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(54) Device for treating and distributing drinks, particularly water

(57) Device for treating and distributing drinks, particularly water, comprising a carbonator (1) into which a specific body of water (2) and a specific quantity of gas are introduced through suitable supply and pumping means (4, 5, 6, 6') so as to form a cushion (3) of pressurized gas between the upper wall (101) of the carbonator (1) and the body of water (2); the carbonator (1) interacts with a refrigerating system (24) for cooling the body of water (3) and is provided with suitable pipes (22, 25, 26) for transferring the treated water to a set of delivery valves (8, 9, 10) communicating with a terminal (13) for the final distribution of the treated water; the carbonator (1) comprises a pressure switch (20) electrically connected to the water pumping means (5); the pressure switch (20) can detect the pressure in the gas cushion (3) and cause the starting or stopping of the water pumping means (5) if the pressure detected in the gas cushion (3) falls below a certain predetermined value because of the discharge of treated water from the distribution terminal (13), or if it exceeds this predetermined value because of the excessive compression of the gas cushion (3) due to the entry of water into the carbonator (1).

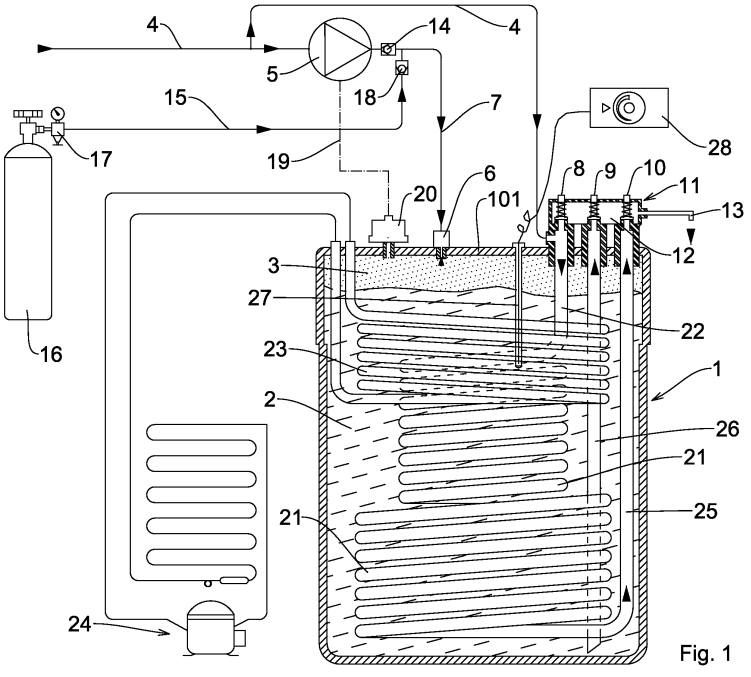

Fig. 1

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Description

[0001] The present invention relates to a device for treating and distributing drinks, particularly water.

[0002] As is known, an ordinary device or equipment for treating and distributing water comprises a carbonator, in other words a hermetically sealed pressurized vessel into which specified quantities of water and gas are introduced to obtain an end product in the form of cool carbonated water, cool still water, or water at ambient temperature. Water drawn from the ordinary water mains can be introduced directly into this carbonator through an injector, after premixing with carbon dioxide if necessary, or can be introduced into a coil positioned inside the carbonator. In both cases, this water introduced into the carbonator can be cooled by exchanging heat with an evaporator, housed inside or outside the said carbonator, of an ordinary refrigerating system. The water introduced into the carbonator is then substantially carbonated and cooled and can be drawn from the carbonator through a final delivery terminal connected to a set of delivery valves. The water level in the carbonator is normally monitored with the aid of conductivity sensors or probes located in the upper part of the carbonator.

[0003] This equipment for treating and distributing drinks, particularly water, has various drawbacks: in the first place, the electronic conductivity sensors or probes located in the upper part of the carbonator for monitoring the water inside it increase the complexity of the equipment, which may therefore suffer from a loss of operating efficiency, and also increase the production and running costs of the equipment; furthermore, the valves for delivering the water treated in the carbonator are generally positioned outside the carbonator, and therefore require the use of various components such as tubes and connectors for connection to the said carbonator and to the final delivery terminal, thus resulting in an additional increase in the costs and the degree of complexity of the equipment.

[0004] The object of the present invention is therefore to provide a device for treating and distributing drinks, particularly water, which overcomes the aforementioned drawbacks of the known equipment, and which is efficient, economical, and simple to produce and operate.

[0005] This object is achieved by the present invention by means of a device for treating and distributing drinks, particularly water, comprising a carbonator into which a given body of water and a given quantity of gas are introduced through suitable supply and pumping means so as to form a cushion of pressurized gas between the upper wall of this carbonator and this body of water, this carbonator interacting with a refrigerating system for cooling the body of water and is provided with suitable pipes for transferring the treated water to a set of delivery valves communicating with a terminal for the final distribution of the treated water, characterized in that this carbonator comprises a pressure switch electrically connected to the water pumping means; this pressure switch can detect the pressure in the gas cushion and cause the starting or stopping of the water pumping means if the pressure detected in the gas cushion falls below a certain predetermined value because of the discharge of treated water from the distribution terminal, or if it exceeds this predetermined value because of the excessive compression of the gas cushion due to the entry of water into the carbonator.

[0006] According to a further aspect of the present invention, this set of delivery valves communicating with the final distribution terminal is integrated directly into one of the walls of the carbonator, particularly on a wall positioned near the final treated water distribution terminal.

[0007] Other features and advantages of the present invention will be made clear in the course of the following description, to be considered as a non-limiting example, with reference to the attached drawings, in which:

- Fig. 1 shows a schematic view, in lateral elevation and partial section, of equipment for treating and distributing drinks, particularly water, according to the present invention, comprising a carbonator provided on its top with a pressure switch and an injector of water and carbon dioxide;
- Fig. 2 shows a view in lateral elevation and on an enlarged scale of part of the present device relating to the said pressure switch and the said injector, provided with a water and gas premixing chamber.

[0008] With reference to the attached drawings and particularly to Fig. 1, the number 1 indicates a carbonator, in other words a hermetically sealed vessel containing a certain quantity of carbonated waver 2 and a cushion 3 of pressurized gas, such as carbon dioxide, located above the body of carbonated water. The number 4 indicates a pipe of an ordinary water mains from which water is drawn and sent to a first valve 8 for admitting water into the said carbonator 1. This first valve 8 is housed in a mounting 11 which is formed on or fitted in the upper wall 101 of the carbonator 1 and which can receive another two valves 9 and 10 for the delivery of the water. This mounting 11 comprises an internal chamber 12 communicating with a terminal 13 for the final delivery of the water treated by means of the present device. Essentially, this delivery valve 8 can introduce water at ambient temperature into the said carbonator 1 or deliver water at ambient temperature through the said final delivery terminal 13, while the second delivery valve 9 can be used to obtain cooled carbonated water 2 and the third delivery valve 10 can be used to obtain cooled still water, again through the terminal 13. Water at ambient temperature is drawn from the pipe 4 of the water mains by a pump 5, which has in a downstream position a first non-return valve 14, through which the water to be carbonated flows, this valve being located on a supply tube 7 of an injector 6 by means of which a mixture of water and gas is introduced into the carbonator 1. Downstream

of the said first non-return valve 14, the pipe 7 is connected to the final end of a tube 15 for supplying gas, such as carbon dioxide, drawn from a corresponding cylinder 16 provided with a pressure reducer 17. Upstream of the said terminal connection of the tube 15 with the tube 7, the said tube 15 has a second non-return valve 18 through which the pressurized gas flows. The pump 5 is connected by means of an ordinary electrical connection 19 to a pressure switch 20, housed on the upper wall 101 of the carbonator and capable of detecting the pressure of the gas cushion 3 contained in it. This first valve 8 for supplying water from the water mains and for delivering water at ambient temperature from the terminal 13 sends the water from the pipe 4 to a first tubular portion 22 for the downflow of the water towards a coil 21 which can interact with an evaporator 23 of an ordinary refrigerating system 24, thus cooling the water flowing in the coil. At the end of the said coil 21 for the passage of the water from the first delivery valve 8, a second tubular portion 25 is provided in the carbonator 1 for the upflow of the cooled water towards the third delivery valve 10. The number 26 indicates a vertical tube, which can collect cooled carbonated water 2 near the bottom of the carbonator, and which has its upper end connected to the second delivery valve 9. The probe 27 of a thermostat 28 is also fitted in the carbonator, in such a way that it is partially immersed in the cooled carbonated water 2, for the purpose of setting the desired temperature of the carbonated water which does not flow out of the final delivery terminal 13.

[0009] Fig. 2 shows a variant of the present device. The injector 6' is provided with a suitably shaped internal chamber 29 for premixing the water at ambient temperature sent from the pump 5 of Fig. 1 through the tube 7 and the gas sent from the cylinder 16 through the tube 15. As is more clearly shown, the water at ambient temperature from the supply pipe 4 from the water mains flows into an aperture 30 formed in the mounting 11 housed on the top of the carbonator 1, and at this point the first delivery valve 8 can be used to determine directly whether to deliver the water through the terminal 13 of Fig. 1, after it has flowed through the chamber 12 of the said mounting 11, or to send it to the vertical tubular portion 22 connected to the coil 21.

[0010] As an alternative to what is shown in the above figures, connections can be provided to enable the pump 5 to draw cooled water from the coil 21 to improve the carbonation, and the pipe 15 can send the carbon dioxide from the cylinder 16 directly to the carbonator 1, without providing any premixing with the water sent through the tube 7 by the pump. The refrigerator evaporator 23, which in Fig. 1 is positioned inside the carbonator 1, could be positioned externally in contact with the lateral walls of the said carbonator 1. The pressure switch 20 could be positioned on the gas inlet tube 15, instead of on the upper wall 101 of the carbonator 1, if the tube is connected directly to the carbonator 1, or could be positioned on the carbonated water outlet tube 26. In order to perform the various functions described below in the description of the operation of the present device, the delivery valves 8, 9 and 10 can be driven directly or by means of electrical systems.

[0011] The operation of the present device will now be described with reference to Figs. 1 and 2. The carbonator 1 can be filled, as mentioned above, by means of the pipe 4 of the water mains which sends water at ambient temperature to the valve 8 and from there to the coil 21, or by premixing with the gas supplied from the cylinder 16 through the tube 7 and then the injector 6 or 6', provided with a premixing chamber 29 if necessary. The injector 6, 6' increases the velocity of the jet of water and gas so as to direct the gas (carbon dioxide) as deeply as possible into the body of water 2 present in the carbonator 1. The water pressure in the carbonator 1 is raised by means of the pump 5 which is driven via the electrical connection 19 from the pressure switch 20. When, as a result of the filling, the pressure in the carbonator 1 becomes equal to that of the gas cushion 3, the gas ceases to enter the carbonator 1 through the injector 6, 6', or directly from the tube 15 where provided, but the pump 5 continues to pump until a cut-off threshold of the pressure switch 20 is reached, thus additionally compressing the gas cushion 3 formed in the upper part of the carbonator 1 in the proximity of its upper wall 101. The introduction of more water into the carbonator 1 causes a rise in the temperature of the body of carbonated water 2 and consequently the starting of the refrigeration system 24 which cools the water by means of the evaporator 23. The device enters a state of equilibrium when the temperature set in the refrigeration system 24 is reached. When cooled carbonated water is discharged through the terminal 13 by means of the delivery valve 9, the pressure inside the carbonator falls abruptly, and the pressure switch 20 therefore enables the pump 5 which introduces gas and water, restarting the sequence described above. For the most satisfactory operation of the pressure switch system 20 according to the present invention, it is preferable for the gas cushion 3 inside the carbonator 1 to have a pressure, of about 6 bar for example, slightly below the cut-off pressure of the pressure switch 20, about 6.5 bar for example, and for the pressure switch to have a minimal pressure difference between starting and cut-off.

[0012] Advantageously, as demonstrated by the preceding description, the valves 8, 9 and 10 can preferably be driven directly, thus avoiding the cost of solenoid valves or electromagnets and the corresponding electrical control system, and their direct integration in the carbonator 1, particularly on its upper wall 101, results in a considerable saving of components such as tubes, connectors and materials in general, thus significantly reducing the costs of the device and increasing its safety. By using the pressure switch 20 as the element for controlling the water level in the carbonator, the present device can be produced in a simple and economical way, avoiding the use of costly electronic level controllers or probes.

Claims

1. Device for treating and distributing drinks, particularly water, comprising a carbonator (1) into which a given body of water (2) and a given quantity of gas are introduced through suitable supply and pumping means (4, 5, 6, 6') so as to form a cushion (3) of pressurized gas between the upper wall (101) of the said carbonator (1) and the said body of water (2); the carbonator (1) interacts with a refrigerating system (24) for cooling the said body of water (3) and is provided with suitable pipes (22, 25, 26) for transferring the treated water to a set of delivery valves (8, 9, 10) communicating with a terminal (13) for the final distribution of the treated water, **characterized in that** the said carbonator (1) comprises a pressure switch (20) electrically connected to the water pumping means (5), the said pressure switch (20) being capable of detecting the pressure in the said gas cushion (3) and causing the starting or stopping of the said water pumping means (5) if the pressure detected in the said gas cushion (3) falls below a certain predetermined value because of the discharge of treated water from the said distribution terminal (13), or if it exceeds the said predetermined value because of the excessive compression of the said gas cushion (3) due to the entry of water into the carbonator (1).

2. Device according to Claim 1, **characterized in that** the said pressure switch (20) is positioned on a wall (101) of the carbonator (1) adjacent to the said gas cushion (3) or directly on a tube (15) for supplying the pressurized gas to the carbonator (1).

3. Device according to Claim 1, **characterized in that** the said set of delivery valves (8, 9, 10) communicating with the final distribution terminal (13) is integrated directly into one of the walls (101) of the carbonator (1), particularly on a wall positioned near the final treated water distribution terminal (13).

4. Device according to Claim 1, **characterized in that** the said set of delivery valves (8, 9, 10) is housed inside a mounting (11) formed on or fixed to the upper part (101) of the said carbonator (1), a chamber (12), which communicates with the said final distribution terminal (13), being formed in the said mounting (11).

5. Device according to Claim 4, **characterized in that** the said mounting (11) located on the upper wall (101) of the carbonator (1) comprises a first valve (8) for supplying the carbonator (1) with water at ambient temperature, drawn via a suitable pipe (4) from a water mains, and for delivering water at ambient temperature, the said valve (8) communicating directly with a tubular portion (22) inside the carbonator (1) for the downflow of the water towards a suitable coil (21) in which the said water is cooled by means of the said refrigerating system (24).

6. Device according to Claim 4, **characterized in that** the said mounting (11) comprises a second valve (9) for delivering cooled carbonated water, communicating directly with a vertical tube (26) for collecting the said water near the bottom of the said carbonator (1).

7. Device according to Claim 4, **characterized in that** the said mounting (11) comprises a third valve (10) for delivering cooled water, communicating directly with a vertical tube (25) for the upflow of the water from the said cooling coil (21).

8. Device according to Claim 1, **characterized in that** the pressure of the said gas cushion (3) located above the said body of water (2) is slightly below a specified cut-off pressure of the said pressure switch (20) and the said pressure switch (20) has a minimum pressure difference between starting and cut-off.

9. Device according to Claim 1, **characterized in that** it comprises an injector (6') for introducing a mixture of water and gas into the said carbonator (1), the said injector (6') being positioned on the upper wall (101) of the said carbonator (1) and provided with a premixing chamber (29) into which a gas delivery tube (15) and a water supply tube (7) flow.

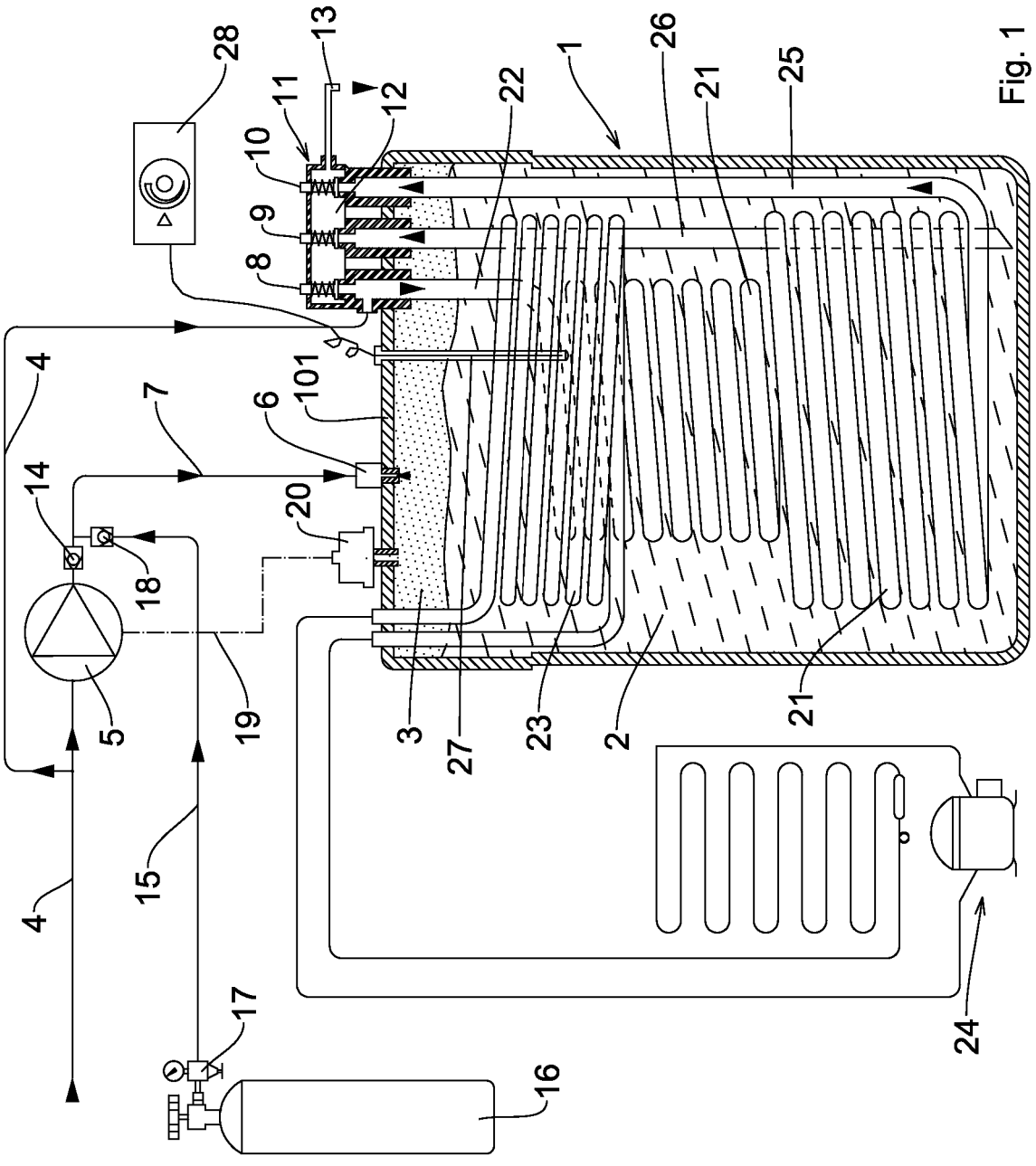
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Fig. 1

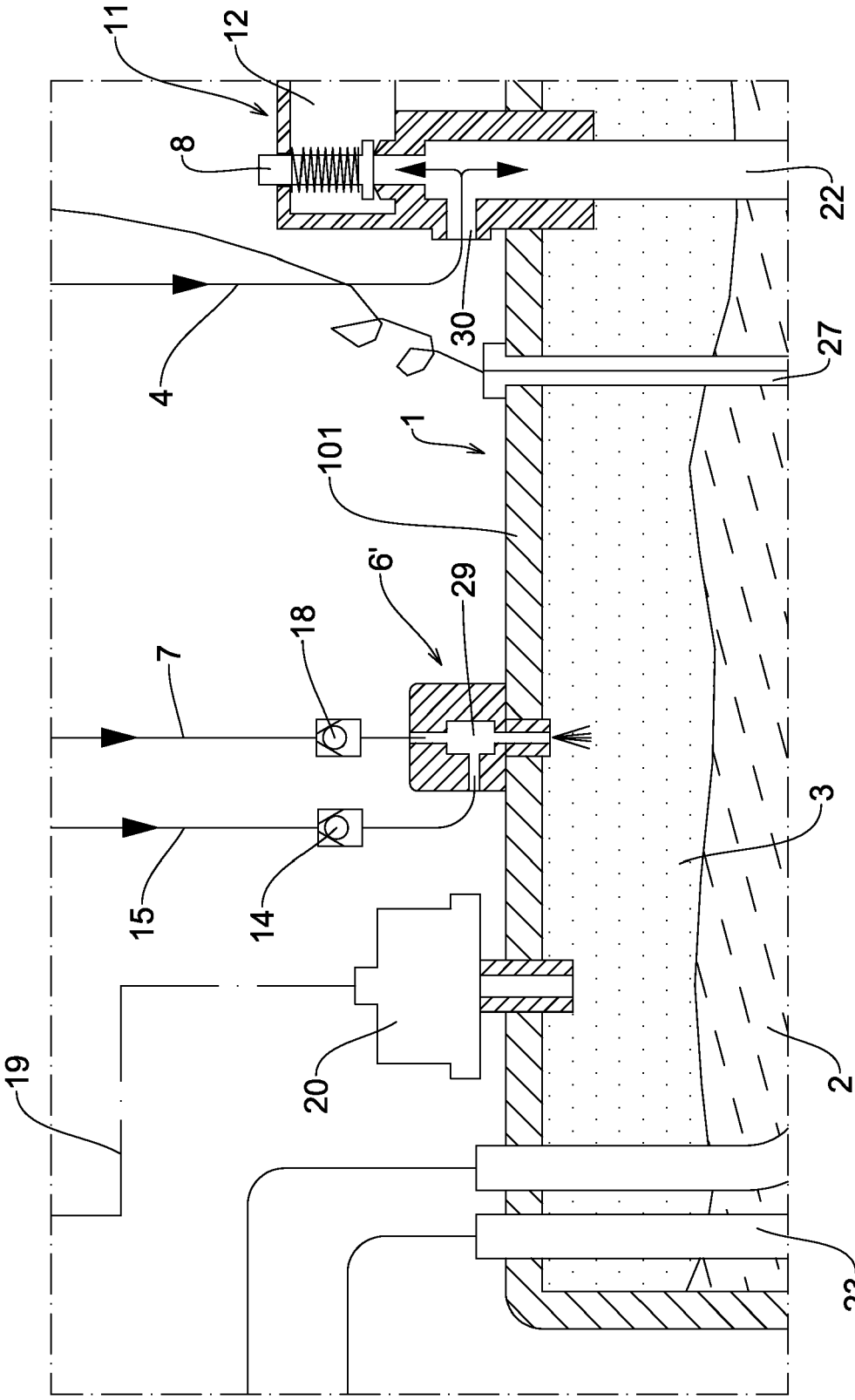

Fig. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 07 11 3223

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	14 January 2008	PAPANTONIOU, E

CATEGORY OF CITED DOCUMENTS

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