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(54) **System for stopping water flow in water use installations**

(57) The system is based on fitting a thermostatic bypass (1) at the point of use of the water, such as a faucet (6), between the hot water pipe (4) and the cold water pipe (5), connected to a heating boiler (8) of a water consumption installation, so that opening and closing the faucet (6) will turn on the boiler (8) and the circulation pump (9) fitted in the hot water pipe (4), making the water run through said hot water pipe (4), the bypass (1), the cold water pipe (5) and the return pipe to the boiler (8), heating the water until a preset temperature is reached, at which time the bypass (1) is closed and the hot water is available at the faucet (6) when it is opened in the hot water position. The circulation pump is governed by a relay (10) that is activated by a flow switch (11) fitted in the hot water pipe (4).

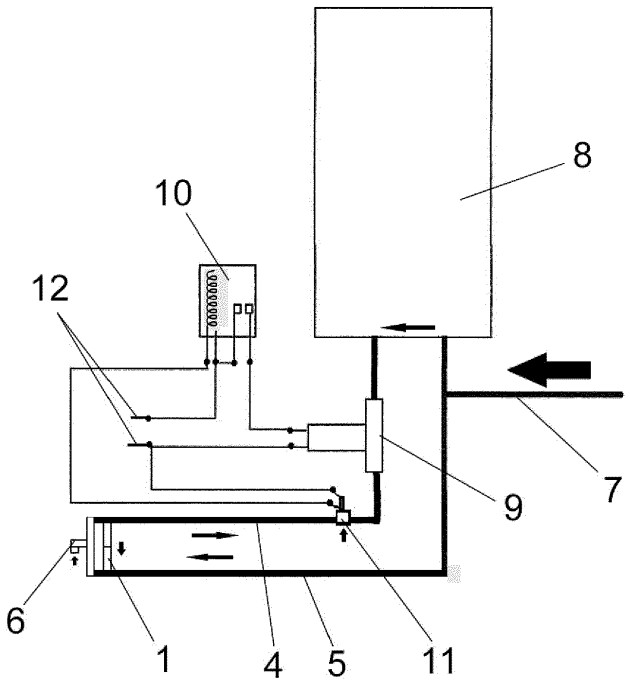

FIG. 1

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Description

[0001] This application claims priortity of Spanish Patent Application No. P 201231127, filed July 18, 2012, the entire contents of which are hereby incorporated by reference into this application.

OBJECT OF THE INVENTION

[0002] The present invention relates to a system for stopping water flow in water use installations, and more specifically to a system meant to prevent the loss of cold water and the resulting energy cost when requesting hot water at a point of use.

[0003] The object of the invention is to provide an environmentally-friendly manner to save water without sacrificing comfort, as well as optimising water and energy resources by the advantage of the cold and lukewarm water that is typically and inevitably wasted when opening a hot water faucet, for example, until the desired water temperature is reached, and also provides savings in the water purification system and in the energy, whether by gas or electricity, used by the corresponding boiler needed to heat the water.

[0004] A further object of the invention is to provide a device that can be fitted in any existing installation in a simple manner, with fully automatic operation, without the need for electronic devices or circuits, and with an extremely simple electrical circuit.

BACKGROUND OF THE INVENTION

[0005] It is known that whenever hot water is demanded in a home at a water faucet, opening the faucet results in cold water running for a time while the boiler starts to heat the water, until the water heated by the boiler reaches the faucet. That is, it is first necessary to eliminate all the cold water from the pipes between the faucet and the boiler, plus the lukewarm water obtained at the start of heating. This water is wasted, as is the energy used by the boiler during this period.

[0006] This is, at this time in most households when hot water is desired it is necessary to open the corresponding faucet and wait for the water to reach the correct temperature for its use, thereby wasting many litres of water and considerable energy.

[0007] However, some households are fitted with a water accumulator in a closed circuit with a circulation pump, which allows supplying hot water as soon as the faucet is opened, with the object of not wasting water.

[0008] The drawback of this system is its cost of installation and the energy wasted by it, as the circulation is constantly in operation, and regardless of the insulation of the pipe there will always be some heat losses, in addition to the cost of the accumulator tank and the space it occupies.

[0009] In addition, it should be remarked that the recirculation takes place in a main circuit, with some pipe segments not recirculating that contain cold water that will be wasted until the hot water arrives when the corresponding faucet is opened, such as in a bidet that is distant from the main recirculation circuit.

[0010] There also exist residential buildings in which the system described above is applied to the entire building, the water running up and down main pipes that define the closed circuit, but not running through the individual pipes of each household.

[0011] The drawback in this type of buildings and households is that the main pipe acts as an individual boiler, so that when hot water is required the faucet is opened and it is necessary to wait for the hot water to reach the main pipes of the requesting household, wasting the cold water in these pipes. In this case the pipes of each household function as segments left out of the recirculation, as in the previous example.

DESCRIPTION OF THE INVENTION

[0012] The system disclosed has been conceived to solve the drawbacks described above by means of a simple yet effective solution.

[0013] More specifically, the system of the invention is based on installing a thermostatic bypass between the hot water pipe and the cold water pipe, fitted immediately before the water outlet faucet (avoiding pipe segments out of the recirculation), so that between said bypass and the boiler the hot water circuit contains the circulation pump and a flow switch able to act on a relay that governs the operation of the pump.

[0014] In this way, when the how water faucet is opened and immediately closed, the corresponding flow meter of the boiler detects the water flow and starts the boiler, while the flow switch also detects the flow and turns on the circulation pump, so that the water sent from the boiler through the hot water pipe passes through the pump, the flow switch and reaches the bypass, passing through it and returning to the boiler in the cold water pipe, establishing a closed-circuit recirculation without reaching the faucet, as the water is recirculated at the bypass, the thermostatic valve of the bypass operating so that when the desired temperature is reached this thermostatic valve will close and the hot water flow stops, making the flow switch turn off the circulation pump and stopping the boiler, so that the circuit will contain the hot water and be resting, the boiler then operating in the conventional manner, so that hot water can be obtained directly at the time of opening said faucet.

[0015] This is, with the described system when a hot water faucet is opened the flow switch detects the water flow and closes a switch that sends power to a relay, which in turn closes some greater-power switches that feed the pump. The pump will keep the flow switch closed even if the faucet is closed, as water is being received through the thermostatic bypass and the cold water pipe, so that the water flow does not stop.

[0016] When the programmed temperature is reached

the thermostatic bypass will close, stopping the water flow and opening the relay, thus stopping the circulation pump and the boiler.

[0017] However, when the faucet is opened again to demand hot water, the circulation pump will start again (not without any specific function, as the bypass is closed), driving hot water through the corresponding pipe to the faucet, the boiler then operating in the conventional manner, that is, if the hot water faucet is opened, the boiler starts, and if it is closed the boiler turns off.

[0018] In this way, no cold water is wasted as the water being heated is flowing through the bypass, the pump and the cold water pipe, that is, it returns to the boiler until the thermostatic valve of the bypass detects that the programmed temperature has been reached, at which time the bypass is closed and the circulation pump and the boiler are turned off, allowing to supply hot water directly to the faucet if it is opened in the hot water position.

[0019] During the time it takes for water to recirculate through the bypass to heat the water to the programmed temperature, it is possible to prepare everything needed for a shower, if the hot water will be used for a shower. The shower can be used as if the thermostatic bypass were not present, as after it has fulfilled its purpose the bypass closes and does not operate again while the water in the pipe is hot, so that its function is obviously to allow water to recirculate until it reaches its temperature of use.

[0020] After some time without using hot water, the water in the pipe will cool, and the bypass will have returned to its standby position, open. The recirculation can be activated again by opening and c losing the faucet in the hot water position.

[0021] In conclusion, when the hot water pipe contains cold water, opening and closing the faucet will start the boiler until the temperature set at the corresponding point of use (the faucet) is reached, at which time if the faucet is opened again hot water will flow immediately, and the thermostatic bypass will be turned off.

[0022] Finally, it should be noted that fitting a thermostatic bypass at each point of use of a household means that the recirculation will start each time a faucet is opened and closed, the recirculated water passing by the closest bypass that presents the least resistance to water flow, until the water reaches the preset temperature, when the bypass will close, and so on for all existing bypasses until the last one is closed, stopping the flow. The boiler and the pump flow switch will detect that flow has stopped and will therefore turn off, leaving the entire installation with hot water available at all points of use, regardless of whether there are several main circuits, as in large homes with more than one main circuit, or of points of use distant from the main circuit.

DESCRIPTION OF THE DRAWINGS

[0023] To complete the description made below and in order to aid a better understanding of the characteristics of the invention, according to a preferred embodiment thereof, a set of drawings is provided that forms an integral part of the description, where for purposes of illustration and in a non-limiting sense the following is show:

Figure 1 shows a representation of the scheme for stopping water flow in water consumption installations, all in accordance with the object of the invention.

Figure 2 shows a schematic view of the thermostatic bypass included in the system represented in the previous figure.

PREFERRED EMBODIMENT OF THE INVENTION

[0024] As shown in the referenced figures, the installation of the invention includes, as an essential element, a thermostatic bypass (1), with a thermostatic element (2) and a check valve (3), said bypass (1) being connected between the corresponding hot water pipe (4) and the cold water pipe (5), a point of consumption such as a faucet (6), as shown clearly in figure 1, having been fitted previously.

[0025] The cold water pipe (5) is naturally connected to the corresponding outlet (7) and to the heating boiler (8), from which the hot water pipe (4) runs, and in which the circulation pump (9) is installed, governed by a relay (10) that is activated by a flow switch (11), as will be described below, and which as the circulation pump (9) itself is fitted in the hot water pipe (4). The electrical power supply for the flow switch (11) and the relay (10) is provided by the corresponding power grid (12).

[0026] According to this structure, the operation is as follows. When the faucet (6) is opened in the hot water position and then closed again, the following occurs:

a) the flow sensor (different from the flow switch) of the boiler (8) detects the water flow and starts the boiler

b) similarly, the flow switch (11) detects the flow and turns on the circulation pump (9), so that the water will flow in the hot water pipe (4) outwards to the faucet (6) and return through the cold water pipe (5) to the boiler (8), this water passing through the bypass (1), thereby keeping the boiler in operation

c) the water runs through the bypass (1) placed before the faucet and naturally fitted in between the hot water pipe (4) and cold water pipe (5), so that the water is heated by means of this bypass (1) in its recirculation through the latter and its return to the boiler (8)

d) when the water reaching the faucet (6) through the bypass (1) reaches the desired temperature, the thermostatic valve of the bypass (1) will close, stopping water flow through said bypass (1), which is detected by the flow sensors, turning off the boiler (8) and the circulation pump (9), leaving the system or bypass (1) out of service after it fulfils its function, which is to heat the water to the desired temperature

e) when the circuit is stopped, the water will have been heated and will be available immediately when opening the hot water faucet (6), again turning on the boiler (8) which will operate in the conventional manner, without the participation of the bypass (1), so that the boiler (8) will continue to supply hot water as demanded by the faucet (6)

f) as hot water is being used and its temperature is being regulated, some of the lukewarm water contained in the cold water pipe (5) is supplied, using the energy employed to heat it, the pipe being filled with cold water again within a few seconds

g) the bypass will remain closed while there is hot water in the faucet (5), so that the bypass (1) will be unused after its function has been fulfilled

h) when the water in the circuit has cooled, the thermostatic valve of the bypass (1) opens and it is left in working position, ready to recirculate the water and heat it so that when the faucet (6) is opened again hot water will be available in it.

[0027] In short, the operation can be summarised as follows: when a user decides to obtain hot water at the faucet (6), or example to take a shower, said faucet (6) must be opened and closed in the hot water position, thereby initiating the hot water recirculation through the hot water pipe (4), the bypass (1), the cold water pipe (5), the water then returning to the boiler (8) so that when the thermostatic bypass reaches the desired water temperature it closes, stopping water flow through it so that there is hot water available in the faucet (6) when it is opened.

[0028] It should be mentioned that when the thermostatic bypass is closed the water flow stops, turning off the relay (10) and consequently the pump (9).

[0029] Obviously, as can be inferred from the description made, no cold water is wasted and no energy is required to heat the water as after the hot water faucet (6) is opened and closed to use the hot water, and after the pump (9) has been working for a certain time the water will have reached its desired temperature, at which time the entire system is stopped so that the hot water is present at the faucet (6) itself, and thus when the latter is opened hot water will run directly without cold water running first, as conventionally occurs.

[0030] The bypass (1) provided at the point of use of the water can be manufactured in many different ways, such as an independent part that can be coupled to any existing faucet, as an element integrated in the faucet, whether single lever or thermostatic, can include a thermostatic valve, and electric valve, a manual valve, and can have different shapes and appearances, as well as be made of different materials.

Claims

1. System for stopping water flow in water use installations, meant to prevent the outlet of cold water while heating the water from the corresponding boiler to the faucet of use, with the resulting savings in cold water and energy in the operation of the boiler while heating said water, **characterised in that** between the hot water pipe (4) and the cold water pipe (5) connected to the heating boiler (8), and before or forming part of the faucet (6) itself where water is demanded, a thermostatic bypass (1) is provided through which the water runs in a closed circuit along the hot water pipe, the bypass itself, the cold water pipe and returning to the boiler (8), driven by the corresponding pump (9) fitted in the hot water pipe (4), so that opening and closing the faucet (6) in the hot water position will start this recirculation of water through the bypass until a preset temperature is reached, at which time the thermostatic valve of the bypass is closed and the hot water in the pipe (4) can be used directly when opening the faucet (6).

2. System for stopping water flow in water use installations according to claim 1, **characterised in that** the operation and stoppage of the pump (9) is governed by a relay (10) that is activated by a flow switch (11) fitted in the hot water pipe after the circulation pump (9).

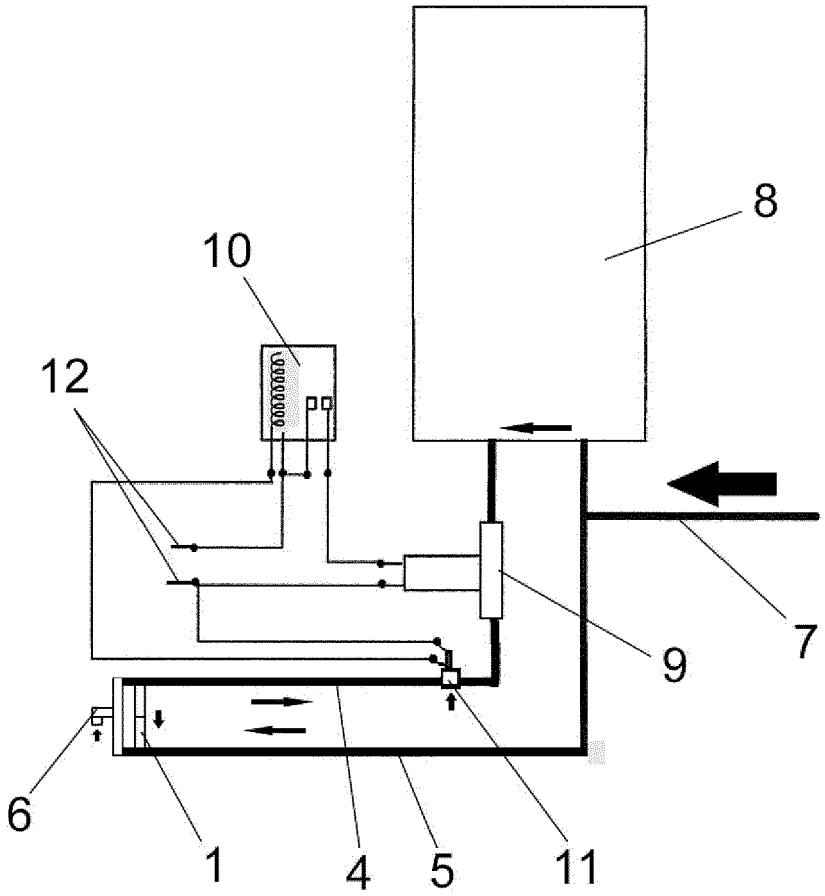

FIG. 1

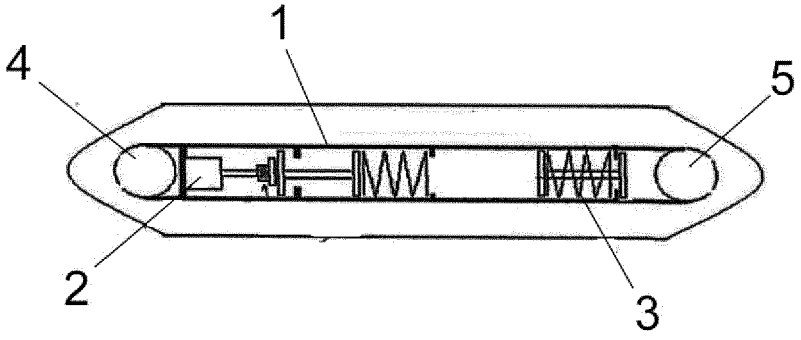

FIG. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 13 38 2280

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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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	8 October 2013	Schwaiger, Bernd

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 13 38 2280

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08-10-2013

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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