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(54) **Mixing device, especially for showers**

(57) The invention concerns a mixing device, especially for showers, with sources of liquids of different temperatures connected using a supply pipeline through a mixing device with a liquid offtake point, the basis of which is in the fact that between the mixing device (3) and the

liquid offtake point (4) there is a controlled valve (5) and a temperature sensor (9) placed into the supply pipeline (7), whereas one of the outputs of the controlled valve (5) is connected to a bypass pipeline (13) leading to a reservoir (6) the output of which is led back into the supply pipeline (7) or to the mixing device (3).

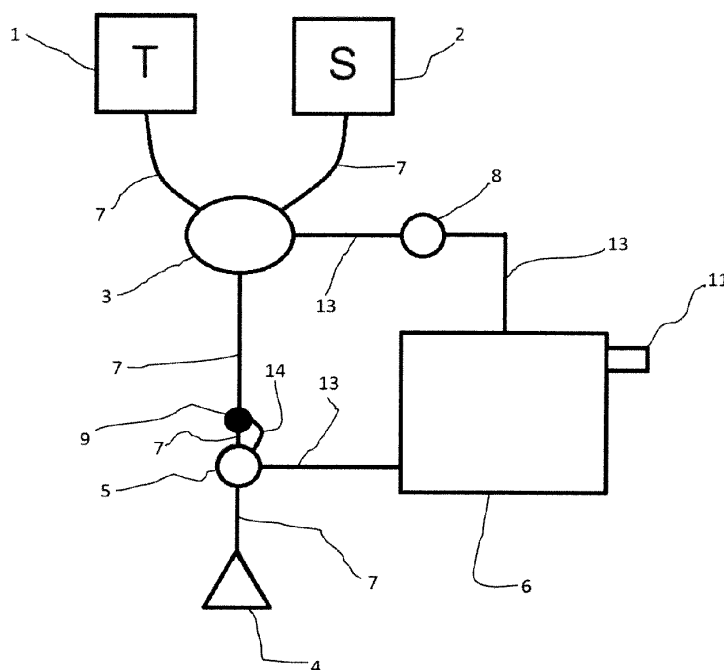


Fig. 1

Description

Technical Field

[0001] The invention concerns a mixing device, especially for showers, with sources of liquids of different temperatures connected using a supply pipeline through a mixing device with a liquid offtake point.

Technical Field

[0002] Mixing of two and more liquids of different temperatures is performed, together with pressure regulation, by a manually controlled lever mixer which offers a possibility of regulation of flowing liquid pressure and the proportion of hot and cold water. Thermostatic mixers enable setting of temperature and direct regulation of outflowing water temperature with the help of thermomechanical properties of material. Digitally controlled mixers with the possibility of setting of temperature and flow rate are a domain of the most modern bathrooms.

[0003] A long-term contemporary trend of decrease of energetic demandingness of households results in a massive spread of shower corners since they are a solution of everyday hygiene demonstrably more economic than baths. Control interface of a shower corner with a human is only reduced to setting of two parameters. These are regulation of temperature of outflowing water and regulation of flow rate of outflowing water. These parameters are in households usually regulated in several ways.

[0004] At present manually controlled lever mixers are the most used for this application. This type of control offers a possibility of regulation of flow rate and temperature at the same time using just one position of the lever, but only if constant values of temperatures of hot and cold water flowing to the shower corner are ensured. Not only for applications where the demand on constant temperature is not met there is a second possibility represented by a thermostatic mixer. Here the temperature is set with the help of thermomechanical properties of material. Therefore the thermostatic mixer is able to compensate variations in temperature of water incoming to the system and so the disadvantage of the aforementioned solution is eliminated.

[0005] Another alternative with minor representation are digital mixers with a possibility of setting of temperature as well as flow rate. These mixers are a domain of the most modern bathrooms.

An issue that none of the abovementioned mixer solutions is able to solve is a lossless initiation of the showering process. None of the aforementioned solutions ensures the demanded temperature of outflowing water immediately after start and water of inadequate temperature flows with no usage into a sink.

There are some technical solutions that focus on the issue of recuperation of waste water during showering. It considers devices installed into waste systems of shower

corners that can be bought separately.

[0006] The aim of this invention is a device for mixing of two or more liquids of different temperatures, where initial conditions of the demanded water temperature are ensured. At the same time water losses due to inadequate temperature are eliminated.

Subject Matter of the Invention

[0007] The subject matter of the mixing device, especially for showers, with sources of liquids of different temperatures connected using a supply pipeline through a mixing device with a liquid offtake point according to the invention is in the fact that between the mixing device of water of different temperatures and the liquid offtake point there is a controlled valve and a temperature sensor placed into the supply pipeline at the liquid offtake point, whereas one of the outputs of the controlled valve is connected to a bypass pipeline leading to a reservoir the output of which is led back to the supply pipeline or to the mixing device. There is a pump placed in the bypass pipeline behind the reservoir, possibly the reservoir can be equipped with a pressure chamber separated from the inner space of the reservoir by a movable or an elastic wall. The reservoir is equipped with an overflow or with an overflow valve. The temperature sensor is represented by a bistable sensor.

Description of the Figures in the Drawings

[0008] In the attached figures there are schematic depictions of the mixing device according to the invention, where

In Figs. 1 and 2 there are two alternatives of the mixing device and

in Figs. 3 to 5 there are depictions of alternatives of the bypass pipeline circuit

Example of Embodiment of the Invention

[0009] As it is evident in Fig. 1 from the source of hot water 1 - marked "T" and from the source of cold water 2 - marked "S" hot and cold water are supplied through the pipeline 7 into the mixing device 3. After mixing in the mixing device 3 water is further led through the pipeline 7 and through the temperature sensor 9 and the controlled valve 5 to the liquid offtake point 4, e.g. a shower. If water supplied to the liquid offtake point 4 is not of the demanded temperature, which is controlled by the temperature sensor 9, water supply to the liquid offtake point 4 is closed by the controlled valve 5 on the basis of a signal 14 coming from the temperature sensor 9 and supply by the bypass pipeline 13 into the reservoir 6 is opened. After reaching the demanded temperature of mixed water, flow of water of the demanded temperature to the liquid offtake point 4 is opened by the controlled

valve 5 on the basis of a signal 14 coming from the temperature sensor 9 and flow into the reservoir 6 is closed.

[0010] Water so far accumulated in the reservoir 6 is then led out of the reservoir 6 using the pump 8 and supplied back to the pipeline 7 or to the mixing device 3 to sequential mixing with water from the hot and cold water sources. So it comes to gradual discharging of the reservoir 6. The flow rate from the reservoir 6 is determined with regard to prevention of strong influence on temperature of water supplied from the mixing device 3 to the liquid offtake point 4. In a case of large amount of water which is supplied to the reservoir 6 some part of water is taken out of the system through the overflow 11.

[0011] In the embodiment according to the Fig. 2 the circuit of water overflown from the controlled valve 5 to the reservoir 6 and back to the pipeline 7 or to the mixing device 3 is adjusted so that there is a pressure chamber 10 placed in a part of the reservoir 6. The part of the reservoir 6 where water is supplied from the controlled valve 5 is separated from the pressure chamber 10 using a movable or an elastic wall. By water flowing into the reservoir 6 pressure in the pressure chamber 10 is increased and this results in subsequent forcing the water out back to the pipeline 7 or to the mixing device 3.

[0012] In a case of large amount of water which is supplied to the reservoir 6 some part of water is taken out of the system using the overflow valve 12 which is switched on by the pressure in the reservoir 6.

[0013] In Figs. 3 to 5 there are various alternatives of water outflow from the reservoir 6 depicted. In Fig. 3 there is an alternative to Fig. 1, where water is supplied to the mixing device 3 from the reservoir 6. In Fig. 3 there is another embodiment, which is different from the one in Fig. 1. In this embodiment ejection effect of water flow in the mixing device 3 is used instead of supplying the water using the pump 8.

[0014] In Fig. 4 there is an embodiment depicted, in which water is supplied from the reservoir 6 to a place in front of the mixing device 3 using the pump 8. Usage of the pump 8 can be possibly replaced by usage of the pressure chamber 10 according to Fig. 2.

[0015] In Fig. 5 there is an embodiment depicted, where water is supplied from the reservoir 6 to a place behind the mixing device 3 using the pump 8. Usage of the pump can be possibly replaced by usage of the pressure chamber 10 according to Fig. 2 as well.

[0016] It is also possible to create an embodiment according to the invention with the use of the pump 8 and the reservoir 6 with the pressure chamber 10 at the same time.

[0017] The temperature sensor 9 can be a sensor with continuous temperature signal or, advantageously, only a bistable sensor providing information whether the temperature is below the demanded limit or above the demanded limit.

[0018] The device according to the invention can be advantageously controlled by a computer.

[0019] It can operate without any computer or outer

source of energy as well. This is possible for example in the embodiment according to Fig. 2, where the controlled valve 5 would be used and would be controlled by temperature stretchability according to the temperature sensor 9 and the reservoir 6 with the pressure chamber 10.

[0020] The invention can be possibly used to achieve comfort and economization not only in the case of mixing two liquids, but in the case of mixing more liquids as well.

Claims

1. A mixing device, especially for showers, with sources of liquids of different temperatures connected using a supply pipeline through a mixing device to a liquid offtake point, featured by the fact that between the mixing device (3) and the liquid offtake point (4) there is a controlled valve (5) and a temperature sensor (9) placed into the supply pipeline (7), whereas one of the outputs of the controlled valve (5) is connected to a bypass pipeline (13) leading to a reservoir (6) the output of which is led back into the supply pipeline (7) or to the mixing device (3).
2. The mixing device for two or more liquids according to the Claim 1, featured by the fact that there is a pump (8) placed in the bypass pipeline (13) behind the reservoir (6).
3. The mixing device for two or more liquids according to one of the above mentioned Claims, featured by the fact that the reservoir (6) is equipped with a pressure chamber (10) that is separated from the inner space of the reservoir (6) using a movable or an elastic wall.
4. The mixing device for two or more liquids according to one of the above mentioned Claims, featured by the fact that the reservoir (6) is equipped with an overflow (11) or with an overflow valve (12).
5. The mixing device for two or more liquids according to one of the above mentioned Claims, featured by the fact that the temperature sensor (9) is a bistable sensor.

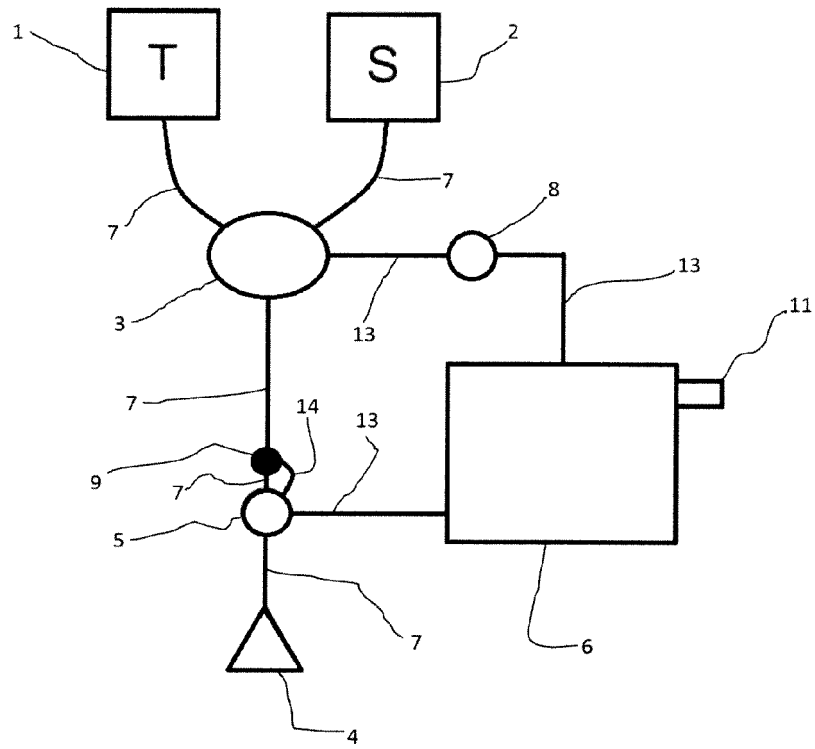


Fig. 1

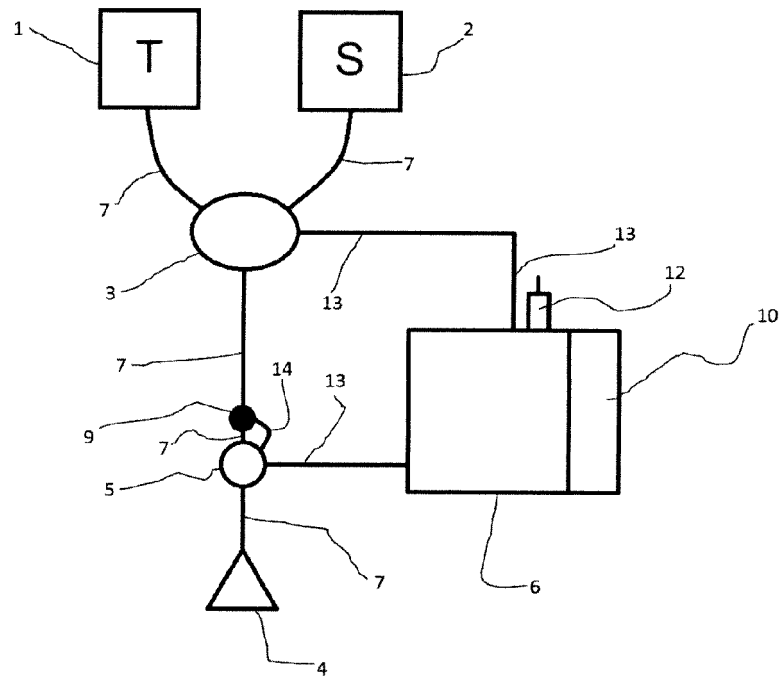


Fig. 2

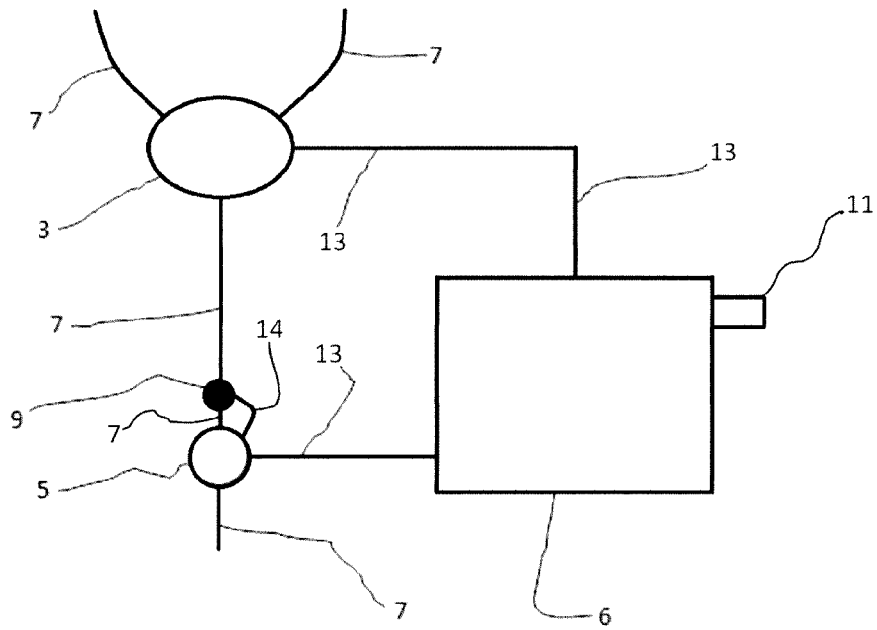


Fig. 3

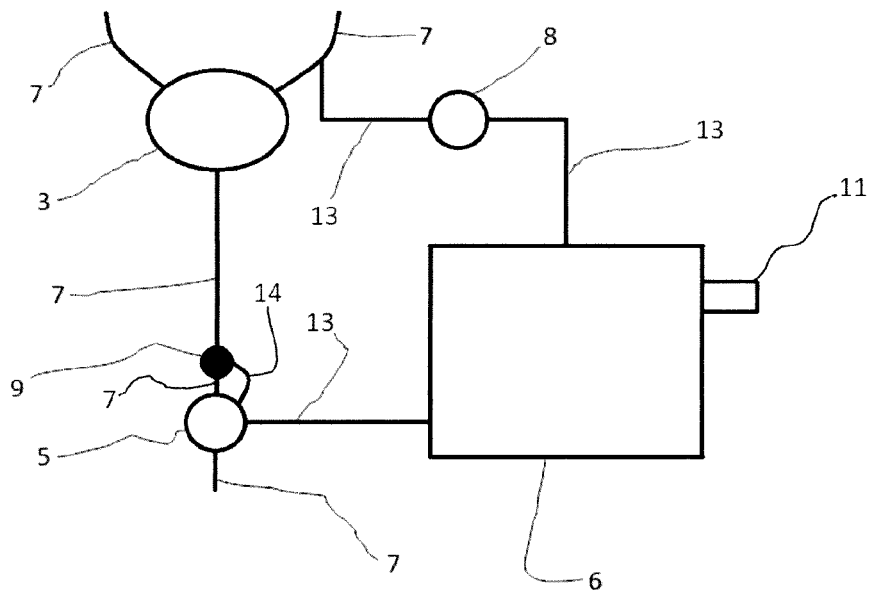


Fig. 4

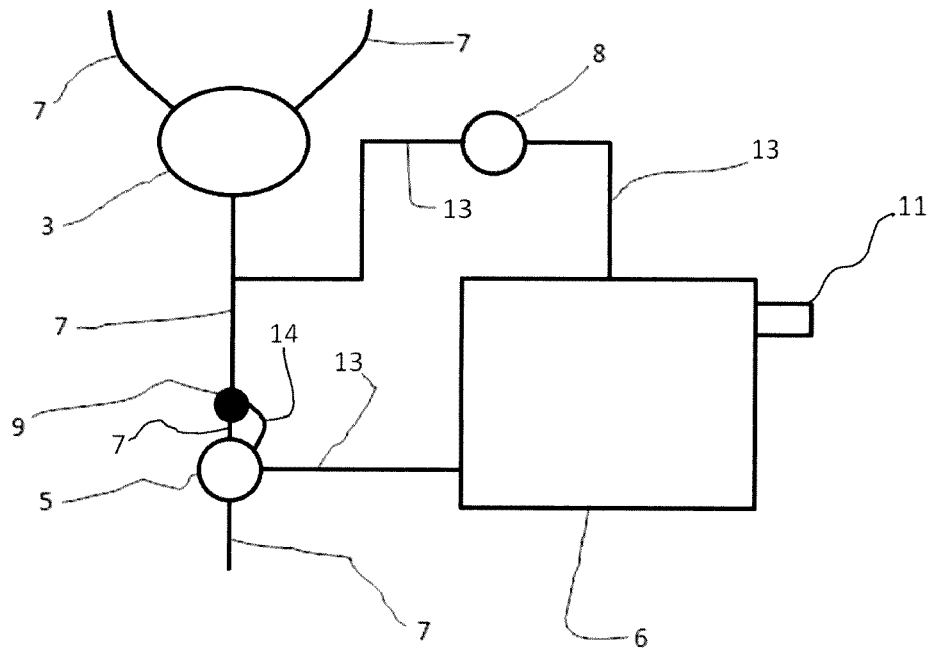


Fig. 5



EUROPEAN SEARCH REPORT

Application Number
EP 13 46 6018

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	US 2012/118414 A1 (MCMURTRY JOHN L [US]) 17 May 2012 (2012-05-17) * the whole document *	1-5	INV. E03B1/04
X	US 5 564 462 A (STORCH PAUL [US]) 15 October 1996 (1996-10-15) * the whole document *	1,2,4	
X	FR 2 946 767 A1 (ROCCAMATISI MARC [FR]) 17 December 2010 (2010-12-17) * the whole document *	1,2,5	
			TECHNICAL FIELDS SEARCHED (IPC)
			E03B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 30 October 2013	Examiner Geisenhofer, Michael
CATEGORY OF CITED DOCUMENTS 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 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 & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

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

EP 13 46 6018

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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30-10-2013

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 2012118414	A1	17-05-2012	NONE	
US 5564462	A	15-10-1996	NONE	
FR 2946767	A1	17-12-2010	NONE	