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

(11) **EP 2 041 496 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
31.05.2017 Bulletin 2017/22

(21) Application number: **07793904.9**

(22) Date of filing: **29.06.2007**

(51) Int Cl.:
F24D 3/08 *(2006.01)* ***F24D 11/02*** *(2006.01)*

(86) International application number:
PCT/NO2007/000243

(87) International publication number:
WO 2008/007968 (17.01.2008 Gazette 2008/03)

(54) **AN ARRANGEMENT AND A METHOD FOR CHANGING THE TEMPERATURE OF A FIRST AND A SECOND FLUID LOCATED IN TWO SEPARATE RECEPTACLES**

ANORDNUNG UND VERFAHREN ZUM ÄNDERN DER TEMPERATUR EINES ERSTEN UND EINES ZWEITEN FLUIDS, DIE SICH IN GETRENNTEN BEHÄLTERN BEFINDEN

CONFIGURATION ET PROCÉDÉ POUR CHANGER LA TEMPÉRATURE D'UN PREMIER ET D'UN DEUXIÈME FLUIDE DANS DEUX RÉCEPTACLES SÉPARÉS

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR

(30) Priority: **14.07.2006 NO 20063270**

(43) Date of publication of application:
01.04.2009 Bulletin 2009/14

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EP 2 041 496 B1

Printed by Jouve, 75001 PARIS (FR)

Description

[0001] The present invention relates to an arrangement for changing the temperature of a fluid located in a receptacle and being arranged to be able to circulate through the receptacle. More precisely, it concerns effecting a change in temperature of a first fluid and a second fluid arranged to be able to circulate through a first receptacle and a second receptacle, respectively. The temperature of the first fluid and the second fluid is influenced by energy exchange elements placed in each of the receptacles. The temperature of the second fluid may be further influenced by the source temperature of the first fluid owing to the fact that the first fluid upstream of the inlet portion of the first receptacle circulates through a piping system extending through a portion of the second receptacle. The invention also relates to a method for using the arrangement.

[0002] In this document, the term receptacle implies a closed tank provided with at least one fluid inlet portion and at least one fluid outlet portion.

[0003] An arrangement for heating consumer water and liquid circulating through at least one heat emission element for heating a room, for example, will be discussed in this document. However, a person skilled in the art will be able to understand that the invention equally well may be used in the heating and cooling industry.

[0004] In modern dwellings it has become increasingly more common to heat day rooms by means of so-called water-borne heat. This implies that for example hot water is circulated from a receptacle within which the water is heated, via heat emission elements such as pipe(s), radiator(s) and/or fan coil unit(s), prior to the water returning again to the receptacle for reheating.

[0005] US 4364239 discloses a hot water supply apparatus comprises a thermodynamic circuit having a compressor, a condensor for heat exchange between the thermodynamic fluid in the circuit and a high temperature source. That circuit further includes an evaporator arranged for heat exchange with a non-freezable heat carrying fluid which is circulated in a solar energy collecting circuit. A tank receives a body of water for heat storage. A heat exchanger is arranged in the circuit for circulation of the heat carrying fluid and is physically located above the tank.

[0006] Hot consumer water, i.e. hot water discharged from a shower or tap, for example, is heated in a so-called water heater. Dwellings installed with water-borne heat must thus be provided with two separate receptacles for heating water.

[0007] Due to continually rising energy prices, it is becoming increasingly more common to use a heat pump to be able to reduce the amount of energy that must be purchased or at least be introduced into the arrangement to be able to heat the water in said two receptacles.

[0008] Due to several reasons, however, it has proven complicated to install the heat pump control and also difficult to make it function satisfactorily.

[0009] Normally, the temperature of the water in a water heater for consumer water is much higher than the temperature of the water in a receptacle for water-borne heat. The temperature in the water heater will typically be 70 °C, whereas the water temperature in the receptacle for water-borne heat will be ca. 35 °C.

[0010] The need for water-borne heat varies as it depends strongly on the outside temperature, whereas the need for hot consumer water is more or less constant throughout the year.

[0011] The control system must be provided with at least two temperature sensors, which are to output signals for controlling the heat pump. This involves a complicated adjustment procedure for the user and also relatively high installation- and maintenance costs.

[0012] The object of the invention is to remedy or reduce at least one of the prior art disadvantages.

[0013] The object is achieved by means of the features disclosed in the description below and in the subsequent claims.

[0014] It has been found, surprisingly, that two fluid receptacles known *per se* and arranged to be able to provide a change in temperature of a fluid, which in a non-limiting example may be for heating consumer water and water for water-borne heat, may be modified in a relatively simple manner allowing for increased efficiency, simple installation and, not the least, simple adjustment for the user.

[0015] Accordingly, the present invention relates to an arrangement for controlling change in temperature of a fluid, the arrangement comprising:

- a first receptacle provided with a first energy exchange element arranged to be able to change the temperature of a first fluid located in the first receptacle, the first receptacle being further provided with a fluid inlet portion and a fluid outlet portion;
- a second receptacle provided with a second energy exchange element and a third energy exchange element, each of which are arranged to be able to effect a change in temperature of a second fluid located in the second receptacle, the second receptacle being further provided with a fluid inlet portion and a fluid outlet portion, wherein the arrangement further comprises an energy source that is in fluid communication with the first energy exchange element and the second energy exchange element in a manner making energy from the energy source available, via an energy carrier, firstly to the first energy exchange element for exchanging energy with the first fluid, and then making it available to the second energy exchange element for exchanging energy with the second fluid, wherein the first fluid, which is conducted into the first receptacle from a fluid supply source, is conducted firstly via the third energy exchange element in the second receptacle for exchanging energy with the second fluid, the energy source being arranged to be controlled by a setpoint arranged to

be able to sense the fluid temperature in the second receptacle, the setpoint is placed at the fluid outlet portion of the second receptacle. The characterizing features is that the first and the second energy exchange element comprise a piping arrangement connected in series, and wherein an outlet portion of the piping arrangement in the first receptacle is connected to an inlet portion of the piping arrangement in the second receptacle, and that the outlet portion of the piping arrangement in the first receptacle is placed higher than the inlet portion of the piping arrangement in the second receptacle..

[0016] In one embodiment, at least one of said first and second energy exchange elements is a piping arrangement for circulation of a fluid between the piping arrangement and the energy source.

[0017] The energy source may, for example, be a heat pump of any type known *per se* for circulating a liquid or a gas. The liquid may, for example, be water, and the gas may, for example, be freon.

[0018] In a preferred embodiment, and in order to be able to use a heat pump, both of the energy exchange elements constitute a piping arrangement.

[0019] In a preferred embodiment, the fluid having circulated through said second receptacle is retuned to the heat pump, after which the fluid again is arranged to be able to circulate to the first receptacle.

[0020] In one aspect of the invention, the first receptacle is a receptacle for heating consumer water, and the second receptacle is a receptacle for circulating hot liquid through at least one heat emission element constituting a part of a closed fluid circuit. In a non-limiting example, the heat emission element may be water pipes for floor heating, one or more radiators, and/or one or more fan coil units.

[0021] In a preferred embodiment, a by-pass valve is placed in the closed fluid circuit. The purpose of the by-pass valve is to be able to maintain circulation of the second fluid even if it is desirable for the fluid not to circulate through the heat emission element.

[0022] In a preferred embodiment, a temperature sensor is placed in a portion of the closed fluid circuit for circulating fluid from the second receptacle. Preferably, the temperature sensor is arranged to be able to communicate with a control unit influencing the at least one energy source. Thus, it is possible to control the temperature of the fluid in both receptacles by means of only one setpoint, for example a thermostat known *per se.*

[0023] In a preferred embodiment, all components, such as piping, pipe couplings, valves, pumps, energy exchange elements in the receptacles and the energy source, are of a standard type commonly used in the field of invention.

[0024] In a preferred embodiment, and in order to be able to reduce any exchange of heat between the receptacles and the surroundings, the receptacles are provided with an insulation means of a type known *per se.* Upon placing the first receptacle above the second receptacle, the insulation means preferably is also placed in the border portion between the receptacles in a manner reducing any heat exchange between the fluids in the receptacles.

[0025] The present invention also relates to a method for controlling change in temperature of a fluid located in two separate receptacles, the change in temperature being effected by a mutual energy source, wherein the method includes the steps of:

- providing a first receptacle with a first energy exchange element arranged to be able to change the temperature of a first fluid located in the first receptacle;
- providing a second receptacle with a second energy exchange element and a third energy exchange element, each of said energy exchange elements being individually arranged to be able to change the temperature of a second fluid located in the second receptacle;

- carrying an energy carrier from an energy source to the first energy exchange element and the second energy exchange element in a manner making the energy carrier from the energy source available firstly to the first energy exchange element for exchanging energy with the first fluid, and then making it available to the second energy exchange element for exchanging energy with the second fluid;
- conducting the first fluid from a fluid source via the third energy exchange element in the second receptacle for exchanging energy with the second fluid prior to being conducted into the first receptacle;
- controlling the energy source by means of a setpoint arranged to be able to sense the fluid temperature in the second receptacle. The method further comprises providing the first and second energy exchange element by means of a piping arrangement connected in series, and connecting an outlet portion of the piping arrangement to an inlet portion of a piping arrangement in the second receptacle; and

placing the outlet portion of the piping arrangement in the first receptacle higher than the inlet portion of the piping arrangement in the second receptacle.

[0026] In the following, a non-limiting example of a preferred embodiment is described and depicted in the accompanying drawing, Fig. 1 showing a principle drawing of a non-limiting example of an arrangement for a hot water installation in a dwelling.

[0027] A person skilled in the art will understand that the figure is only a principle drawing not necessarily showing individual elements depicted at the mutually correct scale, the drawing of which is only prepared to be able to illustrate the main features of one embodiment of the present invention.

[0028] Yet further, a person skilled in the art will un-

derstand the meaning of the symbols used for individual elements, even if they are not specifically referred to in the following. Moreover, a person skilled in the art will understand that further components than those shown in the principle drawing may become necessary.

[0029] In the figure, reference number 1 indicates an arrangement that includes a first fluid receptacle 3 provided with a first energy exchange element 5, and a second fluid receptacle 7 provided with a second energy exchange element 9. Each energy exchange element 5, 9 is comprised of a first piping coil 5 and a second piping coil 9. The piping coils 5, 9 are connected to a heat pump 15 known *per se.* The heat pump 15 may be of any known type.

[0030] When a so-called air/water heat pump is used, freon is used as an energy carrier between the heat pump 15 and the fluid receptacles 3, 7.

[0031] A compressor in the heat pump 15, which is known *per se,* compresses the gas to a high pressure and a high temperature. The gas is carried from the heat pump 15 and into the piping coil 5 in the first receptacle 3 via a pipe 3'. The gas will start condensing in the piping coil 5, thereby transmitting heat to the fluid located in the first receptacle 3. This fluid may, for example, be consumer water. In the following, the first receptacle 3 will therefore be referred to as a water heater 3.

[0032] Upon gradually increasing the temperature of the consumer water in the water heater 3, the condensation of the freon gas in the piping coil 5 will diminish.

[0033] Via a pipe 37, the piping coil 5 in the water heater 3 is connected in series with the piping coil 9 in the second receptacle 7.

[0034] The second receptacle 7 is arranged to be able to heat a liquid, for example water. The water circulates through one or more of the heat emission elements 21, 23, 25. The heat emission elements 21, 23, 25 may, for example, be a piping system embedded in a floor, i.e. so-called water-borne floor heating, a radiator or a fan coil unit, all of which are of a type known *per se* and being well known in the art. In the following, and for the sake of simplicity, the second receptacle will be referred to as a floor heat exchanger 7.

[0035] Freon, in the form of gas and condensate, is conducted from the piping coil 5 in the water heater 3 and onto the piping coil 9 in the floor heat exchanger 7. The freon gas will condense completely in the piping coil 9, thus heating the liquid in the floor heat exchanger 7. Condensed freon is conducted from the piping coil 9 and back to the heat pump 15 via a pipe 7'.

[0036] When no need exists for heating by means of the heat emission elements 21, 23, 25, which oftentimes is the case during the summer half of the year, the temperature of the water in the floor heat exchanger 7 may rise relatively quickly to a predetermined maximum level.

[0037] When the predetermined temperature of the liquid in the floor heat exchanger 7 has been reached, the heat pump 15 will stop in a manner known *per se,* or it will have a reduced output if using inverter-controlled equipment.

[0038] Independent of the heating requirement, however, there will always be a need for hot consumer water.

[0039] A consumer water piping coil 17, hereinafter referred to as a piping coil 17, is placed in the lower portion of the floor heat exchanger 7. The piping coil 17, in an inlet portion 19 thereof, is connected to a water source (not shown), for example a water distribution system. An outlet portion of the piping coil 17 is in fluid communication with an inlet portion 11' placed at the top of the water heater 3. The inlet portion 11' may be comprised of a mixing valve 13' known *per se.*

[0040] Water having a predetermined temperature may be able to flow from the mixing valve 13' and onto discharge points 31. The discharge points 31 may, for example, be a shower or a washbasin.

[0041] When relatively cold distribution system water, typically at a temperature of 7 °C, is conducted through the piping coil 17, this will cause heat exchanging to take place between the distribution system water and the liquid in the floor heat exchanger 7. Thus, the liquid in the floor heat exchanger 7 will be cooled, simultaneously increasing the temperature of the water in the piping coil 17. This brings about two very important consequences.

[0042] Upon reducing the temperature in the floor heat exchanger 7 to below its setpoint, the heat pump 15 will be operational even when heat is not required to the heat emission elements 21, 23, 25. Furthermore, the water being conducted into the water heater 3 will be preheated. This renders possible to reduce the size of the water heater 3 because it is supplied with preheated water whilst simultaneously transmitting heat from the freon gas when condensing in the piping coil 5.

[0043] In order to be able to optimise the production of hot consumer water throughout the summer half of the year, it has proven advantageous to let the liquid in the floor heat exchanger 7 circulate out through an outlet portion 13, via a pipeline 12 and in through an inlet portion 11 in the very same floor heat exchanger 7. This is achieved by means of a pumping arrangement 33 placed in the circulation loop. A bypass valve 27 is placed in the circulation loop in a manner allowing the liquid from the floor heat exchanger 7 to flow past the heat emission elements 21, 23, 25 when the bypass valve 27 is open, and when valves 28 in the pipeline 12 are closed.

[0044] During colder periods of the year, the heat pump 15 may be influenced by the need for heat to the heat emission elements 21, 23, 25, and instead of the need for hot consumer water.

[0045] Surprisingly, and based on the above, a person skilled in the art will understand that the energy source 15, which in the embodiment example is a heat pump, and which is arranged to be able to heat the fluid in both receptacles 3, 7, may be controlled by means of only one setpoint 29, which may be comprised of a thermostat/temperature sensor. The thermostat/temperature sensor 29 is arranged to be able to communicate with a control unit known *per se,* but not shown, and which is

arranged to be able to influence the heat pump 15. This provides great advantages, both in terms of installation costs, user-friendliness and maintenance costs.

[0046] In an alternative embodiment (not shown), a heat pump is replaced by a solar panel for heating a liquid. The heated liquid is circulated, in the same manner as the freon gas referred to in the above example, through the piping coils 5, 9. A solar panel may be used in series together with a condenser circuit for a cooling/freezing plant. When used in this manner, the surplus energy may be used for heating.

[0047] In another alternative embodiment (not shown), a combination of liquid and gas from a solar panel and a heat pump, respectively, is conducted through piping coils in one or both of the receptacles 3, 7.

[0048] In yet another alternative embodiment (not shown), an electric heating coil known *per se* is placed in addition to the piping coil(s), at least in one of the receptacles.

Claims

1. An arrangement for controlling change in temperature of a fluid, the arrangement comprising:

- a first receptacle (3) provided with a first energy exchange element (5) arranged to be able to change the temperature of a first fluid located in the first receptacle (3), the first receptacle (3) being further provided with a fluid inlet portion (11') and a fluid outlet portion (13');
- a second receptacle (7) provided with a second energy exchange element (9) and a third energy exchange element (17), each of which are arranged to be able to effect a change in temperature of a second fluid located in the second receptacle (7), the second receptacle (7) being further provided with a fluid inlet portion (11) and a fluid outlet portion (13), wherein the arrangement further comprises an energy source (15) that is in fluid communication with the first energy exchange element (5) and the second energy exchange element (9) in a manner making energy from the energy source (15) available, via an energy carrier, firstly to the first energy exchange element (5) for exchanging energy with the first fluid, and then making it available to the second energy exchange element (9) for exchanging energy with the second fluid, wherein the first fluid, which is conducted into the first receptacle (3) from a fluid supply source (19), is conducted firstly via the third energy exchange element (17) in the second receptacle (7) for exchanging energy with the second fluid, the energy source (15) being arranged to be controlled by a setpoint (29) arranged to be able to sense the fluid temperature in the second receptacle (7), the setpoint (29) is placed at the fluid outlet portion (13) of the second receptacle (7),

characterised in that the first (5) and the second (9) energy exchange element (5, 9) comprise a piping arrangement connected in series, and wherein an outlet portion (5') of the piping arrangement (5) in the first receptacle (3) is connected to an inlet portion (9') of the piping arrangement (9) in the second receptacle (7), and that the outlet portion (5') of the piping arrangement (5) in the first receptacle (3) is placed higher than the inlet portion (9') of the piping arrangement (9) in the second receptacle (7).

2. The arrangement according to claim 1, **characterised in that** the energy source (15) is a heat pump, and wherein the fluid is a liquid or a gas.

3. The arrangement according to claim 1, **characterised in that** the energy source (15) is a solar panel, and wherein the fluid is a liquid or a gas.

4. The arrangement according to claim 1, **characterised in that** the first receptacle (3) is a receptacle for heating consumer water, and wherein the second receptacle (7) is a receptacle for circulating fluid through at least one heat exchange element (21, 23, 25) constituting a part of a closed fluid circuit (12) that is in fluid communication with the fluid outlet portion (13) and the fluid inlet portion (11) of the second receptacle (7).

5. The arrangement according to claim 4, **characterised in that** the closed fluid circuit (12) is provided with a bypass valve (27) arranged to be able to circulate the fluid past the at least one heat exchange element (21, 23, 25).

6. The arrangement according to claim 5, **characterised in that** the setpoint (29) is placed upstream of the bypass valve (27).

7. A method for controlling change in temperature of fluid located in two separate receptacles (3, 7), the change in temperature being effected by a mutual energy source (15), wherein the method includes the steps of:

- providing a first receptacle (3) with a first energy exchange element (5) arranged to be able to change the temperature of a first fluid located in the first receptacle (3);
- providing a second receptacle (7) with a second energy exchange element (9) and a third energy exchange element (17), each of said energy exchange elements (9, 17) being individually arranged to be able to change the temperature of a second fluid located in the second

receptacle (7);
- carrying an energy carrier from an energy source (15) to the first energy exchange element (5) and the second energy exchange element (9) in a manner making the energy carrier from the energy source (15) available firstly to the first energy exchange element (5) for exchanging energy with the first fluid, and then making it available to the second energy exchange element (9) for exchanging energy with the second fluid;
- conducting the first fluid from a fluid source (19) via the third energy exchange element (17) in the second receptacle (7) for exchanging energy with the second fluid prior to being conducted into the first receptacle (3) ;
- controlling the energy source (15) by means of a setpoint (29) arranged to be able to sense the fluid temperature in the second receptacle (7),

characterised in that the method further comprises:

- providing the first (5) and second (9) energy exchange element (5,9) by means of a piping arrangement connected in series, and connecting an outlet portion (5') of the piping arrangement (5) to an inlet portion (9') of a piping arrangement in the second receptacle; and placing the outlet portion (5') of the piping arrangement (5) in the first receptacle (3) higher than the inlet portion (9') of the piping arrangement in the second receptacle (7).

8. The method according to claim 7, **characterised in** placing the setpoint (29) in a fluid circuit (12) that is in fluid communication with the second fluid through a fluid inlet portion (11) and a fluid outlet portion (13) in the second receptacle (7).

Patentansprüche

1. Eine Anordnung zur Steuerung der Temperaturänderung von einem Fluid, wobei die Anordnung umfasst:

- einen ersten Behälter (3), welcher mit einem ersten Energie-Austauschelement (5) versehen ist, angeordnet, um die Temperatur eines ersten Fluids, das sich im ersten Behälter (3) befindet, zu ändern, wobei der erste Behälter (3) weiter mit einem Fluideinlassabschnitt (11') und einem Fluidauslassabschnitt (13') versehen ist;
- einen zweiten Behälter (7), welcher mit einem zweiten Energie-Austauschelement (9) und einem dritten Energie-Austauschelement (17) versehen ist, von welchen jedes angeordnet ist, um eine Temperaturänderung eines zweiten Fluids, das sich im zweiten Behälter (7) befindet, zu bewirken, wobei der zweite Behälter (7) weiter mit einem Fluideinlassabschnitt (11) und einem Fluidauslassabschnitt (13) versehen ist, wobei die Anordnung weiter eine Energiequelle (15) aufweist, welche sich derart in Fluidkommunikation mit dem ersten Energie-Austauschelement (5) und dem zweiten Energie-Austauschelement (9) befindet, dass Energie aus der Energiequelle (15) über einen Energieträger zunächst für das erste Energie-Austauschelement (5) zum Austauschen von Energie mit dem ersten Fluid verfügbar ist, und sie dann dem zweiten Energie-Austauschelement (9) zum Austausch von Energie mit dem zweiten Fluid verfügbar ist, wobei das erste Fluid, welches von einer Fluidversorgungsquelle (19) in den ersten Behälter (3) geleitet wird, zunächst über das dritte Energie-Austauschelement (17) in den zweiten Behälter (7) geleitet wird, um Energie mit dem zweiten Fluid auszutauschen, wobei die Energiequelle (15) angeordnet ist, um durch einen Sollwert (29) gesteuert zu werden, welcher angeordnet ist, um die Fluidtemperatur im zweiten Behälter (7) zu messen, wobei der Sollwert (29) am Fluidauslassabschnitt (13) des zweiten Behälters (7) platziert ist, **dadurch gekennzeichnet, dass** das erste (5) und das zweite (9) Energie-Austauschelement (5, 9) eine Rohrleitungsanordnung umfassen, die in Reihe geschaltet ist, und wobei ein Auslassabschnitt (5') der Rohrleitungsanordnung (5) im ersten Behälter (3) mit einem Einlassabschnitt (9') der Rohrleitungsanordnung (9) im zweiten Behälter (7) verbunden ist, und dass der Auslassabschnitt (5') der Rohrleitungsanordnung (5) im ersten Behälter (3) höher als der Einlassabschnitt (9') der Rohrleitungsanordnung (9) im zweiten Behälter (7) platziert ist.

2. Die Anordnung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Energiequelle (15) eine Wärmepumpe ist, und wobei das Fluid eine Flüssigkeit oder ein Gas ist.

3. Die Anordnung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Energiequelle (15) ein Solarpanel ist, und wobei das Fluid eine Flüssigkeit oder ein Gas ist.

4. Die Anordnung nach Anspruch 1, **dadurch gekennzeichnet, dass** der erste Behälter (3) ein Behälter zur Aufwärmung von Verbraucherwasser ist, und wobei der zweite Behälter (7) ein Behälter zum Zirkulieren von Fluid durch mindestens ein Wärmeaustauschelement (21, 23, 25) ist, das einen Teil eines geschlossenen Fluidkreislaufes (12)

darstellt, der in Fluidkommunikation mit dem Fluidauslassabschnitt (13) und dem Fluideinlassabschnitt (11) des zweiten Behälters (7) steht.

5. Die Anordnung nach Anspruch 4, **dadurch gekennzeichnet, dass** der geschlossenen Fluidkreislauf (12) mit einem Bypass-Ventil (27) versehen ist, das angeordnet ist, um das Fluid bis über das mindestens eine Wärmeaustauschelement (21, 23, 25) zu zirkulieren.

6. Die Anordnung nach Anspruch 5, **dadurch gekennzeichnet, dass** der Sollwert (29) stromaufwärts vor dem Bypass-Ventil (27) angeordnet ist.

7. Ein Verfahren zur Steuerung der Temperaturänderung von Fluid, das sich in zwei separaten Behältern (3, 7) befinden, wobei die Änderung der Temperatur durch eine gegenseitige Energiequelle (15) bewirkt wird, wobei das Verfahren die Schritte aufweist:

- Bereitstellen eines ersten Behälters (3) mit einem ersten Energie-Austauschelement (5), das eingerichtet, um die Temperatur eines ersten Fluids, das sich im ersten Behälter (3) befindet, zu ändern;
- Bereitstellen eines zweiten Behälters (7) mit einem zweiten Energie-Austauschelement (9) und einem dritten Energie-Austauschelement (17), wobei jedes der besagten Energie-Austauschelemente (9, 17) individuell angeordnet ist, um eine Temperatur eines zweiten Fluids, das sich im zweiten Behälter (7) befindet, zu ändern;
- Befördern eines Energieträgers von einer Energiequelle (15) zum ersten Energie-Austauschelement (5) und zweiten Energie-Austauschelement (9) in einer Weise, die den Energieträger aus der ersten Energiequelle (15) zunächst für das erste Energie-Austauschelement (5) zum Austauschen von Energie mit dem ersten Fluid verfügbar macht, und ihn dann für das zweite Energie-Austauschelement (9) zum Austauschen von Energie mit dem zweiten Fluid verfügbar macht;
- Leiten des ersten Fluids von einer Fluidquelle (19) über das dritte Energie-Austauschelement (17) in den zweiten Behälter (7) zum Austauschen von Energie mit dem zweiten Fluid vor der Beförderung in den ersten Behälter (3);
- Steuern der Energiequelle (15) mittels eines Sollwerts (29), der angeordnet ist, um die Fluidtemperatur im zweiten Behälter (7) zu messen;

dadurch gekennzeichnet, dass das Verfahren weiter umfasst:

- Bereitstellen des ersten (5) und zweiten (9) Energie-Austauschelements (5, 9) mittels einer Rohrleitungsanordnung, die in Reihe geschaltet ist, und wobei ein Auslassabschnitt (5') der Rohrleitungsanordnung (5) mit einem Einlassabschnitt (9') einer Rohrleitungsanordnung im zweiten Behälter verbunden ist; und dass der Auslassabschnitt (5') der Rohrleitungsanordnung (5) im ersten Behälter (3) höher ist als der Einlassabschnitt (9') der Rohrleitungsanordnung im zweiten Behälter (7) platziert ist.

8. Das Verfahren nach Anspruch 7, **gekennzeichnet durch** Platzieren des Sollwerts (29) in einem Fluidkreislauf (12), der durch einen Fluideinlassabschnitt (11) und einen Fluidauslassabschnitt (13) im zweiten Behälter (7) in Fluidkommunikation mit dem zweiten Fluid steht.

Revendications

1. Un agencement (1) pour le contrôle de changements de température d'un fluide, l'agencement comprenant :

- un premier réceptacle (3) pourvu d'au moins un premier élément d'échange d'énergie (5) agencé pour être capable de changer la température d'un premier fluide situé dans le premier réceptacle (3), le premier réceptacle (3) étant en outre pourvu d'une partie entrée de fluide (11') et d'une partie sortie de fluide (13') ;
- un second réceptacle (7) pourvu d'au moins un second élément d'échange d'énergie (9) et d'un troisième élément d'échange d'énergie (17), chacun desquels étant agencé pour être capable d'effectuer un changement de température dans un second fluide situé dans le second réceptacle (7), le second réceptacle (7) étant en outre pourvu d'une partie entrée de fluide (11) et d'une partie sortie de fluide (13), dans lequel l'agencement en outre comprend une source d'énergie (15) étant en communication fluidique avec le premier élément d'échange d'énergie (5) et le second élément d'échange d'énergie (9) d'une manière à rendre accessible l'énergie de la source d'énergie (15), par le biais d'un vecteur énergétique, d'abord au premier élément d'échange d'énergie (5) pour échanger de l'énergie avec un premier fluide, et ensuite le rendant accessible au second élément d'échange d'énergie (9) pour échanger de l'énergie avec le second fluide, dans lequel le premier fluide, qui est acheminé dans le premier réceptacle (3) depuis une source d'alimentation de fluide (19), est acheminé d'abord par le biais du troisième élément d'échange d'énergie (17)

dans le second réceptacle (7) pour échanger de l'énergie avec le second fluide, la source d'énergie (15) étant agencée pour être contrôlée par un point de consigne (29) agencé pour être capable de détecter la température de fluide dans le second réceptacle (7), le point de consigne (29) étant placé au niveau de la partie sortie de fluide (13) du second réceptacle (7), **caractérisé en ce que** le premier (5) et le second (9) élément d'échange d'énergie (5, 9) comprennent un agencement de tuyauteries connecté en série, et dans lequel une partie sortie (5') de l'agencement de tuyauteries (5) dans le premier réceptacle (3) est connectée à une partie entrée (9') de l'agencement de tuyauteries (9) dans le second réceptacle (7), et que la partie sortie (5') de l'agencement de tuyauteries (5) dans le premier réceptacle (3) est situé plus haut que la partie entrée (9') de l'agencement de tuyauteries (9) dans le second réceptacle (7).

2. L'agencement selon la revendication 1, **caractérisé en ce que** la source d'énergie (15) est une pompe à chaleur, et dans lequel le fluide est un liquide ou un gaz.

3. L'agencement selon la revendication 1, **caractérisé en ce que** la source d'énergie (15) est un panneau solaire, et dans lequel le fluide est un liquide ou un gaz.

4. L'agencement selon la revendication 1, **caractérisé en ce que** le premier réceptacle (3) est un réceptacle pour le chauffage d'eau de consommation, et dans lequel le second réceptacle (7) est un réceptacle pour faire circuler un fluide à travers au moins un élément d'échange de chaleur (21, 23, 25) constituant une partie d'un circuit de fluide fermé (12) qui est en communication fluidique avec la partie sortie de fluide (13) et la partie entrée de fluide (11) du second réceptacle (7).

5. L'agencement selon la revendication 4, **caractérisé en ce que** le circuit de fluide fermé (12) est pourvu d'une vanne de dérivation (27) agencée pour être capable de faire circuler le fluide en passant devant l'au moins un élément d'échange de chaleur (21,23,25).

6. L'agencement selon la revendication 5, **caractérisé en ce que** le point de consigne (29) est disposé en amont de la vanne de dérivation (27).

7. Un procédé pour le contrôle de changements de température d'un fluide situé dans deux réceptacles séparés (3, 7), le changement de température étant effectuée par l'intermédiaire d'une source d'énergie mutuelle (15), dans lequel le procédé inclut les étapes de :

- fournir un premier réceptacle (3) avec un premier élément d'échange d'énergie (5) agencé pour être capable de changer la température d'un premier fluide situé dans le premier réceptacle (3);
- fournir un second réceptacle (7) avec un second élément d'échange d'énergie (9) et un troisième élément d'échange d'énergie (17), chacun desdits éléments d'échange d'énergie (9, 17) étant individuellement agencé pout être capable de changer la température d'un second fluide situé dans le second réceptacle (7);
- acheminer un vecteur énergétique depuis une source d''énergie (15) au premier élément d'échange d'énergie (5) et le second élément d'échange d'énergie (9) de manière à rendre le vecteur énergétique de la source d'énergie (15) accessible d'abord au premier élément d'échange d'énergie (5) pour échanger de l'énergie avec le premier fluide, et ensuite le faisant accessible à un second élément d'échange d'énergie (9) pour échanger de l'énergie avec le second fluide ;
- acheminer le premier fluide depuis une source de fluide (19) par le biais d'un troisième élément d'échange d'énergie (17) dans le second réceptacle (7) pour échanger de l'énergie avec le second fluide avant d'être acheminé dans le premier réceptacle (3);
- contrôler la source d'énergie (15) au moyen d'un point de consigne (29) agencé pour être capable de détecter la température de fluide dans le second réceptacle (7), **caractérisé en ce que** le procédé comprend en outre :
- fournir le premier (5) et le second (9) élément d'échange d'énergie (5, 9) au moyen d'un agencement de tuyauterie connecté en série, et connecter une partie sortie (5') de l'agencement de tuyauterie (5) à une partie entrée (9') d'un agencement de tuyauterie dans le second réceptacle ; et placer la partie sortie (5') de l'agencement de tuyauterie (5) dans le premier réceptacle (3) plus haut que la partie entrée (9') de l'agencement de tuyauterie dans le second réceptacle (7).

8. Le procédé selon la revendication 7, **caractérisé en ce que** placer le point de consigne (29) dans un circuit de fluide (12) qui est en communication fluidique avec le second fluide à travers une partie entrée de fluide (11) et une partie sortie de fluide (13) dans le second réceptacle (7).

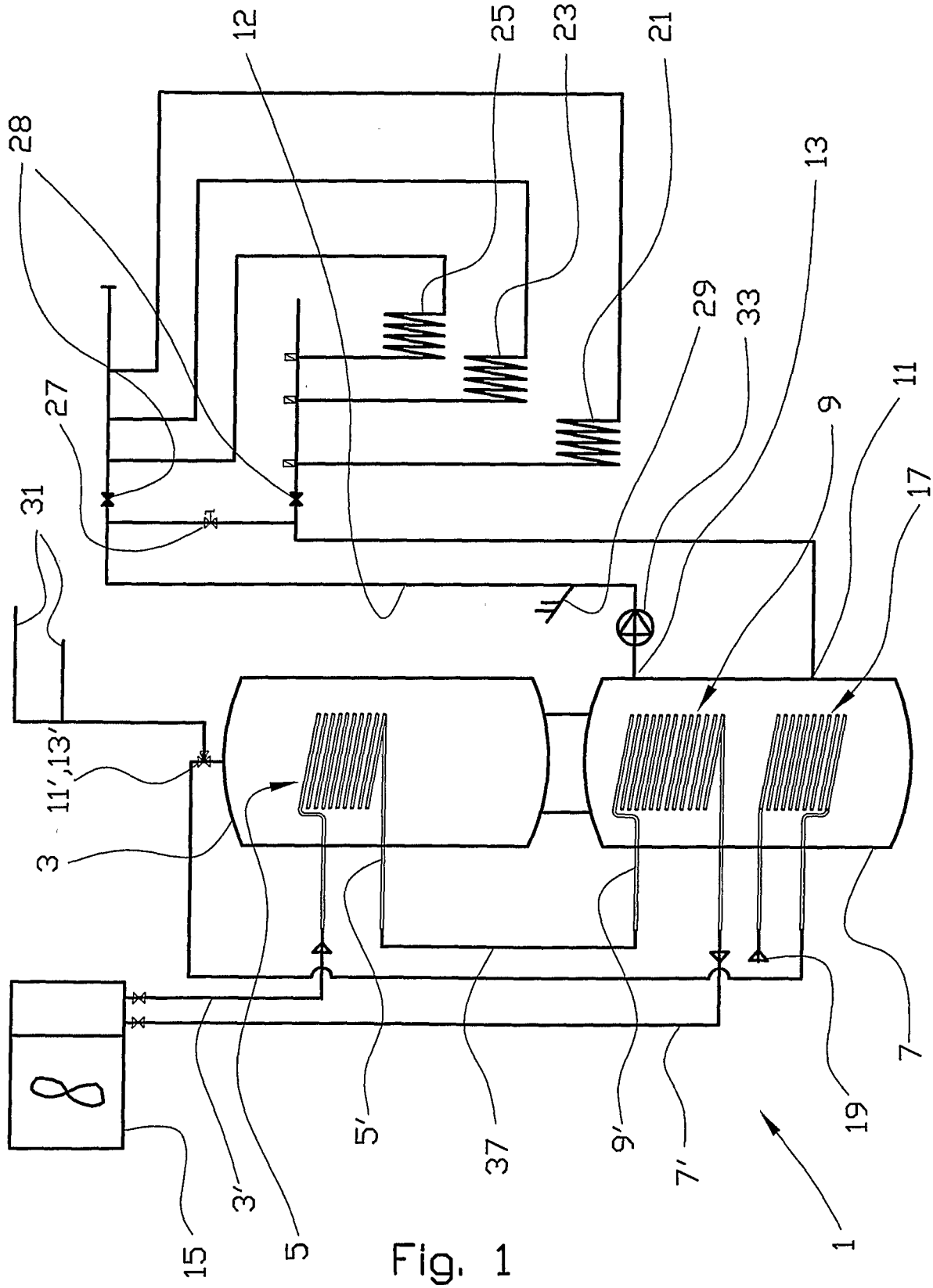

Fig. 1

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 4364239 A **[0005]**