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(54) **A METHOD OF REDUCING GROWTH OF BACTERIA IN A WATER MIXER VALVE AND A MIXER VALVE FOR USING THE METHOD**

VERFAHREN ZUR VERRINGERUNG VON BAKTERIENWACHSTUM IN EINEM WASSERMISCHVENTIL UND WASSERMISCHVENTIL ZUR VERWENDUNG DES VERFAHRENS

PROCEDE PERMETTANT DE DIMINUER LA CROISSANCE DE BACTERIES DANS UNE SOUPAPE DE MELANGE D'EAU ET SOUPAPE DE MELANGE D'EAU METTANT EN OEUVRE CE PROCEDE

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(56) References cited:
EP-A2- 0 270 993
WO-A-99/58885
SE-C2- 510 400
US-A- 5 050 640
US-A- 5 069 241

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Description

FIELD OF INVENTION

[0001] The present invention relates to a method of reducing bacterial growth in a water-mixer that includes a mixed-water consumer line, a hot-water supply line and a cold-water supply line.

[0002] The bacterium legionella pneumophila can be found in all freshwater, particularly in surface water. The bacterium is not particularly dangerous in the small quantities in which it can be found in cold water. Colonisation of this bacterium is most significant at temperatures in the region of 40°C, i.e. showering temperatures. The growth of this colonisation is large enough to place people at risk of infection after only a few hours. This problem is not only found in shower mixers, but in all places where water is tapped, i.e. also in dishwasher mixers and wash-basin mixers, for instance. Growth zones are predominantly edges, biofilms and irregularities in water conduits and valves. The greatest growth risk, however, is found in static water at a temperature of about 40°C.

[0003] Flushing of the mixer with scolding hot water heated to a temperature of 80-85°C will kill the bacteria and therewith eliminate the growth risk. However, flushing with scolding hot water constitutes, in itself, a serious problem particularly in the case of shower mixers.

BACKGROUND OF THE INVENTION

[0004] SE-C-510 400 (Nutsos) (Swedish Patent Application No. 9801626-4) proposes a solution to the problem caused by legionella pneumophila in mixer valves in connection with faucet installations. According to this proposal, the mixer shall be fitted with an additional hot water outlet from its hot water space, wherein the hot water outlet is adapted for connection to a hot water return line through the medium of a second valve means in a closed mixer position and to permit hot water to circulate through the hot water space in said closed mixer position. This document, however, would appear to disregard the fact that heat will also be spread in the cold water line so as to create therein a zone in which the water temperature ranges from 40-45°C, i.e. promote considerable risk of the growth of the legionella bacteria.

[0005] One problem with this proposed solution to the legionella problem is that the system as such is both complex and complicated and requires significant reconstruction of existing systems in order to be used in the manner intended.

[0006] US-A-5,069,241 (Hochstrasser) describes a mixer valve that includes a two-sided valve element. When the water is turned off, the valve element is shifted to an inoperative mode by the force exerted from two mutually counteracting springs. The consumer line is therewith emptied automatically. However, the is still a danger that legionella bacteria will multiply in the actual mixer.

[0007] US-A-5,050,640 (Cowley) describes a water-mixer device that includes a valve for hot and cold water. When the consumer line is shut off, the cold water supply line is closed and a retum line conducts hot water through the valve to prevent the growth of bacteria. Alternatively, the shower handle holder may be provided with a sensor which initiates this process upon termination of a consumer sequence, such as a showering sequence. However, the risk of undesirable bacteria growth still exists as the temperature of the hot water decreases, as with the two earlier known solutions.

OBJECT OF THE PRESENT INVENTION

[0008] An object of the present invention is to provide a method which reliably solve the serious problem of legionella growth in a simple and inexpensive manner.

[0009] Another object is to provide a method which avoid the risk of legionella growth resulting from cooling of the hot water supplied to the mixer such as to produce zones in which there is a serious risk of such bacterial growth.

SUMMARY OF THE INVENTION

[0010] These and other objects are achieved by an inventive method having the characteristic features set forth in the characterising clause of Claim 1.

[0011] As distinct from the method described in the aforesaid Swedish Publication SE-C-510 400, the invention is based on the realisation that the growth of legionella bacteria can be counteracted effectively by draining the mixing chamber and the consumer line of their hot water or mixed water content subsequent to a consumer sequence, and by thereafter maintaining these system components at a temperature which is sufficiently low to prevent the growth of said bacteria.

[0012] Thus, it is no longer necessary to repeatedly flush the system with hot water so as to kill existing legionella bacteria. Such hot water flushing processes also constantly involve additional water heating costs and, in spite of this, there is always the danger of the water in the mixer and in the consumer line cooling to a temperature in which such bacteria can multiply.

[0013] When applying the present invention, the drainage sequence can, instead, be controlled with the aid of simple mechanical devices and with the use of existing water pressure, e.g. simple spring-activated valves, thereby enabling system costs as a whole to be reduced.

[0014] In practice, it is preferred that at least part of the cold water supplied is circulated in a separate circuit and is returned to the mixer for cooling the same.

[0015] To this end, the mixer is conveniently provided with an extra connection, which enables cold water to be circulated out to the full extent of the fitting.

[0016] The circulating cold water cools the whole of the mixer down to the prevailing temperature of said cold water, when the mixer is not in use.

[0017] Such cold water circulation can afford the additional advantage of ensuring that the mixing zone on the hot water side will always have a temperature higher than 40°C, this high temperature ensuring the absence of legionella bacteria that could otherwise colonise.

[0018] If required, the water in the separate circuit may be cooled prior to being returned to the mixer.

[0019] Such cooling is primarily necessary when the ambient temperature is high, whereas it may be excluded in other cases.

[0020] Consequently, cooling may be applied appropriately when a temperature measurement shows that a cooling requirement exists. In this respect, the circulation line may include a thermostat which functions to actuate a cooling element when the temperature of the water in the circulation line exceeds a predetermined value.

[0021] The circulating cold water is delivered conveniently to the mixer, via a standard cold water supply line. In this case, the supply line will include a branch connection for the circulation line.

[0022] In a preferred method of application of the invention, the cold water is flushed through a significantly larger part of the mixer than those parts which take-up hot water and mixed water respectively. To this end, the mixer is designed so that the largest possible space is provided for the cold water, while the channels for hot water and mixed water comprise the minimum of space.

[0023] During those periods in which there is no consumption of water in the cold water system, such that the risk of a rise in temperature to a level at which legionella growth can occur is imminent, both mixer and consumer line may be flushed through as an alternative to the aforesaid cooling process. This can be sufficient to fully ensure against legionella growth, particularly when the ambient temperature is low.

[0024] Such flushing may be controlled by a timer or a temperature sensor in the cold water line.

[0025] The line system affiliated with such a method shall be constructed so as not to include blind lines or conduits, and it will preferably be ensured that cold water will circulate throughout the entire system.

[0026] Further characteristic features of the invention and those advantages afforded thereby will be apparent from the following description of an embodiment of the invention. This description is given with reference to the accompanying schematic drawing.

BRIEF DESCRIPTION OF THE FIGURES OF THE ACCOMPANYING DRAWING

[0027]

Fig. 1 is a front view of a shower mixer, which includes at its ends a temperature regulating knob and a shut-down and regulating valve, and a central consumer line.

Fig. 2 is a cross-sectional view of a schematically drawn mixer for application of the invention, said mixer including chambers for cold water, hot water and mixed water, and a cold water circulation line.

DESCRIPTION OF A PREFERRED EMBODIMENT

[0028] Fig. 1 illustrates the general design of a shower mixer 1 that includes a temperature regulating knob 2, a shut-down and regulating valve 3, and a centrally arranged consumer line, e.g. a shower line 4.

[0029] Alternatively, the mixer may be a mechanical mixer, a single grip mixer, or a thermostat mixer which may be pressure-controlled, which is particularly suitable if the risk of scalding is to be avoided.

[0030] Although not shown in Fig. 1, hot and cold water supply lines are connected to the mixer.

[0031] Fig. 2 is a schematic illustration showing principally how the internal space of a mixer for application of the invention may be disposed and also how affiliated supply lines and consumer line may be disposed.

[0032] The mixer shown in Fig. 2 is referenced 1. The temperature regulating knob 2 and the shut-down and regulating valve 3 has not been shown in Fig. 2. An outlet line 6, which includes a shut-down device 7 has been shown schematically in the figure. A cold water supply line is referenced 10 and a corresponding hot water supply line is referenced 11. The cold water supply line 10 is included in a cold water chamber 15, while the hot water supply line 11 is included in a hot water chamber 16. A mixing chamber 17 is disposed between the hot water chamber 15 and the hot water chamber 16. The cold water chamber 15 connects with the mixing chamber 17 through the medium of a check valve 18, and the hot water chamber 16 connects with said mixing chamber 17 through the medium of a check valve 19.

[0033] In addition to the consumer line 6, there also extends from the mixing chamber 17 a drainage line 8, which includes a shut-down valve 9 which is actuated by a spring 9a.

[0034] The cold water chamber 15 is supplied with cold water from the cold water line 10. Extending from the cold water chamber 15, via a valve 20 is a cold water circulation line 21, which is connected to the cold water supply line 10 via a branch coupling. The circulation line 21 includes a measuring point that has a temperature sensor which senses when the temperature in the circulation line exceeds a predetermined value, e.g. 15°C. Should this temperature exceed said predetermined value, the system is flushed and/or there is activated a cooling device which cools the water in the circulation line so that the cold water delivered via the supply line 10 will have a sufficiently low temperature.

[0035] The circulating cold water cools down the whole of the mixer to the temperature of the cold water, when the mixer is not in use.

[0036] As shown, the cold water chamber 15 in the mixer 1 has been given the greatest possible space, whereas the chambers 16 and 17 for hot water and mixed

water respectively have much smaller dimensions.

[0037] Hot water may be circulated via a branch line, when the mixer is not used.

[0038] Upon completion of a consumer sequence, the consumer line 6 is closed via the manoeuvring valve 7. This results in automatic drainage of mixed water from the chamber 17 and the consumer line 6, via the drainage line 8 and the spring-activated shut-down valve 9.

[0039] The cold water present in the chamber 15 will readily cool the entire mixer 1 to a temperature which is sufficiently low as to obviate the risk of the growth of legionella bacteria.

[0040] Central flushing of the system is initiated when the temperature sensor 22 registers a temperature that exceeds said predetermined temperature, e.g. 15°C, in the circulation line 21, wherewith drainage is effected through the drainage line 8.

[0041] The aforesaid circulating water cooling device may also be activated in conjunction with the through-flushing process.

[0042] It will be seen that the line system is constructed so as not to include blind lines, and that cold water is circulated in the entire system.

[0043] Instead of a mixer of the kind illustrated in Fig. 1, the invention may also be applied in connection with a thermostat mixer or single-grip mixer, for instance.

Claims

1. A method of reducing bacterial growth in a water mixer (1) that has an associated consumer line (4; 6) for mixed water, wherein the mixer (1) includes a cold water supply line (10) and a hot water supply line (11), and a mixing chamber (17), **characterised by** draining the mixing chamber (17) of the mixer and the consumer line (4; 6) of their hot or mixed water content subsequent to a consumer sequence;
   supplying the mixer with additional cold water so as to lower the temperature in the mixer and also in the consumer line; and
   draining supplied cold water from the mixer and from the consumer line.

2. A method according to Claim 1, **characterised by** circulating at least part of the supplied cold water in a separate circuit and returning said water to the mixer for cooling the same.

3. A method according to Claim 2, **characterised by** cooling the water in said separate circuit prior to returning said water to the mixer.

4. A method according to Claim 3, **characterised by** carrying out said cooling process in response to a temperature measurement that shows the existence of a cooling requirement.

5. A method according to any one of Claims 2-4, **characterised by** supplying said circulating cold water to the mixer via a standard cold water supply line.

6. A method according to any one of Claims 1-5, **characterised by** causing the cold water to flush through a much larger part of the mixer than through those parts which accommodate hot and mixed water respectively.

Patentansprüche

1. Verfahren zum Reduzieren des bakteriellen Wachstums in einem Wassermischer (1), der eine zugeordnete Verbraucherleitung (4; 6) für Mischwasser hat, wobei der Mischer (1) eine Kaltwasserzufuhrleitung (10) und eine Heißwasserzufuhrleitung (11) und eine Mischkammer (17) aufweist, **gekennzeichnet durch**
   Entleeren der Mischkammer (17) des Mischers und der Verbraucherleitung (4; 6) bezüglich ihres Heiß- oder Mischwassergehaltes im Anschluss an eine Verbraucherfolge,
   Zuführen von zusätzlichem Kaltwasser zu dem Mischer, um hierdurch die Temperatur in dem Mischer und auch in der Verbraucherleitung zu erniedrigen, und
   Entleeren zugeführten Kaltwassers aus dem Mischer und der Verbraucherleitung.

2. Verfahren nach Anspruch 1, **dadurch gekennzeichnet, dass** mindestens ein Teil des zugeführten Kaltwassers in einem getrennten Kreis zirkuliert und dieses Wasser zum Mischer zum Kühlen desselben zurückgeführt wird.

3. Verfahren nach Anspruch 2, **gekennzeichnet durch** Kühlen des Wassers in dem getrennten Kreis vor dem Zurückführen des Wassers zu dem Mischer.

4. Verfahren nach Anspruch 3, **gekennzeichnet durch** Ausführen des Kühlprozesses in Abhängigkeit von einer Temperaturmessung, welche die Existenz einer Kühlforderung anzeigt.

5. Verfahren nach einem der Ansprüche 2 bis 4, **gekennzeichnet durch** Zuführen des zirkulierenden Kaltwassers zu dem Mischer über eine Standard-Kaltwasserzufuhrleitung.

6. Verfahren nach einem der Ansprüche 1 bis 5, **gekennzeichnet durch** Strömenlassen des Kaltwassers **durch** einen viel größeren Teil des Mischers als durch diejenigen Teile, welche jeweils Heiß- und Mischwasser aufnehmen.

Revendications

1. Procédé permettant de réduire le développement bactérien dans un mélangeur d'eau (1) qui a une conduite de consommation (4 ; 6) associée pour l'eau mélangée, dans lequel le mélangeur (1) comprend une conduite d'alimentation d'eau froide (10) et une conduite d'alimentation d'eau chaude (11), et une chambre de mélange (17), **caractérisé en ce qu'**il comprend les étapes consistant à évacuer la chambre de mélange (17) du mélangeur et la conduite de consommation (4; 6) de leur contenu d'eau chaude ou mélangée suite à une séquence de consommation ;

   alimenter le mélangeur avec de l'eau froide supplémentaire afin de faire baisser la température dans le mélangeur et également dans la conduite de consommation ; et .
   évacuer l'eau froide alimentée du mélangeur et de la conduite de consommation.

2. Procédé selon la revendication 1, **caractérisé en ce qu'**il comprend les étapes consistant à faire circuler au moins une partie de l'eau froide alimentée dans un circuit séparé et faire revenir ladite eau dans le mélangeur pour refroidir ce dernier.

3. Procédé selon la revendication 2, **caractérisé par** l'étape consistant à refroidir l'eau dans ledit circuit séparé avant de faire revenir ladite eau vers le mélangeur.

4. Procédé selon la revendication 3, **caractérisé en ce qu'**il comprend l'étape consistant à réaliser ledit processus de refroidissement en réponse à une mesure de température qui laisse apparaître l'existence d'une exigence de refroidissement.

5. Procédé selon l'une quelconque des revendications 2 à 4, **caractérisé par** l'étape consistant à alimenter ladite eau de refroidissement au mélangeur via une conduite d'alimentation d'eau froide standard.

6. Procédé selon l'une quelconque des revendications 1 à 5, **caractérisé par** l'étape consistant à amener l'eau froide à jaillir en passant par une partie nettement plus importante du mélangeur qu'en passant par ces parties qui reçoivent l'eau chaude et mélangée respectivement.

Fig. 1

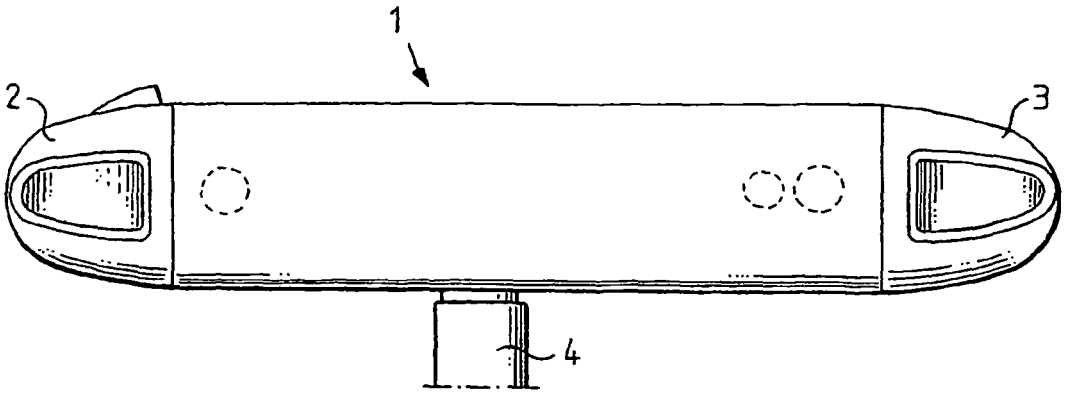
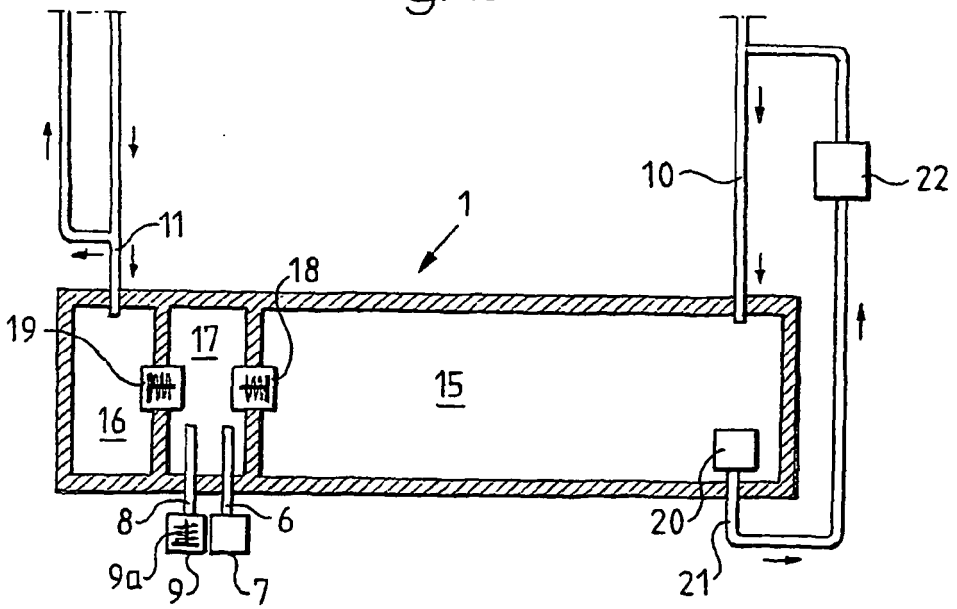


Fig. 2



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- SE 510400 C **[0004] [0011]**
- SE 98016264 **[0004]**
- US 5069241 A **[0006]**
- US 5050640 A **[0007]**