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(54) **WATER SUPPLY SYSTEM**

(57) The invention is related to liquid supply systems of buildings and constructions, where an intake water line is connected to the external municipal, city, or local water supply. Also, liquid supply systems with two liquid sources, where the intake liquid line is connected to the external water supply and simultaneously to the alternative water source, for example, a vessel filled with rainwater, are known from the state of the art. Such systems can be used for cold, as well as for hot water.

The water supply system comprises a liquid intake line connected to at least two sources of water - an external water supply line and an alternative source made in the form of a collecting vessel and a liquid supply line, characterized in that the water supply system is adapted to predominantly supply water from the alternative source as the tank on the liquid supply line of the alternative source having a pressure higher than the pressure of the external water supply line.

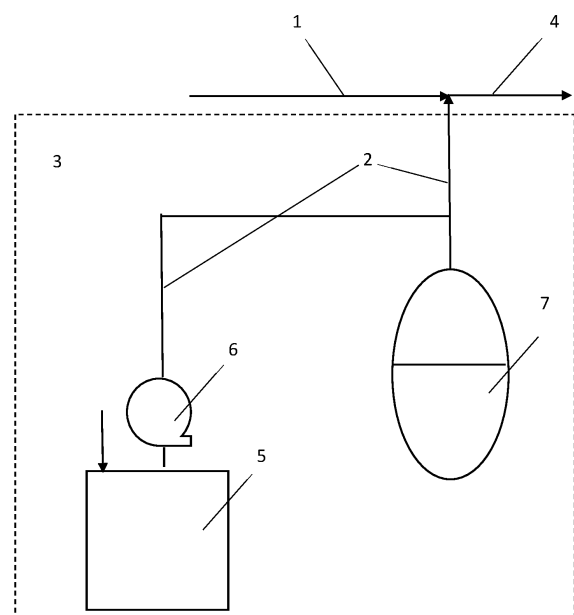


Figure 1

EP 4 317 620 A1

Description

[0001] The invention related to liquid supply systems of buildings and constructions, where intake water line is connected to an external municipal, city, or local water supply. Also, liquid supply systems with two liquid sources, where an intake liquid line is connected to an external water supply and simultaneously to an alternative water source, for example, a vessel filled with rainwater, are known from the state of the art. Such systems can be used for cold, as well as for hot water.

[0002] A hot water supply system from a patent JP6036016B2 (priority 30.08.2012), chosen by the applicant as the closest analogue, is known from the state of the art. The system consists of an intake water for consumption line, which through a control valve is connected to an external water supply and an alternative source, made as a storage vessel, equipped with a heater, operating on solar energy, and a temperature sensor functionally connected with the control valve. At the moment when water is taken from one source only - from the external water supply or from the vessel. The control valve has two operating positions: a first one - water supply from the external source and water supply from the vessel is closed, second one - water supply from the vessel and water supply from the external source is closed.

[0003] Within the scope of the patent, the system operates as follows. The vessel is filled with cold water. Then it is heated by solar energy under temperature control by the sensor. If the detected temperature of the water in the vessel is higher than a given value, the control valve is switched to the second position and water from the vessel flows to the water intake line. If the detected temperature of the water in the vessel is lower than the given value, the control valve is switched to the first position and water from the external supply line flows to the water from the intake line.

[0004] The main drawback of the closest analogue is the complexity of the control valve which decreases accuracy of the system as there is a connection between the valve and the sensor. The valve must get a signal from the sensor and so there is always a pause when the liquid source is changed. Also, the complicated construction of the valve decreases reliability and service life of the system.

[0005] The object of the invention and technical result achieved when using the invention is the development of a new water supply system with several water sources with increased efficiency when alternative sources are used and increased reliability when the sources are changed.

[0006] The given task and the claimed technical result are achieved by a system that comprises a liquid intake line connected with at least two sources of water - an external water supply line and an alternative source, made as collecting vessel and liquid supply line, characterized in predominant water supply from the alternative source as the tank on the alternative source water supply

line has the pressure higher than the pressure of the outer source, also the system may additionally comprise the pressure reducer placed in the spot of the external water source to liquid intake line connection, liquid purification unit and alternative source flashing line from the external water supply line.

[0007] Figure 1 shows an example of the simple water supply system with two sources.

[0008] The water supply system comprises a liquid intake line 4, which is connected to at least two water sources: to an external water supply line 1 and an alternative source 3. The alternative source 3 comprises a vessel 5, a liquid supply line 2 with a pump 6 and a tank 7. The tank 7 is made in the form, for example, but not limited to, an air-water tank, a pressurized vessel, or a tank with pressurizing means.

[0009] With the scope of the given invention the water supply system works as follows. Water supply of the building or construction and water for consumption is supplied along the water intake line 4, which is connected to at least two water sources. The external water supply line 1 is the permanent water source and the alternative source 3 may be filled with water or be empty. The presence of water in the alternative source 3 means that there is water in the vessel 5 (collected rain, melted snow or any other type). The efficient working of the alternative source 3 is that water from the vessel 5 predominantly flows to the intake water line 4. The water from the vessel 5 through the pump 6 flows into the tank 7. If the level in the tank is higher than a minimal amount, water is under pressure higher than the pressure of the outer water supply line 1. So, the water to the intake line 4 will predominantly flow from the alternative source 3. If the water level in the tank 7 is lower than said minimal amount, the water to the intake line 4 flows from the external water supply line 1. The claimed system operates with no control valve and so there is no complicated flow changing and that increases the system reliability.

[0010] The system may comprise two or more alternative sources of the same construction. The inlet water intake line 4 is connected to three sources: the external water supply line 1, the alternative source 3 and an additional alternative source (not shown). The highest pressure has the alternative source with the highest water level in the vessel 5. The water to the intake line 4 predominantly flows from the source with the highest water level. When there is water in neither of the two alternative sources, water flows from the external water supply line 1.

[0011] Additionally, the water supply system may further comprise water purification means (not shown) in the alternative source, after the pump 6 and before the tank 7. Water purification means may be made in the form of, but not limited to, a reverse osmosis unit, a membrane water purification unit, a hollow fiber cartridge or a mechanical prefiltration unit, or more units combined. The water from the vessel 5 flows to the pump 6, then through the water purification unit into the tank 7 and then to the water intake line 4.

[0012] Additionally, the water supply system may further comprise a pressure reducer (not shown), which is placed in the spot of the external water source 1 to the intake line 4 connection. The pressure reducer decreases the pressure of water flowing from the external water supply line 1, so the pressure in the tank 7 may be proportionally decreased, but at the same time, be higher than the pressure of the external water source 1. Pressure decrease in the water supply system increases the system's safety and reliability.

[0013] Additionally, the system may comprise a flushing line (not shown), an inlet of this line is connected to the outlet water source 1, and the outlet is connected to the vessel 5 of the alternative source 3. Water from the alternative source 3 (for example melted snow or rain-water) contains contaminants, which can cause water supply system clogging. Besides, for example, during dry seasons, there will be no water in the alternative source 3 for a long time. This leads to over-drying of the system lines. Due to the flushing line, the vessel 5 of the alternative source 3 is filled periodically with water from the external water source 1.

[0014] If the vessel 5 is filled with water, the claimed system operates within the scope of the invention. At the moment when water fills the vessel 5 of the alternative source 3, the pump 6 pumps water into the tank 7. Water is collected in the tank 7 and if the level of water is higher than minimal, the water is taken from the intake line 4. As water flows through all the system, there is no over-drying of the alternative source 3 units. So, reliability of the system is additionally increased.

[0015] The foregoing description, for the purpose of explanation, has been provided. However, the illustrative discussions above are not intended to be exhaustive or to limit the invention to the precise forms disclosed. Instead, many modifications and variations thereof are possible within the scope of the claims, which makes it possible to widely use the invention.

Claims

1. A water supply system comprising a liquid intake line connected to at least two sources of water - an external water supply line and an alternative source made as a collecting vessel and a liquid supply line, **characterized in that** the water supply system is adapted to predominantly supply water from the alternative source as the tank on the liquid supply line of the alternative source having a pressure higher than the pressure of the external water supply line.
2. The water supply system according to claim 1, **characterized in that** the system additionally comprises a pressure reducer placed in the spot of the external water supply line to the liquid intake line connection.
3. The water supply system according to claim 1, **char-**

acterized in that the system additionally comprises a liquid purification unit.

4. The water supply system according to claim 1, **characterized in that** the system additionally comprises an alternative source flushing line from the external water supply line.

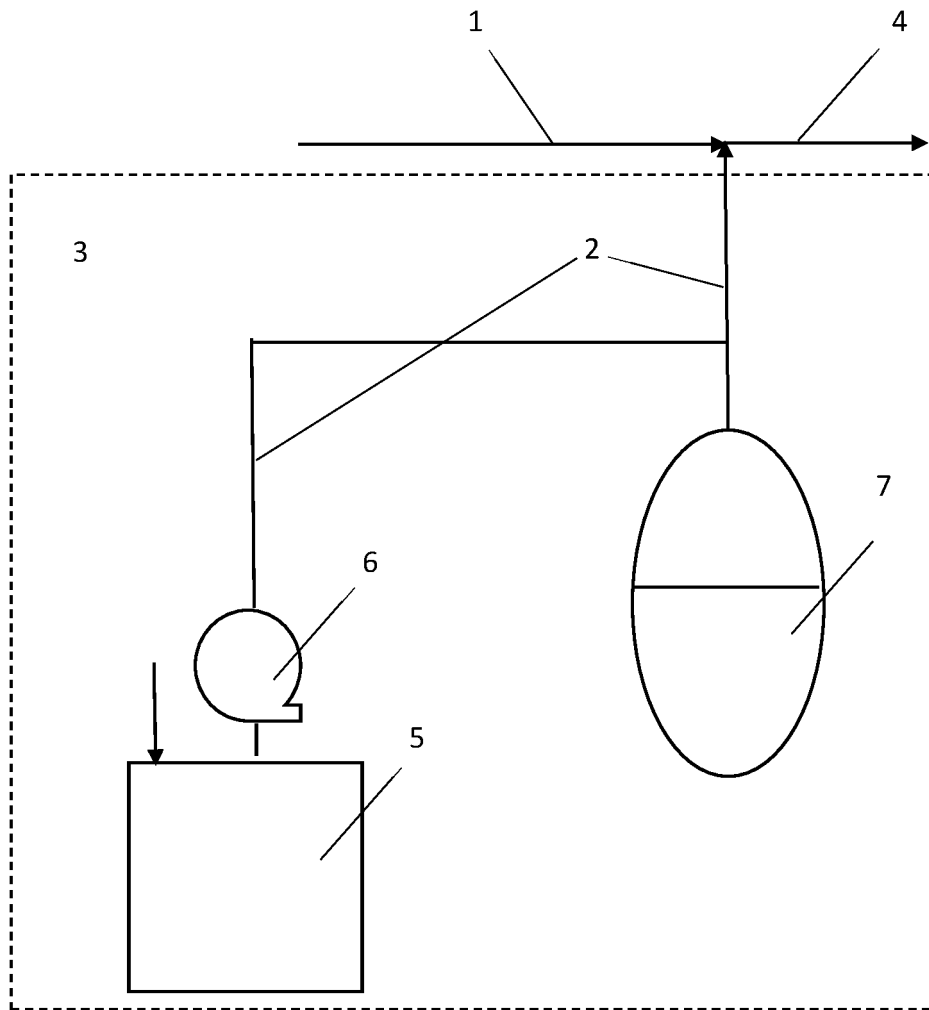


Figure 1

INTERNATIONAL SEARCH REPORT

International application No.
PCT/RU 2022/000089

A. CLASSIFICATION OF SUBJECT MATTER
E03B 3/02 (2006.01) E03B 3/30 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

E03B 1/00-11/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PatSearch (RUPTO internal), USPTO, PAJ, K-PION, Esp@cenet, Information Retrieval System of FIPS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	SU 947310 A1 (MOSKOVSKIY ORDENA TRUDOVOGO KRASNOGO ZNAMENI GIDROMELIORATIVNY INSTITUT) 30.07.1982	1-4
A	RU 16931 U1 (KROTOV ALEKSEY PAVLOVICH) 27.02.2001	1-4
A	BY 7030 C1 (ARENDOE NPO "ZHILKOMMUNTEKHNIKA"), 30.06.2005	1-4
A	SU 901418 A1 (PAPENKOV V.A.) 30.01.1982	1-4
A	JP 6036016 B2 (NORITZ CORP.) 30.11.2016	1-4

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

15 June 2022 (15.06.2022)

Date of mailing of the international search report

07 July 2022 (07.07.2022)

Name and mailing address of the ISA/RU

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 6036016 B [0002]