

WATER TEMPERATURE MANAGEMENT SYSTEM

FIELD OF THE INVENTION

5 The present invention relates to the regulation of water temperature in a hot/cold water mixer system, particularly for use in a domestic setting. It is envisaged for particular use in regulating shower water temperature in an environment where many users are connected to the same water supply, such as in an apartment complex or hotel.

BACKGROUND TO THE INVENTION

10 Consistency of water temperature can be difficult to achieve where more than one user is connected to a single source of water. This problem is commonly experienced where several showers are connected to a single source of water. Typically, a user sets the water temperature of their shower to be at a desired level. When a subsequent user turns on a shower or other tap from the
15 same water source, the temperature of the water at the first user suddenly increases or decreases. This problem recurs each time a subsequent shower is turned on. As a corollary, the turning off of a shower or other tap in the system leads to a temperature rise or drop in the other showers. Such temperature changes can have severe effects on water users, especially in children. A
20 considerable amount of water is also wasted during the re-adjustment to optimal temperature.

It is therefore desirable to provide a water inlet/outlet system that reduces the effect of changes in water outlet temperature which may otherwise result from changes to upstream water usage.

25 SUMMARY OF THE INVENTION

In a broad form, a pressure release valve is connected to the hot/cold mixer chamber of a hot/cold water mixer system, the valve operational to recirculate some of the water within the mixer chamber prior to exiting the chamber. In one aspect of the invention, a hot/cold water mixer is provided, which
30 includes a hot/cold water mixing chamber having: a hot water inlet; a cold water inlet; a water outlet; and a pressure release system, the pressure release system including: a pressure release outlet in the mixing chamber; a pressure release inlet adjacent the water outlet; and a pressure release valve extending between

the pressure release outlet and the pressure release inlet, the valve adapted to recirculate a portion of the water within the mixing chamber into the pressure release system.

In another form, there is provided a system for regulating water temperature in a hot/cold water mixer the system including: a hot/cold water mixer according to claim 1; a first water flow regulating device connected before the cold water inlet; and a second water flow regulating device connected before the hot water inlet, the water flow regulating device comprising a flow restricting member axially moveable within a water flow chamber, the flow restricting member including at least one of a tapered portion or a stepped portion, and wherein the size of a gap between the flow restricting member and internal walls of the water flow chamber varying according to an axial position of the flow restricting member, the water flow chamber having at least a first region and a second region whereby movement of the flow restricting member from the first region to the second region results in a step-change in the size of the gap between the flow restricting member and the internal walls of the water flow chamber.

Ideally, the desired temperature range at the water outlet is between 0 and 5, ideally 0 and 3, degrees Celsius of a user's selected outlet temperature.

In one form, the pressure release valve comprises an inlet connected to a body having an aperture for permitting water flow there through, the valve operational such that upon a decrease in water pressure upon the valve inlet, the valve assumes a closed position, increasing the pressure of the water flowing through the valve aperture, the increased pressure resulting in the water flowing through the valve to re-enter the water mixer chamber. To maintain the water temperature at an acceptable level, preferably the predetermined pressure level is between about 1.0 and 5 bar, ideally about 1.5 bar.

The present invention provides a mixer and a system for maintaining a substantially constant water outlet temperature in a hot/cold water mixing system following undesired changes in upstream water input. The system is particularly advantageous in environments where many users are connected to the same water supply, such as in an apartment complex or hotel. The system results in an added safety mechanism to ensure that users, in particular children, are not inadvertently scalded by a sudden increase in water temperature. Including both

a pressure regulating device and water flow regulating device assists in maintaining both a near constant pressure and temperature at the mixer outlet.

BRIEF DESCRIPTION OF THE DRAWINGS

5 An illustrative embodiment of the present invention will now be described with reference to the accompanying figures. Further features and advantages of the invention will also become apparent from the accompanying description.

Figure 1 is a schematic diagram of a hot/cold water mixer system including a pressure regulating device according to an embodiment of the invention;

10 Figure 2 is a side view of the hot/cold water mixer showing the pressure regulating device according to an embodiment of the invention;

Figure 3 is a cross sectional side view of the hot/cold water mixer of Figure 2;

Figure 4 is a top view of the hot/cold water mixer of Figure 2;

Figure 5 is a perspective view of the hot/cold water mixer of Figure 2;

15 Figure 6 is a cross sectional perspective view of the hot/cold water mixer of Figure 2; and

Figure 7 is a perspective view of the pressure release valve according to one embodiment.

DESCRIPTION OF PREFERRED EMBODIMENT

20 The following description is presented to enable any person skilled in the art to make and use the invention, and is provided in the context of a particular application and its requirements. Various modifications to the disclosed embodiment will be readily apparent to those skilled in the art, and the general principles defined herein may be applied to other embodiments and applications
25 without departing from the spirit and scope of the present invention. Thus, the present invention is not intended to be limited to the embodiments shown, but is to be accorded the widest scope consistent with the principles and features disclosed herein.

30 Figure 1 shows a hot/cold water mixer system 10. The system comprises a hot water inlet 12 and a cold water inlet 14. Hot water and cold water pumps may be connected to the respective inlets 12, 14 to assist with water flow into the mixer chamber 20 and water outlet 22.

CLAIMS:

1. A hot/cold water mixer including:
 - a hot/cold water mixing chamber having:
 - a hot water inlet;
 - a cold water inlet;
 - a water outlet; and
 - a pressure release system, the pressure release system including:
 - a pressure release outlet in the mixing chamber;
 - a pressure release inlet adjacent the water outlet; and
 - a pressure release valve extending between the pressure release outlet and the pressure release inlet, the valve adapted to recirculate a portion of the water within the mixing chamber into the pressure release system.
2. A hot/cold water mixer according to claim 1, wherein the pressure release valve comprises an inlet connected to a body having an aperture for permitting water flow there through, the valve operational such that upon a decrease in water pressure upon the valve inlet, the valve assumes a closed position, increasing the pressure of the water flowing through the valve aperture, the increased pressure resulting in the water flowing through the valve to re-enter the mixing chamber.
3. A hot/cold water mixer according to claim 1, wherein the mixer maintains a desired temperature of water flowing through the water outlet at between 0 and 5 degrees Celsius of a user's selected outlet temperature.
4. A hot/cold water mixer according to claim 1, wherein the mixer maintains a desired temperature of water flowing through the water outlet at between 0 and 3 degrees Celsius of a user's selected outlet temperature.
5. A system for regulating water temperature in a hot/cold water mixer the system including:

a hot/cold water mixer according to claim 1;
a first water flow regulating device connected before the cold water inlet;
and
a second water flow regulating device connected before the hot water inlet,

the water flow regulating device comprising a flow restricting member axially moveable within a water flow chamber, the flow restricting member including at least one of a tapered portion or a stepped portion, and wherein the size of a gap between the flow restricting member and internal walls of the water flow chamber varying according to an axial position of the flow restricting member, the water flow chamber having at least a first region and a second region whereby movement of the flow restricting member from the first region to the second region results in a step-change in the size of the gap between the flow restricting member and the internal walls of the water flow chamber.

6. A system according to claim 5, wherein the pressure release valve comprises an inlet connected to a body having an aperture for permitting water flow there through, the valve operational such that upon a decrease in water pressure upon the valve inlet, the valve assumes a closed position, increasing the pressure of the water flowing through the valve aperture, the increased pressure resulting in the water flowing through the valve to re-enter the mixing chamber.

7. A system according to claim 5, wherein the system maintains a desired temperature of water flowing through the water outlet at between 0 and 5 degrees Celsius of a user's selected outlet temperature.

8. A system according to claim 1, wherein the system maintains a desired temperature of water flowing through the water outlet at between 0 and 3 degrees Celsius of a user's selected outlet temperature.

WATER TEMPERATURE MANAGEMENT SYSTEM

FIELD OF THE INVENTION

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BACKGROUND TO THE INVENTION

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15 same water source, the temperature of the water at the first user suddenly increases or decreases. This problem recurs each time a subsequent shower is turned on. As a corollary, the turning off of a shower or other tap in the system leads to a temperature rise or drop in the other showers. Such temperature changes can have severe effects on water users, especially in children. A
20 considerable amount of water is also wasted during the re-adjustment to optimal temperature.

It is therefore desirable to provide a water inlet/outlet system that reduces the effect of changes in water outlet temperature which may otherwise result from changes to upstream water usage.

25 SUMMARY OF THE INVENTION

In a broad form, a pressure release valve is connected to the hot/cold mixer chamber of a hot/cold water mixer system, the valve operational to recirculate some of the water within the mixer chamber prior to exiting the chamber. In one aspect of the invention, a hot/cold water mixer is provided, which includes a hot/cold water mixing chamber having: a hot water inlet; a cold water inlet; a water outlet; and a pressure release system, the pressure release system including: a pressure release outlet in the mixing chamber; a pressure release inlet adjacent the water outlet; and a pressure release valve extending between

the pressure release outlet and the pressure release inlet, the valve adapted to recirculate a portion of the water within the mixing chamber into the pressure release system.

In another form, there is provided a system for regulating water temperature in a hot/cold water mixer the system including: a hot/cold water mixer according to claim 1; a first water flow regulating device connected before the cold water inlet; and a second water flow regulating device connected before the hot water inlet, the water flow regulating device comprising a flow restricting member axially moveable within a water flow chamber, the flow restricting member including at least one of a tapered portion or a stepped portion, and wherein the size of a gap between the flow restricting member and internal walls of the water flow chamber varying according to an axial position of the flow restricting member, the water flow chamber having at least a first region and a second region whereby movement of the flow restricting member from the first region to the second region results in a step-change in the size of the gap between the flow restricting member and the internal walls of the water flow chamber.

Ideally, the desired temperature range at the water outlet is between 0 and 5, ideally 0 and 3, degrees Celsius of a user's selected outlet temperature.

In one form, the pressure release valve comprises an inlet connected to a body having an aperture for permitting water flow there through, the valve operational such that upon a decrease in water pressure upon the valve inlet, the valve assumes a closed position, increasing the pressure of the water flowing through the valve aperture, the increased pressure resulting in the water flowing through the valve to re-enter the water mixer chamber. To maintain the water temperature at an acceptable level, preferably the predetermined pressure level is between about 1.0 and 5 bar, ideally about 1.5 bar.

The present invention provides a mixer and a system for maintaining a substantially constant water outlet temperature in a hot/cold water mixing system following undesired changes in upstream water input. The system is particularly advantageous in environments where many users are connected to the same water supply, such as in an apartment complex or hotel. The system results in an added safety mechanism to ensure that users, in particular children, are not inadvertently scalded by a sudden increase in water temperature. Including both

a pressure regulating device and water flow regulating device assists in maintaining both a near constant pressure and temperature at the mixer outlet.

BRIEF DESCRIPTION OF THE DRAWINGS

5 An illustrative embodiment of the present invention will now be described with reference to the accompanying figures. Further features and advantages of the invention will also become apparent from the accompanying description.

Figure 1 is a schematic diagram of a hot/cold water mixer system including a pressure regulating device according to an embodiment of the invention;

10 Figure 2 is a side view of the hot/cold water mixer showing the pressure regulating device according to an embodiment of the invention;

Figure 3 is a cross sectional side view of the hot/cold water mixer of Figure 2;

Figure 4 is a top view of the hot/cold water mixer of Figure 2;

Figure 5 is a perspective view of the hot/cold water mixer of Figure 2;

15 Figure 6 is a cross sectional perspective view of the hot/cold water mixer of Figure 2; and

Figure 7 is a perspective view of the pressure release valve according to one embodiment.

DESCRIPTION OF PREFERRED EMBODIMENT

20 The following description is presented to enable any person skilled in the art to make and use the invention, and is provided in the context of a particular application and its requirements. Various modifications to the disclosed embodiment will be readily apparent to those skilled in the art, and the general principles defined herein may be applied to other embodiments and applications
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30 Figure 1 shows a hot/cold water mixer system 10. The system comprises a hot water inlet 12 and a cold water inlet 14. Hot water and cold water pumps may be connected to the respective inlets 12, 14 to assist with water flow into the mixer chamber 20 and water outlet 22.

CLAIMS:

1. A hot/cold water mixer including:
a hot/cold water mixing chamber having:
a hot water inlet;
a cold water inlet;
a water outlet; and
a pressure release system, the pressure release system including:
a pressure release outlet in the mixing chamber;
a pressure release inlet adjacent the water outlet; and
a pressure release valve extending between the pressure release outlet and the pressure release inlet, the valve adapted to recirculate a portion of the water within the mixing chamber into the pressure release system.
2. A hot/cold water mixer according to claim 1, wherein the pressure release valve comprises an inlet connected to a body having an aperture for permitting water flow there through, the valve operational such that upon a decrease in water pressure upon the valve inlet, the valve assumes a closed position, increasing the pressure of the water flowing through the valve aperture, the increased pressure resulting in the water flowing through the valve to re-enter the mixing chamber.
3. A hot/cold water mixer according to claim 1, wherein the mixer maintains a desired temperature of water flowing through the water outlet at between 0 and 5 degrees Celsius of a user's selected outlet temperature.
4. A hot/cold water mixer according to claim 1, wherein the mixer maintains a desired temperature of water flowing through the water outlet at between 0 and 3 degrees Celsius of a user's selected outlet temperature.
5. A system for regulating water temperature in a hot/cold water mixer the system including:

a hot/cold water mixer according to claim 1;
a first water flow regulating device connected before the cold water inlet;
and

a second water flow regulating device connected before the hot water inlet,

the water flow regulating device comprising a flow restricting member axially moveable within a water flow chamber, the flow restricting member including at least one of a tapered portion or a stepped portion, and wherein the size of a gap between the flow restricting member and internal walls of the water flow chamber varying according to an axial position of the flow restricting member, the water flow chamber having at least a first region and a second region whereby movement of the flow restricting member from the first region to the second region results in a step-change in the size of the gap between the flow restricting member and the internal walls of the water flow chamber.

6. A system according to claim 5, wherein the pressure release valve comprises an inlet connected to a body having an aperture for permitting water flow there through, the valve operational such that upon a decrease in water pressure upon the valve inlet, the valve assumes a closed position, increasing the pressure of the water flowing through the valve aperture, the increased pressure resulting in the water flowing through the valve to re-enter the mixing chamber.

7. A system according to claim 5, wherein the system maintains a desired temperature of water flowing through the water outlet at between 0 and 5 degrees Celsius of a user's selected outlet temperature.

8. A system according to claim 1, wherein the system maintains a desired temperature of water flowing through the water outlet at between 0 and 3 degrees Celsius of a user's selected outlet temperature.

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It is therefore desirable to provide a water inlet/outlet system that reduces the effect of changes in water outlet temperature which may otherwise result from changes to upstream water usage.

SUMMARY OF THE INVENTION

~~In a broad form, a pressure release valve is connected to the hot/cold mixer chamber of a hot/cold water mixer system, the valve operational to recirculate some of the water within the mixer chamber prior to exiting the chamber.~~

In one aspect of the invention, a system for regulating water temperature in a hot/cold water mixer is provided, the mixer including a hot/cold water mixing chamber and a water outlet, the system including a pressure regulating device connected to the water mixing chamber, the pressure regulating device including

~~a pressure release valve adapted to recirculate a portion of the water about to exit~~
the water outlet back into the hot/cold water mixing chamber thereby maintaining
the temperature in the water mixing chamber to within a desired temperature
range.

5 Ideally, the desired temperature range is between 0 and 5, ideally 0 and 3,
degrees Celsius of a user's selected outlet temperature.

 Preferably, the hot/cold water mixer further includes: a hot water chamber;
a cold water chamber; a first water flow regulating device connected to the cold
water chamber; and a second water flow regulating device connected to the hot
10 water chamber, the water flow regulating device comprising a flow restricting
member axially moveable within a water flow chamber, the flow restricting
member including at least one of a tapered portion or a stepped portion, and
wherein the size of a gap between the flow restricting member and internal walls
of the water flow chamber varying according to an axial position of the flow
15 restricting member, the water flow chamber having at least a first region and a
second region whereby movement of the flow restricting member from the first
region to the second region results in a step-change in the size of the gap
between the flow restricting member and the internal walls of the water flow
chamber. Including both a pressure regulating device and water flow regulating
20 device assists in maintaining both a near constant pressure and temperature at
the mixer outlet.

 In one form, the pressure release valve comprises an inlet connected to a
body having an aperture for permitting water flow there through, the valve
operational such that upon a decrease in water pressure upon the valve inlet, the
25 valve assumes a closed position, increasing the pressure of the water flowing
through the valve aperture, the increased pressure resulting in the water flowing
through the valve to re-enter the water mixer chamber. To maintain the water
temperature at an acceptable level, preferably the predetermined pressure level
is between about 1.0 and 5 bar, ideally about 1.5 bar.

30 The present invention provides a system for maintaining a substantially
constant water outlet temperature in a hot/cold water mixing system following
undesired changes in upstream water input. The system is particularly
~~advantageous in environments where many users are connected to the same~~

~~water supply, such as in an apartment complex or hotel. The system results in an added safety mechanism to ensure that users, in particular children, are not inadvertently scalded by a sudden increase in water temperature.~~

BRIEF DESCRIPTION OF THE DRAWINGS

5 An illustrative embodiment of the present invention will now be described with reference to the accompanying figures. Further features and advantages of the invention will also become apparent from the accompanying description.

 Figure 1 is a schematic diagram of a hot/cold water mixer system including a pressure regulating device according to an embodiment of the invention;

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 Figure 3 is a cross sectional side view of the hot/cold water mixer of Figure 2;

 Figure 4 is a top view of the hot/cold water mixer of Figure 2;

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 Figure 6 is a cross sectional perspective view of the hot/cold water mixer of Figure 2; and

 Figure 7 is a perspective view of the pressure release valve according to one embodiment.

20 **DESCRIPTION OF PREFERRED EMBODIMENT**

 The following description is presented to enable any person skilled in the art to make and use the invention, and is provided in the context of a particular application and its requirements. Various modifications to the disclosed embodiment will be readily apparent to those skilled in the art, and the general
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CLAIMS:

1. A system for regulating water temperature in a hot/cold water mixer, the mixer including a hot/cold water mixing chamber and a water outlet, the system including a pressure regulating device connected to the water mixing chamber, the pressure regulating device including a pressure release valve adapted to recirculate a portion of the water about to exit the water outlet back into the hot/cold water mixing chamber thereby maintaining the temperature in the water mixing chamber to within a desired temperature range.
2. A system according to claim 1, wherein the hot/cold water mixer further includes:
 - a hot water chamber;
 - a cold water chamber;
 - a first water flow regulating device connected to the cold water chamber;and
 - a second water flow regulating device connected to the hot water chamber, the water flow regulating device comprising a flow restricting member axially moveable within a water flow chamber, the flow restricting member including at least one of a tapered portion or a stepped portion, and wherein the size of a gap between the flow restricting member and internal walls of the water flow chamber varying according to an axial position of the flow restricting member, the water flow chamber having at least a first region and a second region whereby movement of the flow restricting member from the first region to the second region results in a step-change in the size of the gap between the flow restricting member and the internal walls of the water flow chamber.
3. A system according to claim 1, wherein the pressure release valve comprises an inlet connected to a body having an aperture for permitting water flow there through, the valve operational such that upon a decrease in water pressure upon the valve inlet, the valve assumes a closed position, increasing the pressure of the water flowing through the valve aperture, the increased pressure resulting in the water flowing through the valve to re-enter the mixing chamber.

- ~~4. A system according to claim 1, wherein the desired temperature range is between 0 and 5 degrees Celsius of a user's selected outlet temperature.~~
5. A system according to claim 1, wherein the desired temperature range is between 0 and 3 degrees Celsius of a user's selected outlet temperature.
6. A system according to claim 3, wherein the predetermined pressure level is between about 1.0 and 5.0 bar, ideally 1.5 bar.