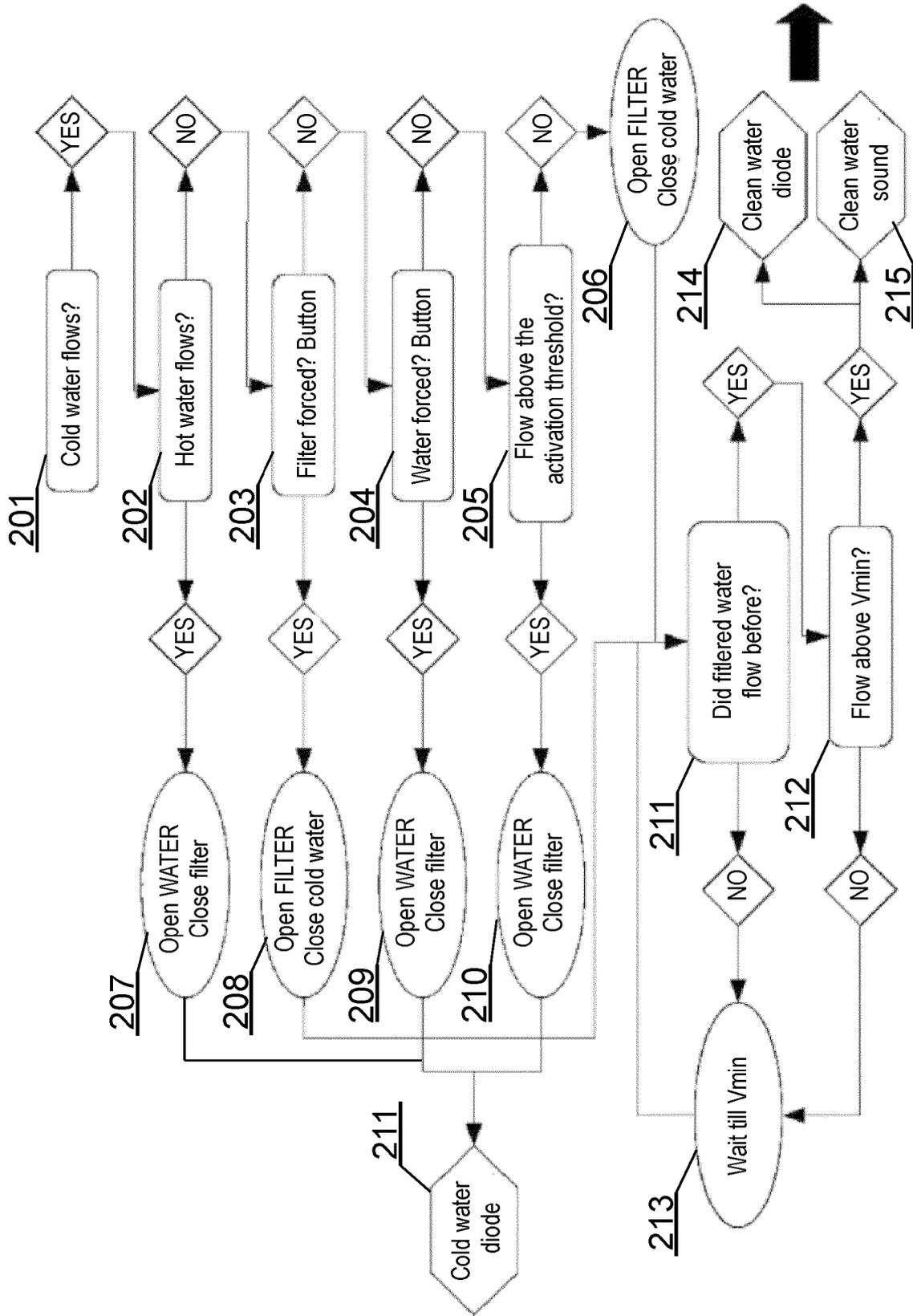


Fig. 2

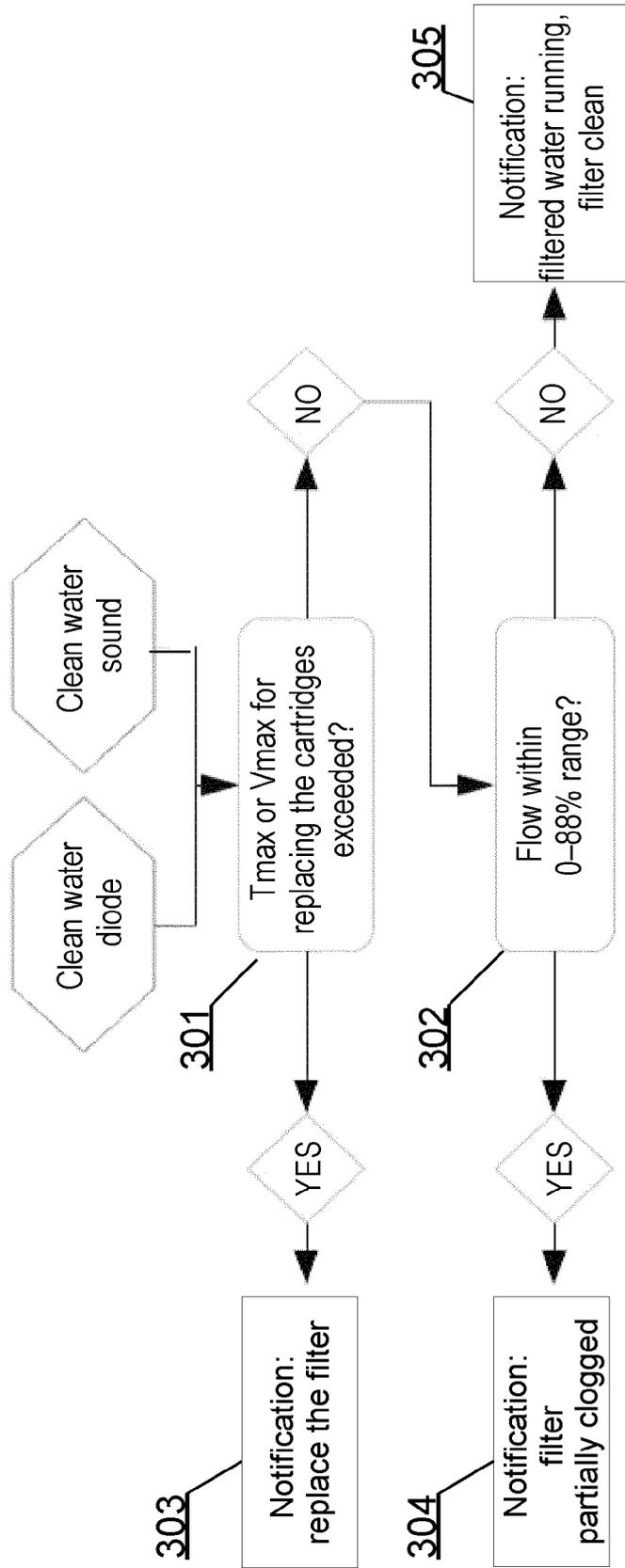


Fig. 3



EUROPEAN SEARCH REPORT

Application Number  
EP 20 20 3740

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The present search report has been drawn up for all claims			
Place of search <b>Munich</b>		Date of completion of the search <b>2 March 2021</b>	Examiner <b>Posavec, Daniel</b>
CATEGORY OF CITED DOCUMENTS		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	
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		& : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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**REFERENCES CITED IN THE DESCRIPTION**

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