



(11)

EP 2 549 195 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
31.08.2016 Bulletin 2016/35

(51) Int Cl.:
F24H 6/00 (2006.01)

(21) Application number: **12174876.8**

(22) Date of filing: **04.07.2012**

(54) Heating apparatus

Erhitzungsvorrichtung

Appareil de chauffage

(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**

(30) Priority: **22.07.2011 IT PN20110055**

(43) Date of publication of application:
23.01.2013 Bulletin 2013/04

(73) Proprietor: **MCZ Group S.p.A.
33074 Fontanafredda (PN) (IT)**

(72) Inventors:
• **Mezzalira, Claudio
31030 Altivole (TV) (IT)**

• **Zanette, Giacomo
33077 Sacile (PN) (IT)**

(74) Representative: **Gonella, Mario et al
Propria S.r.l.
Via della Colonna, 35
33170 Pordenone (IT)**

(56) References cited:
**WO-A2-96/06309 FR-A1- 2 142 585
US-A- 4 371 111 US-A- 4 641 631
US-A- 4 925 093 US-A- 5 046 478**

EP 2 549 195 B1

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

TECHNICAL FIELD OF THE INVENTION

[0001] The present invention relates to a heating apparatus such as a stove or similar, apt to be fed with pellets, wood, coal or any other solid inflammable material for the combined production of hot air and hot water to introduce into the domestic heating circuit.

[0002] In particular, the present invention relates to a solid-fuel heating apparatus in which each time it is possible to select the amount of heat to transfer to the air in order to heat one or more rooms and/or the amount of heat to transfer to the water to introduce into the heating circuit, i.e. to send to the domestic radiators network.

[0003] The present invention is also related to the working method of said heating apparatus and to the use of a particular type of heat exchanger particularly advantageous in the invention embodiment.

BACKGROUND OF THE INVENTION

[0004] To date, solid-fuel heating apparatuses, such as stoves, are known basically comprising a combustion chamber wherein it is provided a fire bed where the fuel is placed; the combustion chamber is directly connected to a flue provided for conveying the combustion fumes.

[0005] The first pellet stoves allowed only the heating of the room where they were installed because of the radiative heat transfer through the refractory material forming the body of the stove itself.

[0006] A first improvement made to this kind of stoves was the insertion of a fan below a heat exchanger wherein occurs the heat exchange between the hot combustion fumes going towards the flue and the air drawn off a room and subsequently reintroduced at a greater temperature. In this way, besides making the utilization of the heat supplied by the fuel more efficient, it is also possible to channel the hot air into rooms different from the room where the stove is installed.

[0007] Recently there has been a great diffusion on the market of stoves also provided with a system for heating water: in these apparatuses, thanks to a pump, the water circulating in the heating circuit, that is the circuit feeding the radiators of a living space, is caused to flow into a suitable duct placed in contact with the combustion chamber where the heat exchange, which enables the water to be heated, occurs. The hot water thus produced is then reintroduced into the heating circuit.

[0008] Initially, the heat exchange between the heat produced by the combustion and the water had a rather low efficiency and hence it did not relevantly affect the heat exchange between the combustion fumes and the air taking place belower thanks to a fan.

[0009] Anyway, thanks to a more careful planning, over the years the heat exchange with water has been made more and more efficient so as to reach an efficiency even more than 90%: this virtually means that in the more re-

cent apparatuses, most of the heat produced by the combustion is absorbed by the water directed to the heating circuit and only a small remaining portion is available for heating the air where the apparatus is placed.

[0010] Therefore, the air going out of the delivery vents is felt cold by the users because, as a matter of fact, it does not have a temperature much greater than the incoming one; this makes the user unsatisfied as he desires to enjoy the typical and pleasant warmth usually given by a stove at least in the room where it is installed, yet without renouncing the obvious economical advantage of having at your disposal also the hot water necessary to heat your residence.

[0011] Gaseous fuel boilers adapted to produce hot water and hot air are known, for example in US5046478 and WO96/06309.

SUMMARY OF THE INVENTION

[0012] The main object of the present invention is that of providing a heating apparatus overcoming the drawbacks of the prior art by devising a heating apparatus provided with a system of choking the amount of heat to be transferred to the air and to the water.

[0013] In the scope of this object, a purpose of the present invention is that of providing a heating apparatus which enables to obtain the expected object without compromising the heat exchange efficiency between the combustion fumes and the water.

[0014] A further purpose of the present invention consists in supplying a heating apparatus in which the choking will provide a precise but easy to execute adjustment by the user.

[0015] Still a further purpose is that of providing a heating apparatus which can be made by means of the usual and known plants, machinery and equipment.

[0016] The foregoing objective and purposes, and others which will be more apparent later, are achieved by means of a combined heating apparatus of air and water as defined in claim 1, by means of a method for the combined production of hot water and hot air having the characteristics listed in the appended claim 8 and by means of a heat exchanger as defined in claim 7.

BRIEF DESCRIPTION OF DRAWINGS

[0017] Advantages and characteristics of the invention will be more apparent from the following description, for exemplification only but not limited to, with reference to the appended figures, wherein:

- Fig. 1 is a sectional schematic view of a heating apparatus according to the present invention showing the working scheme in order to obtain only hot water to send to a domestic radiators network;
- Fig. 2 is a sectional schematic view of a heating apparatus according to the present invention showing the working scheme in order to obtain hot water only;

- Fig. 3 shows a water/air heat exchanger particularly advantageous in a heating apparatus according to the present invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS OF THE INVENTION

[0018] With reference to figures 1 and 2, a heating apparatus 100 for the combined production of hot air and hot water according to the invention, such as a stove preferably fed with solid fuel, comprises a housing 1, formed with a box-like element defining a compartment 2.

[0019] Inside the compartment 2 is housed a combustion chamber made accessible from the outside through a door and directly connected to a flue provided for conveying the combustion fumes into the atmosphere.

[0020] Moreover, the compartment 2 contains a first circuit 10 for the production of hot water to be introduced into a heating circuit, and a second circuit 20 for the air heating.

[0021] In particular, the first circuit and the domestic heating circuit, that is the duct network feeding the radiators of a living space, basically form a sole hermetic circuit which is filled with water from the water supply only at the beginning and filled up only occasionally, if necessary.

[0022] Said first circuit 10 comprises an inlet duct 5 apt to introduce a water flow to be heated Q5F into the heating apparatus 100.

[0023] Said water flow to be heated Q5F enters the heating inner chamber 11, preferably formed by a cavity provided between the outer surface of the walls of the combustion chamber 3 and the inner surface of housing 1 so as to form a sort of "jacket" around the combustion chamber 3.

[0024] A first pumping means P, such as a pump, gives the water flow to be heated Q5F the driving power needed in order to flow through said first circuit 10.

[0025] Preferably, the water flow to be heated Q5F is introduced into the apparatus in correspondence with the lower portion of said inner chamber 11; at full capacity, i.e. when the inner chamber is filled up to the maximum of its capacity, in its upper portion it is possible, through an extraction duct 6, to draw off a heated water flow Q6C having a temperature higher than that of the water flow to be heated Q5F, since, while being inside the inner chamber 11, it has absorbed part of the heat produced by the combustion inside the contiguous combustion chamber 3.

[0026] The extraction duct 6 then branches off into a connection duct 7 with the domestic heating circuit, exiting the apparatus 100 and into an inner duct 8 leading to the inlet of a heat exchanger 12.

[0027] Therefore, as it will be later explained, a first portion Q8C of the heated water flow Q6C can be sent to the heat exchanger 12 through the inner duct 8, while the remaining portion Q7C of the heated water flow Q6C can be extracted from the apparatus 100 and sent,

through the connection duct 7, to the domestic heating circuit, i.e. to the network feeding the domestic radiators. In general, it has always to be: $Q6C = Q7C + Q8C$.

[0028] At the outlet of said heat exchanger 12, a recirculation duct 9 which carries a chilled water flow Q9F back to the inlet duct 5 which again recycles it in the inner chamber 11.

[0029] Adjusting means V, such as a three-way valve, controls the water flow to the inlet duct 5: in fact, said valve V comprises a first and a second inlet V1, V2 respectively associated with a return duct 4 coming from the heating circuit and with said recirculation duct 9, and only one outlet associated with said inlet duct 5. Therefore, acting on said valve V it is possible to adjust the amount of water flow flowing from the heating circuit and now chilled Q4F, with respect to the amount of the chilled water flow Q9F flowing out of the heat exchanger 12.

[0030] Instead, the second circuit 20 comprises a second pumping means F, such as a fan, which draws off an air flow M from a living space at a first temperature t1, makes it go beyond said heat exchanger 12 and then introduces it again outside.

[0031] Following the flowing through said heat exchanger 12, the entering air flow M is heated drawing off the heat of the water flow Q8C circulating inside the same; therefore, when air flow M is reintroduced outside flowing from one or more outlets, it has a temperature t2 greater than said first temperature t1.

[0032] With reference to figure 3, a heat exchanger 12 is described thereof. Said heat exchanger 12 is preferably of the finned type, formed by a serpentine-shaped tube 13, advantageously made of a conductor material, such as copper, whose surface is provided with a plurality of fins 14 capable of maximizing the heat exchange between the fluid circulating inside the tube and the fluid flowing outside.

[0033] According to a characteristic of the invention, said heat exchanger 12 basically works similarly to a radiator: in fact, advantageously, the heated water flow Q8C is caused to circulate inside the tube while the cold water flow M, thanks to the fan F, is caused to flow through the cavities present between the fins 14 of the heat exchanger.

[0034] In figures 1 and 2 there are shown the working schemes of an apparatus 100 according to the present invention working in two extreme situations, that is when it is desired to obtain only a heated water flow Q7C to be introduced in the domestic heating circuit, and when it is desired to obtain only a heated air flow M.

[0035] In order to use said apparatus 100 so as to obtain only hot air (figure 1) it is necessary to suitably act on the adjusting valve V and completely close said second inlet V2, that is the one controlling the flow of the recirculated water Q9F, so that only the water flow coming from the domestic heating circuit Q4F can flow in the inlet duct 5 and hence enter the inner chamber 11. Therefore it results that: $Q5F=Q4F$ and $Q9F=0$.

[0036] At the outlet of said inner chamber 11, the heat-

ed water flow Q6C can only flow through the connection duct 7 in the heating circuit directed to the radiators because the inlet to the inner duct 8 connecting the inner chamber 11 and the heat exchanger 12 is blocked by the closing made by means of valve V, as previously described. Therefore the complete flow Q6C flowing out the inner chamber can be introduced into the domestic heating circuit, resulting in $Q7C=Q6C$ and $Q8C=0$.

[0037] Consequently, it will not be possible to perform any heat exchange between the heated water and the air drawn off from the surrounding living space through the heat exchanger 12 being the latter bypassed by the heated water flow.

[0038] In figure 2 it is shown the operating scheme of a heating apparatus 100 according to the present invention when it is desired to obtain only heated air. In this case it is necessary to suitably operate on said valve V to completely close said first inlet V1 that is the one which controls the water flow coming from the domestic heating circuit Q4F, so that only the chilled water flow Q9C can flow in the inlet duct 5, hence entering the inner chamber 11. Therefore it results that $Q5F=Q9F$ and $Q4F=0$.

[0039] At the outlet of said inner chamber 11, the heated water flow Q6C is completely deviated, thanks to the return by pump P to the heat exchanger 12, through the inner duct 8. Therefore the flow Q7C available to be introduced in the domestic heating circuit is null, resulting in $Q8C=Q6C$ and $Q7C=0$.

[0040] Consequently, basically all the heat produced by the combustion inside the apparatus 100 and absorbed by the water while inside the inner chamber 11 (obviously taking into consideration the yield of such passage) is made available in the heat exchanger 12 in order to heat the air flow M drawn off by the fan F at a temperature t_1 which then is reintroduced outside at a temperature $t_{max}>t_1$.

[0041] Obviously the two situations described above are referred to extreme operating modalities; acting on the adjusting valve V it is possible to suitably adjust the amount of water flow re-circulated Q9F and the amount of water flow flowing from the heating circuit Q4F consequently obtaining a choking of the heat developed by the combustion which is distributed between the water and the air according to the requirements.

[0042] In fact, for example, acting on valve V so that said first and second inlets V1, V2 are only partially open, the water flow to be heated Q5C will have a composition resulting from the sum of a determined re-circulated water flow Q9F and a determined water flow by then cold flowing from the domestic radiators network Q4F, always resulting in $Q5C=Q9F+Q4F$.

[0043] Consequently in correspondence with the branching off of the extraction duct 6, a first portion Q8C of the heated water flow Q6C, in particular a portion basically proportional to the opening degree of said second inlet V2, will deviate inside the inner duct 8 towards the heat exchanger 12, while the remaining portion Q7C will be available to be reintroduced into the domestic heating

circuit through the connection duct 7, being $Q6C = Q8C+Q7C$.

[0044] Therefore, only the first portion Q8C sent to the heat exchanger 12 will be available in order to perform the heat exchange with the air flow M to be heated and hence, on equal exchange surface and fan F power, the air flow M exiting the apparatus 100 will have a temperature t_2 greater than temperature t_1 of the incoming air flow, but lower than temperature t_{max} which would have acquired if all the heated water flow Q6C had flowed through the heat exchanger 12.

[0045] Alternatively, the power of fan F can be modulated based on the water flow circulating into the heat exchanger 12 so that the outgoing air will always have the highest temperature t_{max} . In particular, the air flow M rate to be returned, and therefore the fan F speed, can be automatically determined based on the opening degree of valve V, or thanks to a sensor detecting the surface temperature of the heat exchanger 12.

[0046] Clearly the adjustment on the valve V can be performed manually by the user or, in more technological models, by a servomotor actuated by suitable command and control means which, advantageously, acquire the temperature t_1 of a living space air, compares it to the value set by the user, for example through a suitable interface, and then commands the actuation of said valve V.

[0047] In conclusion, from the foregoing it is apparent that an apparatus 100 for the production of hot air and hot water according to the present invention achieves the expected objects and advantages.

[0048] In fact, it has been obtained a heating apparatus 100 provided with a system of choking the amount of heat to be transferred to the air and the water which can be operated based on the user's requirements.

[0049] Moreover, said apparatus 100 makes it possible to obtain said choking in a precise way but of simple execution by the user.

[0050] Of course the present invention can have a lot of different applications, modifications or variations without exiting the protection area, as defined by the appended claims.

[0051] Moreover, the materials and equipment used for the embodiment of the present invention, as well as the forms and dimensions of each component can be the most suitable according to the specific requirements.

Claims

1. Solid fuel stove (100) for a combined production of hot air and hot water comprising:

- a housing (1) defining a compartment (2) in which are housed a combustion chamber (3) and an inner chamber (11) for heating water, said inner chamber (11) being formed in a cavity provided between the outer surface of the walls

of said combustion chamber (3) and the inner surface of said housing (1),

- a first circuit (10) for heating a water flow (Q_{5F}) comprising an inlet duct (5) to introduce said water flow to be heated (Q_{5F}) in said inner chamber (11) through first pumping means (P), and an extraction duct (6) to draw a flow of heated water (Q_{6C}) off from said inner chamber (11), and

characterized in that it comprises a heat exchanger (12) for exchanging heat between at least a first portion (Q_{8C}) of said heated water flow (Q_{6C}) drawn off from said inner chamber (11) and said air flow (M), a remaining portion (Q_{7C}) of said heated water flow (Q_{6C}) being suitable to be circulated into a domestic heating circuit, and a chilled water flow (Q_{9F}) from said heat exchanger (12) being capable to be recirculated within said inner chamber (11), adjusting means (V) comprising a three-way valve being provided to adjust the amount of water flow flowing from the domestic heating circuit (Q_{4F}) with respect to the amount of said chilled water flow (Q_{9F}), said amount of water flow flowing from the domestic heating circuit (Q_{4F}) and said amount of chilled water flow (Q_{9F}) forming the water flow to be heated (Q_{5F}).

2. Solid fuel stove (100) for a combined production of hot air and hot water according to claim 1, wherein said heat exchanger (12) includes a serpentine-shaped tube (13) provided with a plurality of surface fins (14), said first portion (Q_{8C}) of said heated water flow (Q_{6C}) circulating inside said tube (13) and said air flow (M) flowing outside said tube (13).
3. Solid fuel stove (100) for a combined production of hot air and hot water according to claim 1 or 2, wherein said three-way valve (V) comprises a first inlet (V1) associated with a return duct (4) which allows a controlled water flow flowing from the domestic heating circuit (Q_{4F}), and a second inlet (V2) associated with a recirculation duct (9) which allows a controlled flow of said chilled water flow (Q_{9F}).
4. Solid fuel stove (100) for a combined production of hot air and hot water according to any of the preceding claims, wherein the power of said second pumping means (F) is determined according to the temperature detected by a sensor placed on the surface of said heat exchanger (12).
5. Use of a heat exchanger (12) in a solid fuel stove for a combined production of hot air and hot water according to any of claims 1 to 4, wherein said heat

exchanger (12) performs a heat exchange between a heated water flow and an air flow to be heated, said heat exchanger (12) comprising at least a tube within which said heated water flow flows while said air flow flows onto the outer surface of said at least a tube.

6. Method for a combined production of hot air and hot water by means of a solid fuel stove (100) according to any of claims 1 to 4, comprising the following steps:

- a) introducing a flow of water to be heated (Q_{5F}) into said inner chamber (11) through first pumping means (P);
- b) extracting a heated water flow (Q_{6C}) from said inner chamber (11);
- c) drawing off an air flow (M) at a first temperature (t_1) through second pumping means (F);

characterized in that it further comprises the following steps:

- d) operating a heat exchange between at least a first portion (Q_{8C}) of said heated water flow (Q_{6C}) extracted from said inner chamber (11) and said air flow (M) to obtain said air flow (M) at a second temperature (t_2) greater than said first temperature (t_1) and a flow of chilled water (Q_{9F}) to be recirculated into said inner chamber (11);
- e) circulating the remaining portion (Q_{7C}) of said heated water flow (Q_{6C}) into said domestic heating circuit,

wherein said step a) is performed by selecting the amount of water flow flowing from said domestic heating circuit (Q_{4F}) and the amount of said chilled water flow (Q_{9F}) through said adjusting means (V) to set the amount of said first portion (Q_{8C}) of heated water flow (Q_{6C}) to operate said heat exchange and the amount of said remaining portion (Q_{7C}) of said heated water flow (Q_{6C}) to be circulated into said domestic heating circuit.

Patentansprüche

1. Festbrennstoffofen (100) für eine kombinierte Erzeugung von Heißluft und heißem Wasser, mit:
 - einem Gehäuse (1), das einen Raum (2) abgrenzt, in welchem eine Verbrennungskammer (3) und eine innere Kammer (11) zum Erwärmen von Wasser angeordnet sind, wobei die innere Kammer (11) in einem Hohlraum gebildet ist, der zwischen der Außenfläche der Wände der Verbrennungskammer (3) und der Innenfläche des Gehäuses (1) vorgesehen ist,

- einem ersten Kreis (10) zur Erwärmung eines Wasserstroms (Q_{5F}) mit einer Einlassleitung (5) zum Einführen des zu erwärmenden Wasserstroms (Q_{5F}) in die innere Kammer (11) mittels einer ersten Pumpeinrichtung (P) und mit einer Auslassleitung (6) zum Abführen eines Stroms aus erwärmten Wasser (Q_{6C}) aus der inneren Kammer (11), und
- einem zweiten Kreis (20) zur Erwärmung eines Luftstroms (M) von einer ersten Temperatur (t_1) auf eine zweite Temperatur (t_2), die höher als die erste Temperatur (t_1) ist, wobei der Luftstrom (M) mittels einer zweiten Pumpeinrichtung (F) abgeführt wird,

dadurch gekennzeichnet, dass der Festbrennstoffofen aufweist: einen Wärmetauscher (12) zum Austausch von Wärme zwischen zumindest einem ersten Teil (Q_{8C}) des erwärmten Wasserstroms (Q_{6C}), der aus der inneren Kammer (11) abgeführt wird, und dem Luftstrom (M), wobei ein verbleibender Teil (Q_{7C}) des erwärmten Wasserstroms (Q_{6C}) geeignet ist, in einen Hausheizkreis eingespeist zu werden, und wobei ein abgekühlter Wasserstrom (Q_{9F}) aus dem Wärmetauscher (12) in der Lage ist, in der inneren Kammer (11) rezirkuliert zu werden; eine Einstelleinrichtung (V) mit einem 3-Wege-Ventil, das zur Einstellung der Menge des Wasserstroms, die von dem Hausheizkreis (Q_{4F}) abfließt, in Bezug auf die Menge des gekühlten Wasserstroms (Q_{9F}) vorgesehen ist, wobei die Menge des Wasserstroms, die von dem Hausheizkreis (Q_{4F}) abfließt, und die Menge des gekühlten Wasserstroms (Q_{9F}) den Wasserstrom bilden, der zu erwärmen ist (Q_{5F}).

2. Festbrennstoffofen (100) für eine kombinierte Erzeugung von Heißluft und heißem Wasser nach Anspruch 1, wobei der Wärmetauscher (12) ein serpentinenförmiges Rohr (13) aufweist, das mit mehreren Oberflächenrippen (14) versehen ist, wobei der erste Teil (Q_{8C}) des erwärmten Wasserstroms (Q_{6C}) in dem Rohr (13) zirkuliert und der Luftstrom (M) außerhalb des Rohrs (13) strömt.
3. Festbrennstoffofen (100) für eine kombinierte Erzeugung von Heißluft und heißem Wasser nach Anspruch 1 oder 2, wobei das 3-Wege-Ventil (V) einen ersten Einlass (V1), der mit einer Rückleitung (4) verbunden ist, die das Strömen eines gesteuerten Wasserstroms aus dem Hausheizkreis (Q_{4F}) ermöglicht, und einen zweiten Einlass (V2) aufweist, der mit einer Rezirkulationsleitung (9) verbunden ist, die ein gesteuertes Strömen des gekühlten Wasserstroms (Q_{9F}) ermöglicht.
4. Festbrennstoffofen (100) für eine kombinierte Erzeugung von Heißluft und heißem Wasser nach einem

der vorhergehenden Ansprüche, wobei die Leistung der zweiten Pumpeinrichtung (F) durch die Temperatur bestimmt ist, die von einem Sensor erfasst wird, der auf der Oberfläche des Wärmetauschers (12) angeordnet ist.

5. Verwendung eines Wärmetauschers (12) in einem Festbrennstoffofen für eine kombinierte Erzeugung von Heißluft und heißem Wasser nach einem der Ansprüche 1 bis 4, wobei der Wärmetauscher (12) einen Wärmeaustausch zwischen einem erwärmten Wasserstrom und einem zu erwärmenden Luftstrom vornimmt, wobei der Wärmetauscher (12) mindestens ein Rohr aufweist, in welchem der erwärmte Wasserstrom strömt, während der Luftstrom an der Außenfläche des mindestens einen Rohrs strömt.
6. Verfahren für eine kombinierte Erzeugung von Heißluft und heißem Wasser mittels eines Festbrennstoffofens (100) nach einem der Ansprüche 1 bis 4, mit den folgenden Schritten:

- a) Einführen eines Stroms aus zu erwärmendem Wasser (Q_{5F}) in die innere Kammer (11) mittels einer ersten Pumpeinrichtung (P);
- b) Herausführen eines erwärmten Wasserstroms (Q_{6C}) aus der inneren Kammer (11);
- c) Abführen eines Luftstroms (M) mit einer ersten Temperatur (t_1) mittels einer zweiten Pumpeinrichtung (F);

dadurch gekennzeichnet, dass das Verfahren ferner die folgenden Schritte umfasst:

- d) Durchführen eines Wärmeaustausches zwischen zumindest einem ersten Teil (Q_{8C}) des erwärmten Wasserstroms (Q_{6C}), der aus der inneren Kammer (11) herausgeführt wird, und dem Luftstrom (M), um den Luftstrom (M) mit einer zweiten Temperatur (t_2), die höher ist als die erste Temperatur (T_1), und einen Strom aus abgekühltem Wasser (Q_{9F}), der in die innere Kammer (11) zurückzuführen ist, zu erhalten;
- e) Einspeisen des verbleibenden Teils (Q_{7C}) des erwärmten Wasserstroms (Q_{6C}) in den Hausheizkreis,

wobei der Schritt a) ausgeführt wird, indem die Menge des Wasserstroms, die aus dem Hausheizkreis (Q_{4F}) abfließt, und die Menge des gekühlten Wasserstroms (Q_{9F}) durch die Einstelleinrichtung (V) so ausgewählt werden, dass die Menge des ersten Teils (Q_{8C}) des erwärmten Wasserstroms (Q_{6C}) zum Durchführen des Wärmeaustausches und die Menge des verbleibenden Teils (Q_{7C}) des erwärmten Wasserstroms (Q_{6C}), die in den Hausheizkreis einspeisen ist, festgelegt werden.

Revendications

1. Poêle à combustible solide (100) pour une production combinée d'air chaud et d'eau chaude comprenant:

- un boîtier (1) définissant un compartiment (2) dans lequel sont logés une chambre de combustion (3) et une chambre intérieure (11) pour l'eau de chauffage, ladite chambre intérieure (11) étant formée dans une cavité ménagée entre la surface extérieure des parois de ladite chambre de combustion (3) et la surface intérieure dudit boîtier (1),
 - un premier circuit (10) pour chauffer un flux d'eau (Q_{5F}) comprenant un conduit d'entrée (5) pour introduire ledit écoulement d'eau à chauffer (Q_{5F}) dans ladite chambre intérieure (11) par l'intermédiaire de premiers moyens de pompage (P), et un conduit d'extraction (6) pour tirer un courant d'eau chaude (Q_{6C}) hors de ladite chambre intérieure (11), et
 - un second circuit (20) pour chauffer un flux d'air (M) à partir d'une première température (t_1) à une seconde température (t_2) supérieure à ladite première température (t_1), ledit flux d'air (M) étant tiré par des seconds moyens de pompage (F),

caractérisé en ce qu'il comprend un échangeur de chaleur (12) destiné à échanger de la chaleur entre au moins une première partie (Q_{8C}) dudit courant d'eau chaude (Q_{6C}) tiré de ladite chambre intérieure (11) et ledit flux d'air (M), une partie restante (Q_{7C}) dudit courant d'eau chaude (Q_{6C}) étant apte à être mise en circulation dans un circuit de chauffage domestique, et un débit d'eau de refroidissement (Q_{9F}) dudit échangeur de chaleur (12) étant apte à être remis en circulation dans ladite chambre intérieure (11), des moyens de réglage (V) comprenant une vanne à trois voies prévue pour ajuster la quantité de débit d'eau circulant dans le circuit de chauffage domestique (Q_{4F}) par rapport à la quantité dudit flux d'eau de refroidissement (Q_{9F}), ladite quantité de débit d'eau circulant dans le circuit de chauffage domestique (Q_{4F}) et ladite quantité de débit d'eau de refroidissement (Q_{9F}) formant l'écoulement d'eau à chauffer (Q_{5F}).

2. Poêle à combustible solide (100) pour une production combinée d'air chaud et d'eau chaude selon la revendication 1, dans lequel ledit échangeur de chaleur (12) comporte un tube en forme de serpent (13) muni d'une pluralité d'ailettes de surface (14), ladite première partie (Q_{8C}) dudit courant d'eau chaude (Q_{6C}) circulant à l'intérieur dudit tube (13) et ledit écoulement d'air (M) circulant à l'extérieur dudit tube (13).

3. Poêle à combustible solide (100) pour une production combinée d'air chaud et d'eau chaude selon la revendication 1 ou 2, dans lequel ladite vanne à trois voies (V) comprend une première entrée (V1) associée à un conduit de retour (4) qui permet un écoulement d'eau contrôlé découlant du circuit de chauffage domestique (Q_{4F}) et une seconde entrée (V2) associée à un conduit de recirculation (9), qui permet un débit contrôlé dudit débit d'eau de refroidissement (Q_{9F}).

4. Poêle à combustible solide (100) pour une production combinée d'air chaud et d'eau chaude selon l'une quelconque des revendications précédentes, dans lequel la puissance dudit second moyen de pompage (F) est déterminée en fonction de la température détectée par un capteur placé sur la surface dudit échangeur de chaleur (12).

5. Utilisation d'un échangeur de chaleur (12) à l'intérieur d'un appareil de chauffage pour une production combinée d'air chaud et d'eau chaude selon l'une des revendications 1 à 4, dans lequel ledit échangeur de chaleur (12) effectue un échange de chaleur entre un flux d'eau chaude et un flux d'air à chauffer, ledit échangeur de chaleur (12) comprenant au moins un tube à l'intérieur duquel ledit flux d'eau chaude s'écoule lorsque ledit flux d'air circule sur la surface externe dudit au moins un tube.

6. Procédé pour la production d'une combinaison d'air chaud et d'eau chaude au moyen d'un poêle à combustible solide (100) selon l'une quelconque des revendications 1 à 4, comprenant les étapes suivantes:

a) introduire un écoulement d'eau à chauffer (Q_{5F}) dans ladite chambre intérieure (11) par l'intermédiaire des premiers moyens de pompage (P);
 b) extraire un flux d'eau chaude (Q_{6C}) de ladite chambre intérieure (11),
 c) tirer un flux d'air (M) à une première température (t_1) par l'intermédiaire des seconds moyens de pompage (F),

caractérisé en ce qu'il comprend en outre les étapes suivantes :

d) faire fonctionner un échange de chaleur entre au moins une première partie (Q_{8C}) dudit courant d'eau chaude (Q_{6C}) extraite de ladite chambre intérieure (11) et dudit flux d'air (M) afin d'obtenir ledit flux d'air (M) à une seconde température (t_2) supérieure à ladite première température (t_1) et un débit d'eau de refroidissement (Q_{9F}) devant être remis en circulation dans ladite chambre intérieure (11),
 e) faire circuler la partie restante (Q_{7C}) dudit cou-

rant d'eau chaude (Q_{6C}) dans ledit circuit de chauffage domestique,

dans lequel l'étape a) est réalisée en sélectionnant le débit d'écoulement d'eau provenant dudit circuit de chauffage domestique (Q_{4F}) et la quantité dudit flux d'eau de refroidissement (Q_{9F}) par ledit moyen de réglage (V) pour régler la quantité de ladite première partie (Q_{8C}) du flux d'eau chaude (Q_{6C}) pour faire fonctionner ledit échangeur de chaleur et la quantité de ladite portion restante (Q_{7C}) dudit courant d'eau chaude (Q_{6C}) à circuler dans ledit circuit de chauffage domestique.

5

10

15

20

25

30

35

40

45

50

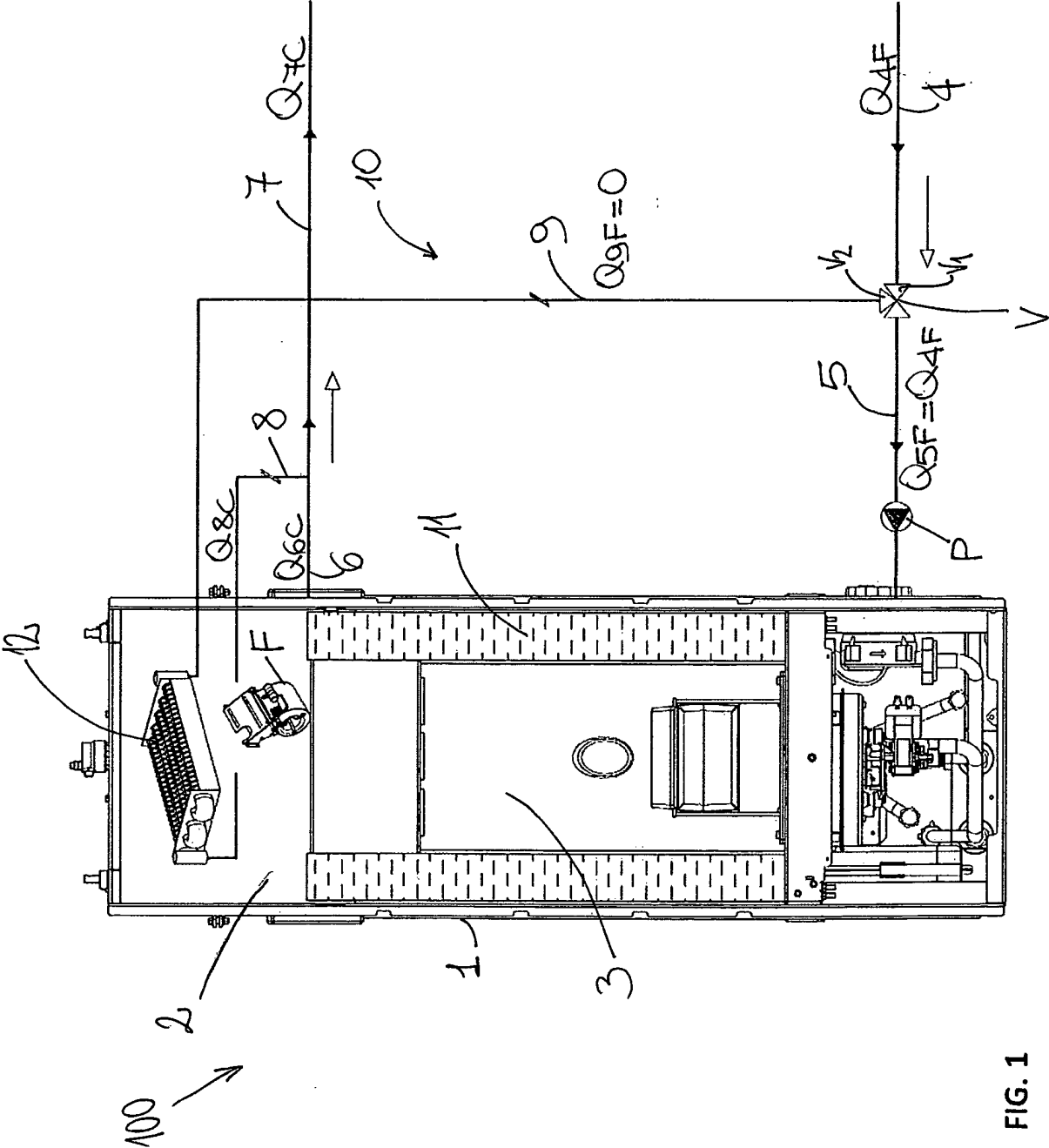
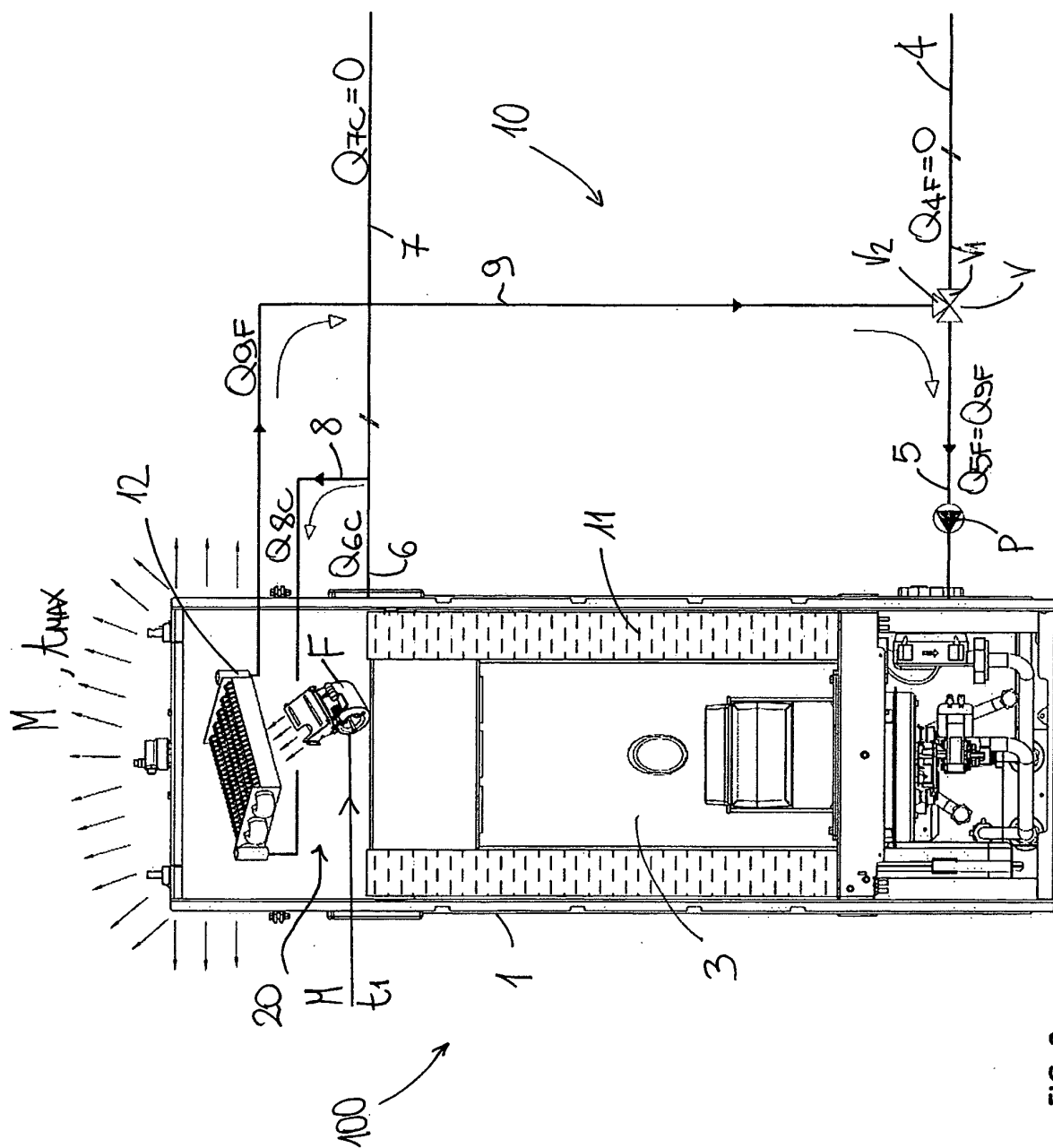


FIG. 1



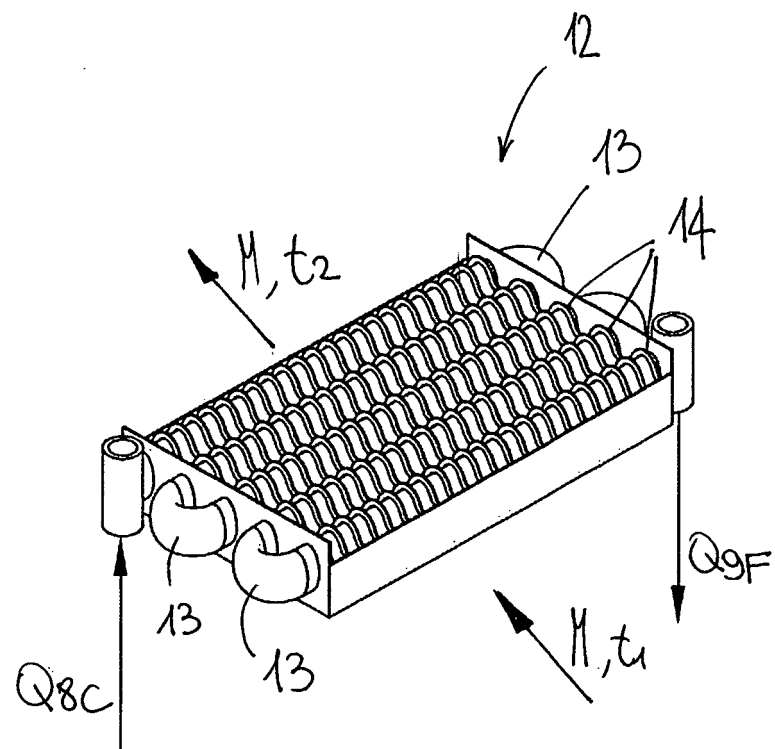


FIG. 3

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 5046478 A [0011]
- WO 9606309 A [0011]