(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 626 637 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
14.08.2013 Bulletin 2013/33

(21) Application number: **13155018.8**

(22) Date of filing: **13.02.2013**

(51) Int Cl.:
F24B 1/183 *(2006.01)* ***F24B 1/187*** *(2006.01)*
F24B 1/188 *(2006.01)* ***F24B 9/00*** *(2006.01)*
F24C 15/34 *(2006.01)* ***F28D 21/00*** *(2006.01)*

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **13.02.2012 FI 20125152**

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(54) Method and arrangement for adjusting heat emission of fireplace

(57) The invention relates to a method for adjusting heat emission in a heat-accumulating fireplace. To allow for efficient and fast adjustment of the temperature and heat emission of a fireplace, the fireplace (1) comprises a heat exchanger (3) that is arranged in flow connection with a liquid container (2), a pump (6) and piping (4, 5) for circulating liquid between the heat exchanger (3) and liquid container (2), and a controller (14) for adjusting the flow rate of the liquid produced by the pump, whereby the controller is used to control the flow rate of the liquid in such a manner that the liquid is not circulated or the flow rate of the liquid is kept low, when the fireplace is to emit heat efficiently to the surrounding room space, and that the liquid is circulated at a flow rate that is higher than said low flow rate, when the heat emitted by the fireplace into the surrounding room space needs to be reduced. The invention also relates to an arrangement that permits the implementation of the method according to the invention.

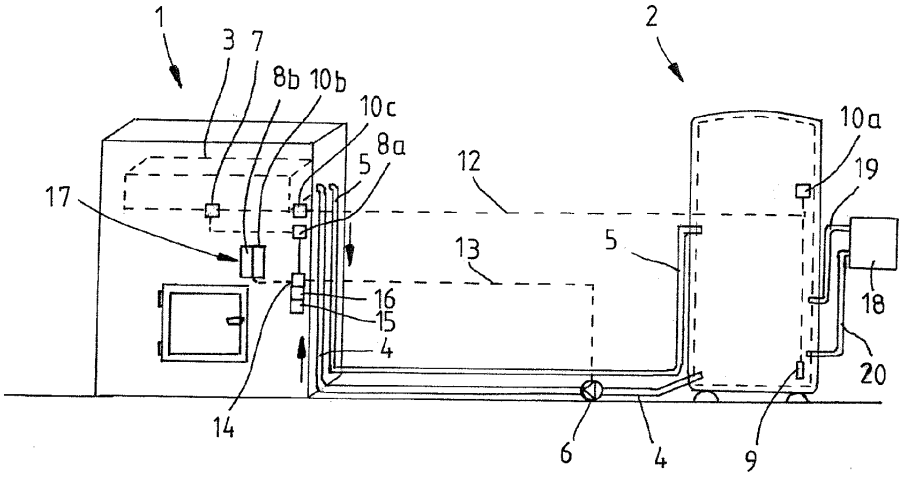

FIG.1

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Description

Background of the invention

[0001] The invention relates to a method for adjusting heat emission into the environment in a heat-accumulating fireplace. A heat-accumulating fireplace refers especially to a fireplace that has a large mass and is capable of storing a great deal of heat.

[0002] The invention also relates to an arrangement in a heat-accumulating fireplace for adjusting heat emission into the environment.

[0003] The heating properties of a fireplace and the heating requirement affect the way a heat-accumulating fireplace should be heated. The correct heating of a heat-accumulating fireplace requires a great deal of experience and practice. Often the person heating the fireplace notices that s/he has heated it too much in respect of the heating requirement, whereby the inside temperature in the room becomes unpleasantly high and energy is wasted in the form of the increased heat losses caused by the too high inside temperature. The temperature curve of a heat-accumulating fireplace is difficult to predict; many factors affect its shape, for instance the mass and structure of the fireplace, the amount and heating value (type of wood) of the loaded firewood (or other solid fuel), the moisture content of the wood (fuel), and the temperature in the room space. Because, in practice, it is difficult to know when no more wood should be added, the temperature of the fireplace easily rises too high, which means that the temperature in the room becomes unpleasantly high and heat is wasted owing to the unnecessary overheating. Sometimes, the user heats the fireplace too cautiously, so the heating effect is not sufficient and it is necessary to heat the fireplace again earlier than expected.

[0004] The temperature and heat amount of a heat-accumulating fireplace needs to be adjusted for various reasons. For instance, adjustment may be necessary, when you have heated a heat-accumulating fireplace for a long time and you want it not to emit as much heat into the surroundings as it naturally does. Adjustment may also be needed because it has been noted that the fireplace has inadvertently been heated too much so that the strength of the stone structures of the fireplace is endangered. Traditionally, the heat emission of a fireplace during heating can be adjusted by adjusting the intensity of the burning with the damper or air supply device of the fireplace. By varying the charge size of wood or pellets, it is possible to affect the amount of energy stored in the heat-accumulating fireplace and the surface temperature of the fireplace and, consequently, the heat emission after heating. Regardless of which adjustment method is used, temperature adjustment is slow when the mass of the heat-accumulating fireplace is large and the adjustment is done with air supply devices and/or by adjusting the intensity of burning. So that the fireplace would in different seasons and at different outside temperatures emit heat as required, that is, in a suitable and even manner into the space, the user of the fireplace has to have a great deal of experience in the operation and heating of the fireplace. Thermal energy accumulated in a large stone mass radiates heat into its surroundings for a long time. After a heat-accumulating fireplace has been heated in a wrong way, the error is in practice almost impossible to correct afterwards and the surface temperature of the heat-accumulating fireplace remains nearly constant and incorrect for several hours due to the large stone mass. If the fireplace heats the apartment too much, it is sometimes necessary to open windows to cool the apartment, which means that some of the heat is totally wasted.

Brief description of the invention

[0005] Behind the invention is the difficulty in heating a heat-accumulating fireplace in such a manner that it emits the desired amount of heat into the room space, the desired amount of heat also referring to the attempt to have an even heat emission for a long time. It is an object of the invention to provide a method and arrangement for adjusting heat emission in a heat-accumulating fireplace, the method helping and aiding the average user and an inexperienced lay user, in particular, to adjust the heat emission from the fireplace to the current heating requirement of the room or space where the fireplace is. The method eliminates or at least greatly reduces the need to adjust the temperature and amount of heat of the fireplace by traditional means and enables the utilization of a heat-accumulating fireplace to the maximum regardless of the heating requirement of the room space.

[0006] This object is achieved by a method of the invention that is **characterised in that** the fireplace comprises a heat exchanger that is arranged in flow connection with a liquid container, a pump and piping for circulating liquid between the heat exchanger and liquid container, whereby in the method, a controller is used to control the flow rate of the liquid provided by the pump in the piping in such a manner that the liquid is not circulated or the flow rate of the liquid is kept low, when the fireplace is to emit heat efficiently to the surrounding room space, and that the liquid is circulated at a flow rate that is higher than said low flow rate, when the heat emission of the fireplace to the surrounding room space needs to be reduced. Typically, when the need for heating is great, the liquid is not circulated or the flow rate of the liquid is kept low, and when the need for heating is not great or is small, the liquid is circulated at a flow rate that is higher than said low flow rate. The need for heating is typically great on a cold winter day, that is, when the outside temperature is low. The need for heating is typically small, when the outside temperature is not particularly low, such as in the fall and spring.

[0007] The liquid is preferably not circulated or the flow rate of the liquid is kept low, when the fireplace is being heated.

[0008] Preferably, after heating has been stopped, the more time has elapsed from the stopping of the heating of the fireplace, the more is the flow rate of water reduced. In this manner the heat emission of the fireplace by radiation into the environment can be made - on the condition that the temperature of the liquid in the liquid container is lower than the temperature of the liquid in the heat exchanger - quite even for a long period of time after heating with wood, which is desirable in terms of improving comfort and minimizing energy consumption.

[0009] Preferred embodiments of the method according to the invention are disclosed in the attached dependent claims.

[0010] Correspondingly, the arrangement of the invention is characterised in that it comprises a heat exchanger arranged in a fireplace, a liquid container, a pump and piping for circulating liquid between the heat exchanger and liquid container, and a controller for controlling the operation of the pump and adjusting the flow rate of the liquid in the piping.

[0011] The liquid container is preferably a container physically apart from the fireplace and having a volume of 300 l or more. A liquid container separated from the fireplace permits an easy integration of the arrangement into a house as a neat entity that is easy to utilise in heating the house. In addition, a liquid container that is at a distance from the fireplace does not disturb the heat emission from the fireplace to the room space. The liquid container may be thermally insulated to the outside.

[0012] The fireplace preferably comprises a temperature sensor arranged in the heat exchanger, the sensor preferably being arranged to indicate the temperature measured from the heat exchanger through a display means. A temperature sensor is preferably also arranged in the liquid container to indicate the temperature measured from the liquid container through a display means.

[0013] If the operation of the controller is to be automated, the automatization is preferably implemented in such a manner that the controller is arranged to control the operation of the pump so that the flow rate of the liquid is zero or low when the temperature measured from the heat exchanger of the fireplace is low and below a certain first temperature, and the flow rate of the liquid is high when the temperature measured from the heat exchanger is high. Temperature adjustment of a fireplace implemented in said manner is generally strived at and hence sensible, and the user of the fireplace rarely needs to monitor the adjustment. This type of arrangement preferably also comprises a remote controller for controlling the heat emission from the fireplace, the arrangement having a signal receiving device for receiving a signal from the remote controller for controlling the operation of the pump in response to the signal received from the remote controller. The remote controller helps to adjust more precisely how large amount of the heat is recovered in the liquid and how much is led to heat the liquid in the liquid container.

[0014] Since the heating requirement of an apartment is greatly dependent on the outside temperature, the operation of the controller and the water circulation are preferably automated in such a manner that the flow rate is zero or small when the outside temperature is low and below a certain first outside temperature and the temperature measured from the fireplace is below a certain first temperature, and the flow rate of the water is high when the outside temperature is above a certain second outside temperature that is higher than said first outside temperature, and the temperature measured from the fireplace is above a certain second temperature.

[0015] Preferred embodiments of the arrangement according to the invention are disclosed in the dependent claims.

[0016] The method and arrangement of the invention make possible an efficient and fast adjustment of the temperature and heat emission capacity of a heat-accumulating fireplace. The method of the invention helps the user of a heat-accumulating fireplace to adjust the heat emission from the fireplace to correspond to the current heating requirement of the room space, and the arrangement of the invention makes possible a fast adjustment of the heat emission from a heat-accumulating fireplace to correspond to the desired heat emission into the room space. By adjusting the heat emission, it is possible to satisfy varying heating requirements of the room space. The adjustment makes it possible to heat the fireplace in the fall and spring in a very similar manner as in winter and still achieve the desired heat emission into the room space. In other words, in the fall or spring, when the heating requirement of the room is clearly smaller than in winter time, the fireplace can be heated using an optimal amount of wood and there is no danger that the fireplace emits too much heat, because any possible extra heat is led to the liquid container, from which it may be utilized for some other use. Thanks to the arrangement of the invention, a heat-accumulating fireplace is easy to heat without needing to know more specifically the heat content of the firewood, which may vary significantly depending on the type of wood and its moisture content. By preventing the fireplace from heating too much and by recovering into the liquid container the "extra heat" from the burning, the invention reduces heat loss, which is desirable in terms of the environment, and at the same time the invention makes it possible to use the fireplace optimally as a an energy source even at a time when the heating requirement of the building/room/space is small. The invention makes it possible to utilize the fireplace optimally for heating the building/room/space regardless of the heating requirement of the building/room/space. Said utilization includes the maximum utilization of the energy from the fuel used in heating the fireplace. The invention also makes it possible to take into consideration personal preferences concerning the temperature of the room space.

Brief description of the figures

[0017] The invention will now be described in greater detail with reference to the attached drawing, in which

Figure 1 shows an arrangement of the invention, and Figure 2 illustrates how the invention can affect the temperature curve of the fireplace.

Detailed description of the invention

[0018] The arrangement shown in Figure 1 and used typically in heating a one-family house comprises a fireplace 1 and a thermally insulated liquid container 2 separate from the fireplace.

[0019] The mass of the fireplace 1 is typically over 1000 kg, but the arrangement of the invention is also useable in fireplaces smaller than this. If the mass is less than 300 kg, the benefits of the invention will not be readily apparent, because the temperature of a fireplace small in mass can quite easily be adjusted without needing the liquid container 2 used in the invention.

[0020] The volume of the liquid container 2 is preferably 300 to 500 l. The performance of the invention is not good, if the volume and the corresponding liquid amount is small, for instance 200 l or even smaller. The distance between the liquid container 2 and fireplace 1 may vary depending on the installation, but it may be several metres, even dozens of metres. The liquid container 2 contains water, but a person skilled in the art understands that the liquid could also be some other liquid than water.

[0021] The liquid container 2 is in flow connection to a heat exchanger 3 in the fire place, that is, water may flow from the liquid container 2 to the heat exchanger 3 and from the heat exchanger back to the liquid container. The heat exchanger 3 is made of copper and/or aluminium or some other heat-resistant material that transmits heat well, whereby heat transmission can be made efficient. The pipes of the heat exchanger 3 may be of copper, and the large heat-transmission surfaces connected to them may be of aluminium. The structure of the heat exchanger 3 is not described in this context, because a person skilled in the art knows how it may be achieved. The flow connection between the liquid container 2 and heat exchanger 3 is achieved by piping. On one hand, the piping comprises a pipe 4 for leading water from the water container 2 to the heat exchanger 3, and on the other hand, a pipe 5 for leading water from the heat exchanger 3 to the liquid container 2. An electric pump 6 is connected to the pipe 4 of the piping for circulating the liquid in the piping.

[0022] A temperature sensor 7 is arranged to the heat exchanger 3 of the fireplace 1. The temperature sensor 7 is arranged to measure the temperature on the output side of the heat exchanger, that is, on the water outlet side of the heat exchanger. The outer shell of the fireplace 1 has a display means 8a for indicating the temperature Tc measured by the temperature sensor 7 to the user of the fireplace.

[0023] The liquid container 2 correspondingly has a temperature sensor 9 and the outer surface of the liquid container 2 has a display means 10a for indicating the temperature measured by the temperature sensor 9. The outer shell of the fireplace 1 also has a display means 10c for indicating the temperature in the liquid container 2. The display means 10c receives a signal along a line 12.

[0024] The user of the fireplace 1 may thus beside the fireplace monitor in the display means 8a and 10c the temperature measured from the heat exchanger 3 and the water temperature in the water container 2.

[0025] The user of the fireplace 1 may control the operation of the pump 6 to adjust the flow rate of the water circulating in the piping 4, 5. Reference number 13 indicates a line, over which a controller 14 on the outer shell of the fireplace provides a signal to the pump 6 to adjust the pumping output. The implementation of the controller 14 will be discussed later. The outer shell of the fireplace 1 also has a flow meter 15 that indicates the flow rate of the water, that is, the water circulation rate in the piping. Depending on the type of flow meter 15 used, the flow rate may be indicated in different ways, for instance as volume per time unit. The display means 8a and 10c and the flow meter 15 facilitate the use of the controller 14 and the achievement of the desired heat emission.

[0026] With the arrangement of Figure 1, the user of the fireplace may efficiently use the controller 14 to adjust the temperature of the fireplace and the amount of heat emission into the surrounding room space, which is described in the following with reference to Figure 2. The heating curves, or temperature curves, of Figure 2 illustrate how it is possible to affect the heat amount emitted by the fireplace into the room space. The first heating curve shows heat emission when the heating requirement of the room space is relatively small; the second temperature curve shows heat emission when the heating requirement of the room space is great; and the third heating curve, drawn with a dashed line, shows a reference situation, in which heat from the fireplace is not transmitted into the water at all, but all heat is emitted into the room space. The temperature curve is as shown by the dashed line, when water is not circulated, because the pump is not working due to a power failure, for instance. A fireplace with no heat exchanger also produces the temperature curve shown by the dashed line. All heating curves have been obtained by burning in the fireplace the same amount of wood or other fuel, and no wood (or other fuel) is added after a time instant t1b. The temperature curves are described in more detail in the following.

[0027] The first temperature curve represents the desired heat emission of the fireplace when the heating requirement of the room space is relatively small and both the fireplace 1 and liquid container 2 are at room temperature, about 20°C, when the heating of the fireplace is started. At the start of heating, water is not circulated in the pipes 4, 5 at all or at a very slow pace (a little). Thanks to this, the fireplace heats up relatively

quickly, even though its mass is large, and it is capable of emitting heat very quickly into the room space. When the heat exchanger 3 of the fireplace has after a time instance t1 heated up to a temperature T1, for instance 40°C, that is relatively close to the highest wanted temperature T2, for instance 50°C, and it is necessary to prevent the temperature from rising above the temperature T2, the pump 6 is started with the control means 14 so that water at 20°C is fed through the pipe 4 from the water container 2 to the heat exchanger 3. While this water efficiently cools the fireplace 1, it also heats up quickly and exits as such from the fireplace through the pipe 5 to the liquid container 2 to heat the water therein. Thanks to the cooling effect of the water, the fireplace does not overheat and, thus, does not emit too much heat into the room space. The cooling of the fireplace 1 is the more efficient, the higher the flow rate of the water is. Due to the water circulation, the temperature measured from the heat exchanger 3 does not rise higher than the value T2 (50°C), which is the highest desired temperature. The reason for the fact that the temperature rises slightly after the time instant t1 (from the value T1 to the value T2) even though water is circulated is that the temperature of the inner structure of the fireplace is considerably higher than that of the fireplace structure at a distance from the inner structure, where the heat exchanger 3 is, whereby heat is transmitted from the inner structure to the heat exchanger and outer structure of the fireplace.

[0028] The second temperature curve, that is, the middle curve, represents the heat emission wanted from the fireplace when the heating requirement of the room space is great and both the fireplace 1 and liquid container 2 are at room temperature (about 20°C) when heating is started. The intention is now to heat mainly the room space and to minimize the proportion of heat transmitted to the water. The pump 6 is only started at a time instant t1' when the temperature measured from the heat exchanger 3 has risen to a temperature T1', about 60°C, which is significantly higher than the temperature T1 (40°C) in the first case. This way, the heat proportion transmitted to the water is kept small and a large amount of the heat of the fireplace goes to heating the room space where the fireplace is. The water temperature in the heat exchanger 3 rises at most to a desired value T2' (e.g. 70°C).

[0029] The temperature curve shown by a dashed line represents the temperature curve of the fireplace in a situation where the heating requirement of the room space is great and water is not circulated in the fireplace. Without water circulation the temperature rises to the value T3, for instance 90°C, in which case the fireplace emits a maximum amount of heat to the room space and elevates the temperature therein to unpleasantly high.

[0030] Because water is circulated after the time instant t1, the lowest temperature curve in Figure 2 can, if desired, be made relatively even for a long period of time and to correspond to the current heating requirement of the room space in particular if the water circulation rate is reduced in proportion to the distance from the time instant t3, that is, the more time has elapsed after the heating of the fireplace. A corresponding advantage is also achieved in the middle curve, and the heat emission of the fireplace corresponds better to the increased heat requirement of the room space due to the weather getting colder, for instance, but the heat emission is not as even as in the example of the lowest temperature curve. With the invention, it is possible to adjust the heat emission of the fireplace to satisfy the preferences of the user and the varying heating requirements of the room space, and to avoid the high heat emission illustrated by a dashed line, when the heating requirement is small. With the invention, it is thus possible to avoid overheating and energy loss and to utilize the entire accumulation capacity of the fireplace in all heating situations.

[0031] The sizes of the surface areas between the temperature curve of Figure 2 shown with a dashed line and those shown with a uniform line represent the amount of thermal energy stored in the liquid container 2. The thermal energy stored in the liquid container 2 is typically utilized in heating a house. A pipe 19 then extends from the liquid container 2 to the water circulation system 18, from which the water returns cooled through a pipe 20 to the liquid container after having heated locations in the house that are at a distance from the fireplace. The water circulation system 18 is a floor heating circuit, for instance. If the volume of the liquid container 2 and that of the water therein is very large and the temperature Tc of the water is much higher than the temperature measured from the heat exchanger 2 of the fireplace 1, the water can be circulated from the liquid container 2 to the fireplace 1 to even out the heat emission from the fireplace. The heating of the liquid container 2 is implemented in such a manner that it does not affect the desired heat emission of the fireplace to the room space.

[0032] Temperature adjustment with the control means 14 is easy. The adjustment may be implemented electrically and/or mechanically. Mechanical adjustment is facilitated by the fact that the user of the fireplace sees on the display means 8a information on the temperature of the water in the heat exchanger 3. In addition, s/he can beside the fireplace 1 compare this temperature to the temperature of the liquid container 2 by means of the display means 8a and 10c.

[0033] If the user of the fireplace wants to have heat emitted to the room space at a low output, s/he instructs the controller 14 accordingly. This means that the pump 6 starts up when the temperature measured from the heat exchanger 3 and with the temperature sensor 7 is low, for instance 40°C (see the lowest temperature curve in Figure 2). If the user wants that heat is emitted at a high output, s/he instructs the controller 14 accordingly. This means that the pump 6 only starts up after the temperature measured from the heat exchanger 3 and with the temperature sensor 7 is high, for instance 60°C (see the middle temperature curve in Figure 2).

[0034] The adjustments described above may be implemented by a manual potentiometer, in which case the controller 14 is the potentiometer. Instead of a potentiometer, it is possible to use some other mechanical control device known by a person skilled in the art.

[0035] So as to adjust the heat emitted by the fireplace to the environment in a simple and effortless manner, the arrangement of the invention preferably comprises a remote controller 17. The remote controller 17 can give a signal to a signal-receiving device (not specifically indicated in the drawing) that is associated with the controller 14, whereby the operation of the pump 6 is controlled in response to the signal and data received from the remote controller. Since the remote controller 17 is connected to the controller 14, it can be said to be part of the controller. The remote controller 17 preferably has a display means 8b for indicating the temperature measured from the heat exchanger 3 of the fireplace and a display means 10b for indicating the temperature measured from the liquid container 2. For this purpose, as understood by a person skilled in the art, the temperature sensor of the fireplace 1 [or another temperature sensor (not shown) of the fireplace 1] and the temperature sensor 9 of the liquid container 2 [or another temperature sensor (not shown) of the liquid container 2] are arranged to provide temperature indicating data to the remote controller 17. A person skilled in the art is capable of choosing the correct components (sensors, etc.) to implement said temperature indication and display means 8b, 10b. Hence this matter is not described in more detail in this context. The arrangement of the invention may thus comprise not only display means 8a, 10a and 10c, but also display means 8b and 10b. To facilitate the instructing, the remote controller 17 may have buttons to select "SMALL HEAT REQUIREMENT", "GREAT HEAT REQUIREMENT" and "MAXIMUM HEAT REQUIREMENT".

[0036] The water circulation of the fireplace may also be automated in such a manner that the water circulation and the heat emission from the fireplace to the room space is controlled as a function of the outside temperature. Water circulation is programmed so that it is zero or low, when the outside temperature is low and below a certain temperature Tu1, for instance - 15°C, and the temperature measured from the fireplace is below a certain temperature Tt1, for instance T1' (=60°C) in Figure 2. The water flow rate is high when the outside temperature is high and above a certain temperature Tu2, for instance 5°C, and the temperature measured from the fireplace is above a certain temperature Tt2, for instance T1 (=40°C) in Figure 2. In the latter case, the temperature Tc of the water in the liquid container 2 should naturally be lower than said high temperature Tt2 for the water to have a cooling effect on the fireplace and to reduce the heat emission from the fireplace. For automatization, the arrangement comprises a processor 16 that is programmed to control the operation of the pump 6 in such a manner that the pump may implement the water circulation described above.

[0037] In the above, the invention is only described by means of examples, wherefore it is noted that the details of the invention may be implemented in various ways within the scope of the attached claims. Thus, differing from the example, instead of the pipe 4, the pump 6 could be connected to pipe 5 that leads from the fireplace 1 to the liquid container 2. The liquid container could, in principle, be immediately beside the fireplace, but when considering the heat emission from the fireplace into the room space, such a location for the liquid container is not recommended. The liquid container may contain other liquid than water.

Claims

1. A method for adjusting heat emission into the environment in a heat-accumulating fireplace, **characterised in that** the fireplace (1) comprises a heat exchanger (3) that is arranged in flow connection with a liquid container (2), a pump (6) and piping (4, 5) for circulating liquid between the heat exchanger (3) and liquid container (2), whereby in the method a controller (14) is used to control the flow rate of the liquid produced by the pump (6) in the piping (4, 5) in such a manner that the liquid is not circulated or the flow rate of the liquid is kept low, when the fireplace is to emit heat efficiently to the surrounding room space, and that the liquid is circulated at a flow rate that is higher than said low flow rate, when the heat emitted by the fireplace into the surrounding room space needs to be reduced.

2. A method as claimed in claim 1, **characterised in that** the liquid is not circulated or the flow rate of the liquid is kept low, when the fireplace is being heated.

3. A method as claimed in claim 1, **characterised in that** after heating has been stopped, the more time has elapsed from the stopping of the heating of the fireplace, the more is the flow rate of water reduced.

4. A method as claimed in any one of the preceding claims, **characterised in that** water circulation is automated by programming the controller (14) in such a manner that the flow rate is zero or low when the outside temperature is low and below a certain first outside temperature (Tu1) and the temperature measured from the fireplace is below a certain first temperature (Tt1), and the flow rate of water is high when the outside temperature is above a certain second outside temperature (Tu2) that is higher than said first outside temperature (Tu1) and the temperature measured from the fireplace is above a certain second temperature (Tt2).

5. An arrangement in a heat-accumulating fireplace (1)

for adjusting heat emission from the fireplace into the environment, **characterised in that** the arrangement comprises a heat exchanger (3) arranged in the fire place, a liquid container (2), a pump (6) and piping (4, 5) for circulating the liquid between the heat exchanger (3) and liquid container (2), and a controller (14) for controlling the operation of the pump and adjusting the flow rate of the liquid in the piping (4, 5).

6. An arrangement as claimed in claim 5, **characterised in that** the liquid container (2) is a container physically separate from the fireplace (1) with a volume of 300 l more.

7. An arrangement as claimed in claim 5, **characterised in that** the mass of the fireplace (1) is 300 kg or more.

8. An arrangement as claimed in any one of preceding claims 5 to 7, **characterised in that** the fireplace (1) comprises a temperature sensor (7) arranged in the heat exchanger (3) of the fireplace.

9. An arrangement as claimed in claim 8, **characterised in that** the temperature sensor (7) is arranged to indicate the temperature measured from the heat-exchanger (3) through a display means (8a, 8b).

10. An arrangement as claimed in claim 8 or 9, **characterised in that** the controller (14) is arranged to control the operation of the pump (6) in such a manner that the flow rate of the liquid is zero or low when the temperature measured from the heat exchanger (3) of the fireplace (1) is low and below a certain first temperature (T1), and the flow rate of the liquid is high when the temperature measured from the heat exchanger (3) is high and above a certain high temperature (T2) not to be exceeded.

11. An arrangement as claimed in claim 10, **characterised in that** the controller (14) comprises a remote controller (17) for controlling the heat emission from the fireplace (1), whereby the arrangement also comprises a signal-receiving device (21) for receiving a signal from the remote controller (17) for controlling the operation of the pump (6) in response to the signal received from the remote controller.

12. An arrangement as claimed in claim 11, **characterised in that** a display means (8b) for indicating the temperature measured from the heat exchanger (3) and a display means (10b) for indicating the temperature measured from the liquid container (2) are arranged on the remote controller (17).

13. An arrangement as claimed in claim 9, **characterised in that** a display means (8a) for indicating the temperature measured from the heat exchanger (3) and a display means (10c) for indicating the temperature measured from the liquid container (2) are arranged on the outer shell of the fireplace (1).

14. An arrangement as claimed in any one of preceding claims 5 to 9 or 13, **characterised in that** the controller is a mechanical actuator.

15. An arrangement as claimed in claim 14, **characterised in that** the controller is a manually operated potentiometer and the pump (6) is electrically operated.

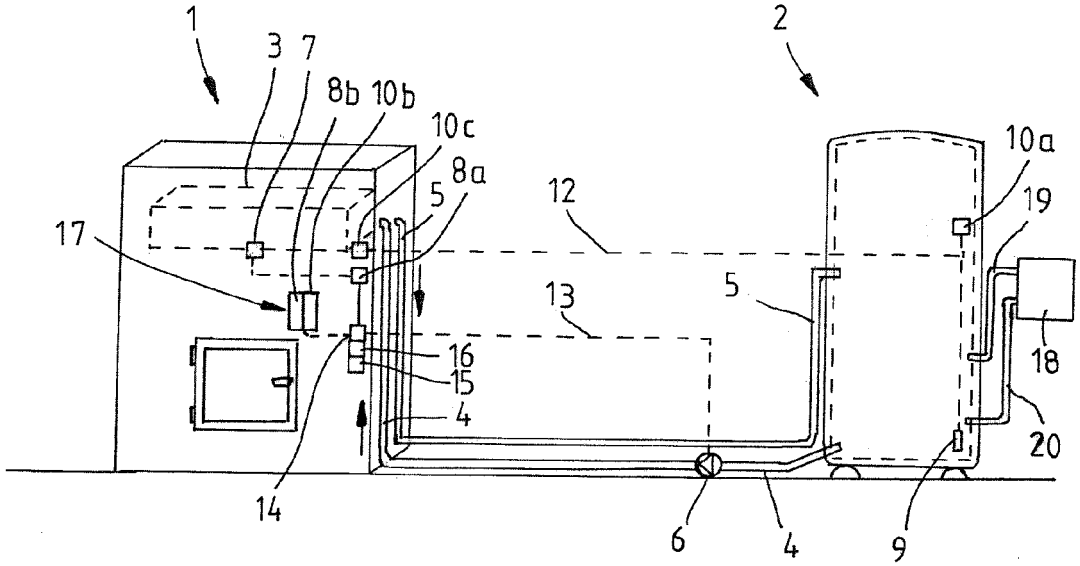
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FIG.1

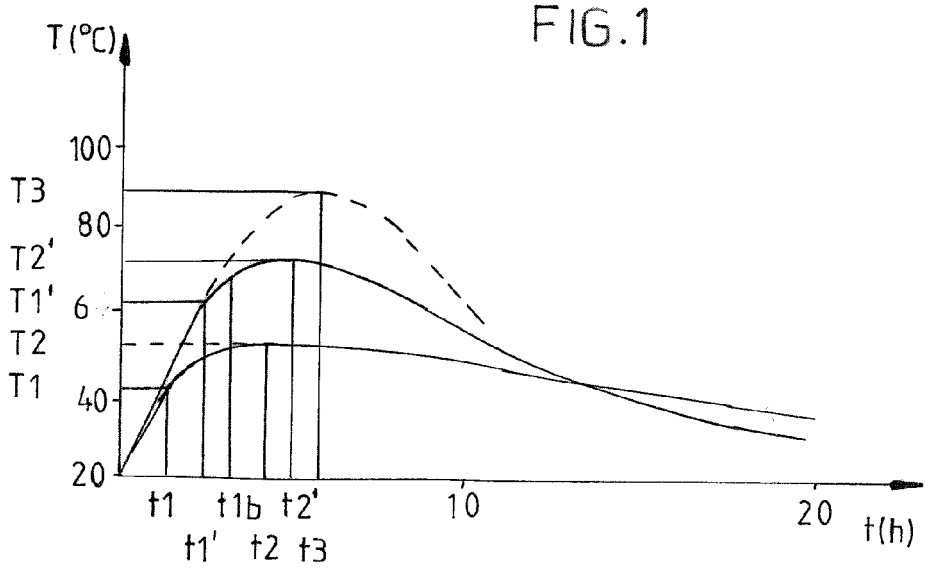
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FIG.2

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EUROPEAN SEARCH REPORT

Application Number
EP 13 15 5018

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
The Hague	12 June 2013	Adant, Vincent

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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