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(54) **Water pipe system with taps including a flushing channel between hot and cold water entries to prevent Legionella**

(57) Sanitary system comprising a cold water source (12), a hot water source (7) and pipes for hot (3) and cold (2, 29) water, connected to mixers (8, 26) with spout to tap warm water, which within the mixer is mixed from water from both pipes (2, 3, 29), and with means to flush the pipes (2, 3, 29) with a treatment agent to counteract legionella. The treatment agent flows from the hot water pipe through the thereto connected mixer into the cold water pipe, without water outflow from the spout. The mixers are provided with an internal permanent water connection (flushing channel) between the hot and cold water side, such that with completely closed mixer, through said flushing channel water can flow from the hot to the cold water side, while no water flows from the spout.

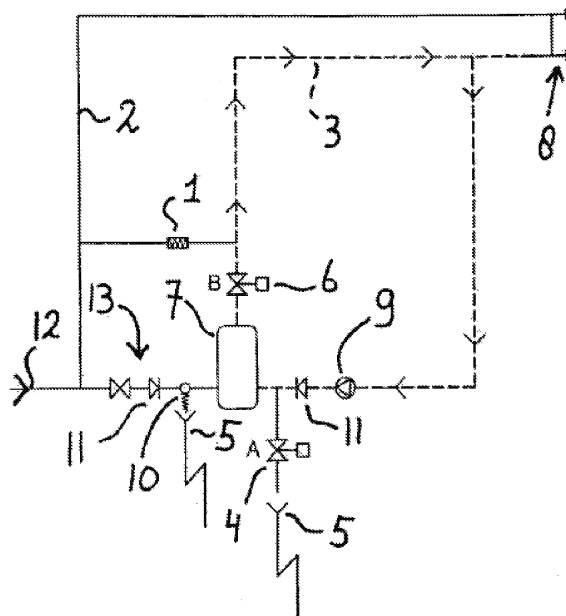


Fig. 1

## Description

**[0001]** The object of the invention is, among others, counteracting legionella bacteria preventive or curative in tap points of sanitary installations, by flushing the pipes and tap points with sufficiently hot water.

**[0002]** As is known, the bacteria causing Legionnaire's disease, grows at temperatures between approximately 25 and 55 degrees Celsius. Above that, it dies, below that, it is inactive. Recently, one has started to frequently flush the sanitary installations with hot water, e.g. each week, to kill the legionella bacteria. Refer e.g. to EP1820910A2 (Markstreamer). With mixers with short spout, like a kitchen sink or faucet, flushing can be carried out in closed-circuit. In mixers with long spout, like a shower, or in a cold water tap, thus with only one connection from the tap point to the cold water pipe, like a toilet or outside tap, the hot rinse water is discharged from the tap point.

**[0003]** This invention is applicable to flushing with hot water, but is also applicable to other ways of treating a sanitary facility, such as cleaning or disinfecting, for example, which is flushed with a chemical such as chlorine.

**[0004]** The object of the invention is versatile. One of the more important aspects that is preferred, is to be able to adapt an existing sanitary facility at low costs for safely and in water saving manner flushing while after all the legionella bacteria can be attacked reliably. In this connection one has to account that as a rule there is hardly or no change possible to the existing sanitary facility without damaging, since the water pipes are behind tiled walls.

**[0005]** The invention is according to the claims. The proposal is thus for a mixer, to which thus the hot and cold water pipes are connected, to provide internally of the mixer in at least one and preferably both flow directions a permanent water connection (so called flush channel) between the hot and cold water side, preferably inside or immediately upstream of the valves with which the tap/faucet is opened, such that with completely closed tap, such that no water can flow from its spout, through said permanent connection the water can flow from the hot to the cold water side while no water flows from the spout. Preferably this water connection has a flow area equal to a hole with a diameter of 0.5, 1, 1.5, or 2 millimetre or less. E.g. for a tap with ceramic closure discs a slot is made in one of the closure discs, providing the permanent water connection. Or for a thermostatic mixer in the partition between the two compartments (for hot and cold water) a hole with a diameter of 0.7 millimetre is drilled. The permanent water connection will provide during operation that through said water connection a leakage is always flowing, e.g. if one opens merely the cold water side, nevertheless a leakage will flow from the hot water pipe through the water connection into the spout. By making the flow area of the water connection sufficiently small, this leakage is neglectable.

**[0006]** E.g. with a single lever mixer the seal between

the cold and hot water gate is partly or completely removed, such that when the tap is closed, cold water can flow from the cold water pipe through the cold water gate, via the removed part of the seal into the hot water gate and subsequently into the hot water pipe, or vice versa. This modification of an existing mixer can also be applied to different mixer types. Preferably the water pressure inside the water pipe (e.g. hot water pipe) to which the water flows through the flushing channel, for this water flow with closed faucet through the flushing channel from the cold water pipe to the hot water pipe, or vice versa, lower than the water pressure in the other water pipe (e.g. cold water pipe).

**[0007]** To prevent that the water flows through the flushing channel in undesired direction, it is preferred to provide a check valve which prevents water flow through the flushing channel in the undesired direction.

## GENERAL

**[0008]** Preferably at short distance to the tap point the hot and/or cold water pipe is provided with a check valve obstructing a water flow opposite the direction during normal operation. Preferably the check valve in the hot or cold water pipe is of the type with switching means such that the sealing action can be switched on and off, e.g. in that the switching means are sensitive to water pressure such that by a pressure pulse of pressure change of sufficient magnitude in the relevant pipe, the switching on and off takes place.

**[0009]** Flushing is preferably carried out such that hot water flows through the cold water pipe, preferably wherein at a central location remote from the tap points hot water is injected into the cold water pipe and through said cold water pipe flows to the tap point and from the tap points flows to the hot water pipe, such that within the hot water pipe the water flows in opposite direction during flushing. When flushing is started the water pressure in the pipe system is changed such that the check valve in the hot water pipe is switched off such that during flushing the flow in opposite direction from the tap point inside and through the hot water pipe is allowed. At the end of flushing the water pressure in the pipe system is changed again such that the check valve in the hot water pipe is switched on again to prevent during typical operation of the sanitary facility that water from the tap point flows inside and through the hot water pipe.

**[0010]** During flushing the water pressure in the hot and cold water pipe which is flushed can be lower than the typical operation pressure, e.g. substantially equal to atmospheric pressure (pressureless), or higher than the typical operation pressure.

**[0011]** The pressure change is preferably larger than a pressure fluctuation that happens during typical operation of the sanitary installation. Within houses and utility buildings the pressure of the to the public water delivery system connected sanitary installation is about 2.5 bar (atmospheric pressure head) during typical operating

conditions and at street level. Pressure fluctuation for opening and closing of taps is typically no more than 5% of the typical operating pressure. The pressure change according to the invention is preferably at least 0.5 bar or 10% of the typical operating pressure. More preferably the pressure change is at least about 1 bar or 20%, more preferably at least about 1.5 bar or 30% of the typical operating pressure. To be able to flush effectively, the pressure in the pipe should be at least 1 bar (atmospheric pressure head).

**[0012]** Preferably during flushing the pressure is increased compared to the typical operating pressure. This pressure increase is preferably 2 bar or 40% of the typical operating pressure. At a typical water pressure of 2.5 bar (atmospheric pressure head, 5 bar is applied during flushing.

**[0013]** Preferably a closing means is set such that it switches at about the pressure caused by the pressure change, or a pressure between the pressure caused by the pressure change and the typical operating pressure. E.g. taking a typical operating pressure of 2.5 bars as a starting point and a flushing pressure of 5 bars, the valve will switch at 4 bar.

**[0014]** Preferably one flushes with hot water, preferably higher than about 55 or 60 degrees Celsius to effectively kill bacteria. However, flushing with cold water, preferably below 25 degrees Celsius, can be a proper alternative. In stead of a chemical treatment, e.g. a chemical treatment can be carried out during flushing, e.g. with a solution of liquid and citric acid.

**[0015]** This invention also relates to the combination of one or more separate features of the invention and one or more separate features as disclosed in EP1820910A2, the disclosure of which is integrally inserted here.

**[0016]** A generic elaboration of the invention, applied to a sanitary installation, is as follows: tap points to which two supply pipes (for hot and cold water) are connected (such as mixers of washstand, bath and sink), are provided with an internal connection between the two supply pipes, such that also during typical operation the tap point always taps simultaneously from both supply pipes, also if one of the two by the mixer operated valves is completely closed and completely seals water flow from the relevant supply pipe to the spout. Remote from the tap points the flushing medium is injected, e.g. in a pipe part common to all related tap points such as immediately downstream from the water meter. The flushing fluid successively flows through the one supply pipe, then through the mixer and through the flushing channel in it into the other supply pipe and then flows further, e.g. in recirculation. During flowing of the flushing fluid through both supply pipes through the mixer in between, no flushing fluid flows from the spout of the mixer, thus all flushing fluid flows from the one supply pipe through the mixer inside the other supply pipe.

**[0017]** The object is to treat an installation with a plurality of tap points integral, as much as possible automat-

ed/mechanised.

## EXAMPLES

**[0018]** The invention is now illustrated by way of examples, which however are not the only possible embodiments of this invention.

**[0019]** Fig. 1-4 show pipe designs.

**[0020]** Fig. 1 shows an example of flushing a hot water pipe from the cold water pipe, or vice versa. Pipe 12 is connected to the domestic water supply. Through a flushing channel with small flow area inside the mixer 8 functioning as tap point, water can flow between the cold water pipe 2 and hot water pipe 3. With equal water pressure in pipes 2 and 3 (typical operating mode, wherein valve 1 is closed), no water flows through the tap 8 between pipes 2 and 3. During flushing valve 1 is open and water flows through the flushing channel. If the pressure in pipe 3 is sufficient lower compared to pipe 2, or vice versa, water automatically flows from pipe 2 through the flushing channel inside mixer 8 into pipe 3 (or from pipe 3 through the mixer 8 into pipe 2).

**[0021]** Fig. 2-4 show a pipe design in three different operating modes, based on the principle of flushing with pressure increase. Illustrated is an electronic control unit which switches through the five pilot lines 25, the pump 9 and the valves 20, 21, 22, 23 and 24 according to the three different operating modes. To the water facility of the building are connected a sewer drain, a washstand mixer, boiler, bath mixer and toilet flusher. Interesting to mention is that at the two mixer taps, during flushing there is no water dispensing at these taps, which is safe with hot flushing. Inside the mixers there is permanent connection with small flow area between the hot and cold water pipe. During flushing water is dispensed in the toilet flusher through a valve 1 which is closed during typical operation.

**[0022]** Fig. 2 shows typical operation, fig. 3 shows flushing the cold water pipe with hot water, fig. 4 shows rinsing with cold water.

## Claims

1. To the sanitary system of a building belonging building water pipe system, comprising a cold water source (12), a hot water source (7) and pipes for hot (3) and cold (2, 29) water, connected to a plurality of in mutually separated spaces in the building provided mixers (8, 26) with spout to tap warm water, which within the mixer is mixed from water from both pipes (2, 3, 29), and provided with means to flush the pipes (2, 3, 29) with a treatment agent to counteract legionella, wherein said means are designed to allow during said flushing for all mixers of the water pipe system the treatment agent from the hot water pipe through the thereto connected mixer into the cold water pipe, or vice versa, without outflow from

the spout of water during said flushing with the treatment agent, **CHARACTERISED IN THAT** the mixers are each provided with an inside the mixer in at least one and preferably both flow directions provided permanent water connection (so called flushing channel) between the hot and cold water side, within or immediately upstream from the hot and cold water valves with which the mixer is opened to tap water, such that with completely closed mixer, and thus no water can flow from the spout, through said permanent water connection the water can flow from the hot to the cold water side, and/or vice versa, while no water flows from the spout, this preferably such that due to the presence of the permanent water connection during typical use (thus outside the flushing times) through said water connection there is always a leaking flow during tapping water from the spout, e.g. if one opens merely the cold water side nevertheless there will be a leaking flow from the hot water pipe through the water connection towards the spout.

2. System according to claim 1, with one or more of the following:

- with a mixer with ceramic closure discs in one of the discs a groove is made providing the permanent water connection;
- with a thermostatic mixer in the partition between the two compartments (for hot and cold water) a hole is drilled providing the permanent water connection;
- with a single lever tap the seal between the cold and hot water gate is partly or completely removed, providing the permanent water connection.

3. System according to claim 1 or 2, wherein with closed mixer from the cold water pipe through the cold water gate, via the permanent water connection, cold water can flow into the hot water gate and subsequently into the hot water pipe, or vice versa.

4. System according to any of claims 1-3, wherein the diameter of the permanent water connection has a flow area equal to a hole with a diameter of 0.5 or 1 or 1.5 or 2 millimetre at the most.

5. System according to any of claims 1-4, wherein the mixers have a feature, such as a valve, to allow the flow through the water connection in only a single direction and to obstruct it in the opposite direction.

6. Mixer, adapted for the system according to any of claims 1-5, provided with an inside the mixer in at least one and preferably both flow directions provided permanent water connection (so called flushing channel) between the hot and cold water side, within or immediately upstream from the hot and cold water

valves with which the mixer is opened to tap water, such that with completely closed mixer, and thus no water can flow from the spout, through said permanent water connection the water can flow from the hot to the cold water side, and/or vice versa, while no water flows from the spout, this preferably such that due to the presence of the permanent water connection during typical use (thus outside the flushing times) through said water connection there is always a leaking flow during tapping water from the spout, e.g. if one opens merely the cold water side nevertheless there will be a leaking flow from the hot water pipe through the water connection towards the spout.

7. Method to flush mixers which within a building are connected to a sanitary water pipe within the building, possibly using the system according to any of claims 1-5, wherein one starts with an existing sanitary facility and first the mixers are each provided with a permanent water connection or are replaced by mixers with permanent water connection and subsequently times of typical use and times of flushing with completely closed mixers are alternating, wherein during the times of flushing one dispenses flushing agent into the cold water pipe upstream from the mixer and flows this agent downstream (related to the typical flow direction) through the cold water pipe towards the mixer and through that into the hot water pipe and then further upstream (related to the typical flow direction) through the hot water pipe, or vice versa, such that with completely closed mixer, and thus no water flows from the spout, through said permanent water connection the water flows from the hot to the cold water side while no water flows from the spout, and possibly during the times of typical use through the permanent water connection there is always a leaking flow through the mixer from the cold water pipe to the hot water pipe, or vice versa, during from the spout tapping of water.

8. Method to build a system according to any of claims 1-5, wherein one with an existing facility provides the existing mixers with a permanent water connection or provides replacement mixers which are provided with a permanent water connection, or with a novel facility provides mixers with permanent water connection, wherein preferably one obtains mixers from a manufacturer, brokering, wholesaling, retailing or different supplier and thereafter provide them with the permanent water connection.

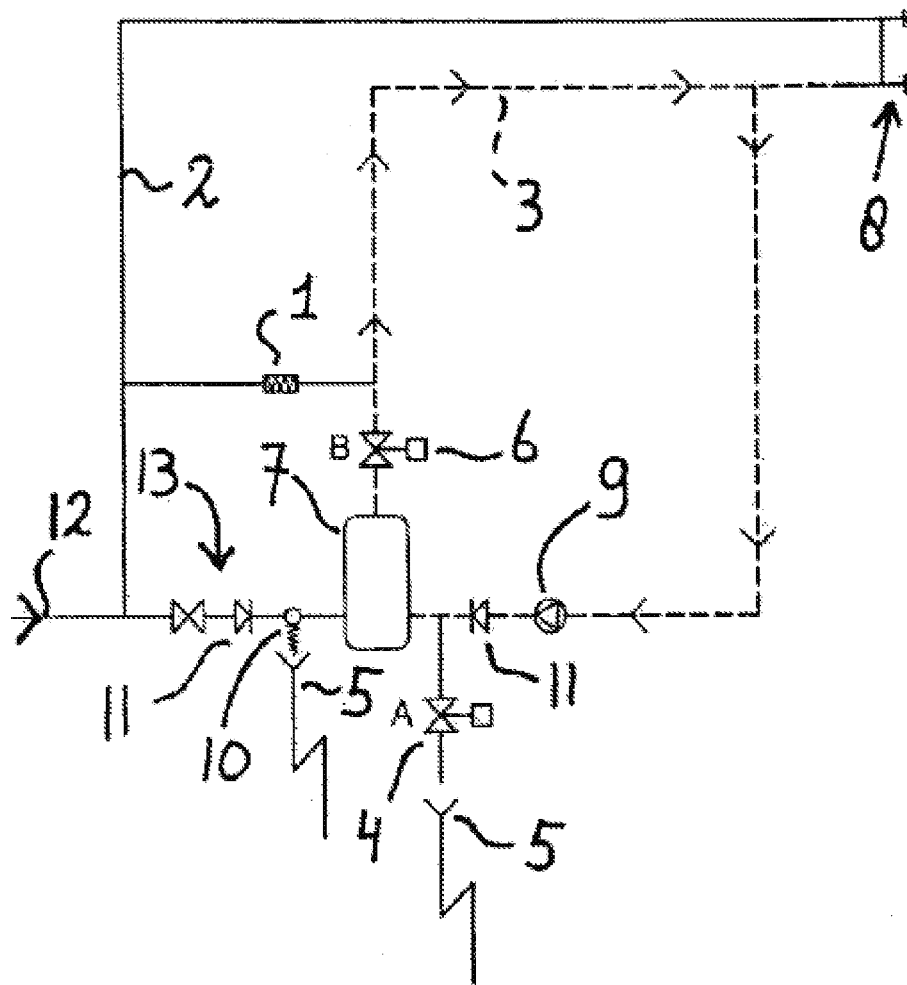


Fig. 1

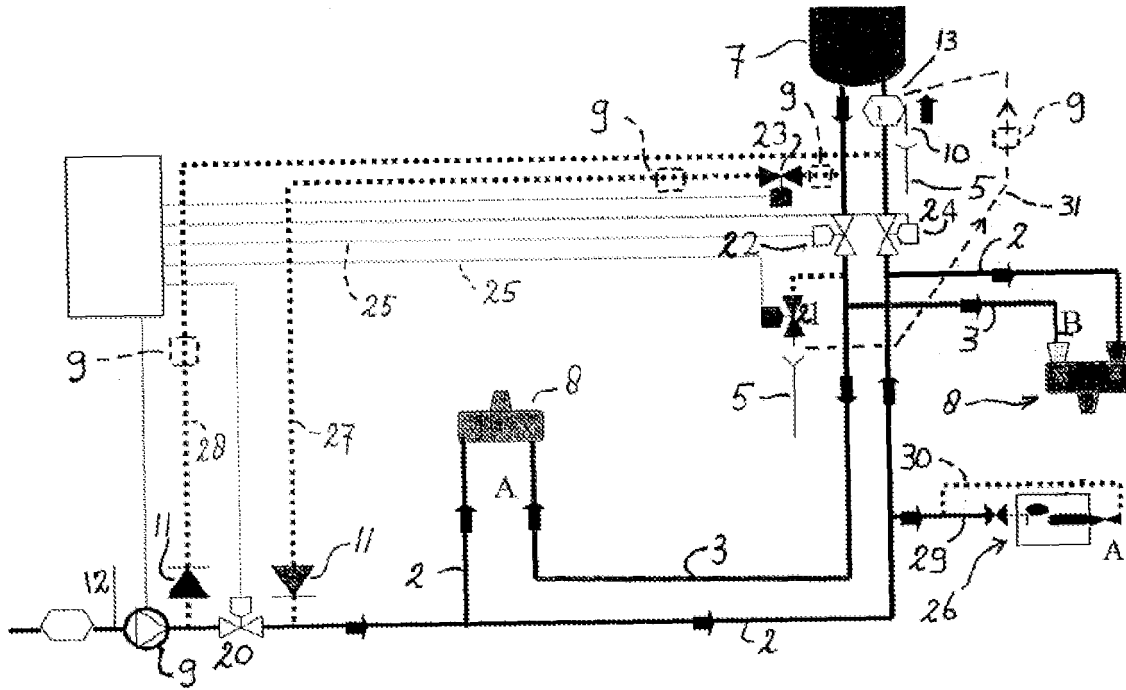


Fig. 2

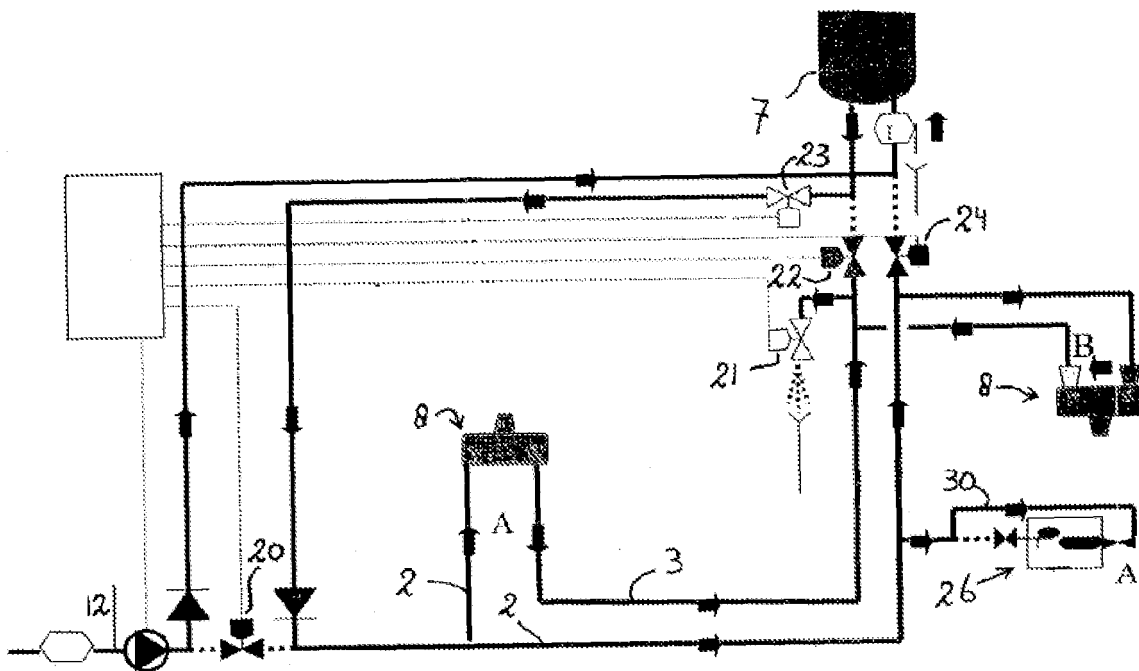


Fig. 3

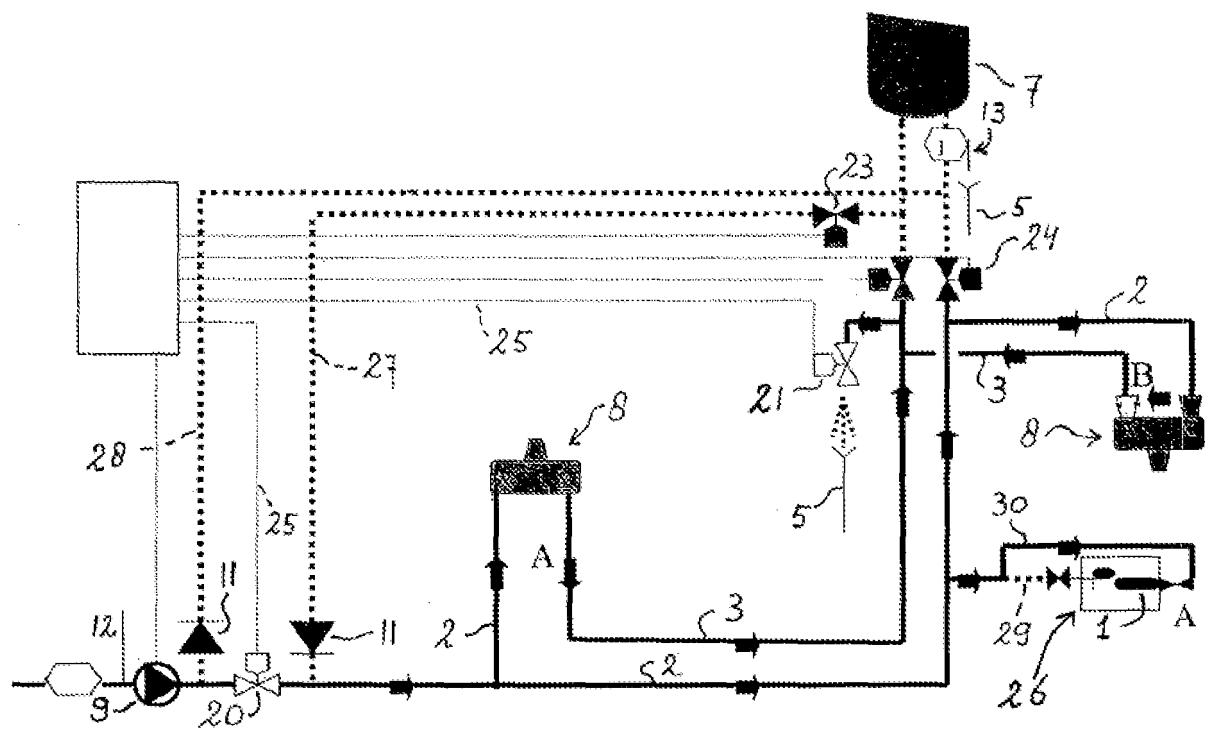


Fig. 4



## EUROPEAN SEARCH REPORT

Application Number  
EP 10 17 0820

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                           |                                                    |                                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|----------------------------------------------------|-------------------------------------------|
| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Citation of document with indication, where appropriate, of relevant passages                             | Relevant to claim                                  | CLASSIFICATION OF THE APPLICATION (IPC)   |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | DE 38 32 837 A1 (STIEBEL ELTRON GMBH & CO KG [DE]) 29 March 1990 (1990-03-29)<br>* the whole document *   | 1-8                                                | INV.<br>E03C1/04<br>E03B7/04<br>F24D17/00 |
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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                           |                                                    | E03C<br>E03B<br>F24D                      |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                           |                                                    |                                           |
| Place of search<br>Munich                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                           | Date of completion of the search<br>8 October 2010 | Examiner<br>Geisenhofer, Michael          |
| <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone<br/>Y : particularly relevant if combined with another document of the same category<br/>A : technological background<br/>O : non-written disclosure<br/>P : intermediate document</p> <p>T : theory or principle underlying the invention<br/>E : earlier patent document, but published on, or after the filing date<br/>D : document cited in the application<br/>L : document cited for other reasons<br/>&amp; : member of the same patent family, corresponding document</p> |                                                                                                           |                                                    |                                           |

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EPO FORM 1503 03.82 (P04C01)

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

EP 10 17 0820

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08-10-2010

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**REFERENCES CITED IN THE DESCRIPTION**

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