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(54) Stove

(57) Stove comprising a combustion chamber 1 with a first part 2 and following thereto a second part 3, which second part is delimited at a top by a dome, wherein the first part 2 has at a bottom a first air supply to allow a first air stream 4 to flow into the first part 2 in order to combust a fuel, in particular wood, in the first part 2, during which combustion flue gasses are generated, and wherein the second part 3 has a second air supply to allow a second air stream to flow into the second part 3 and which second part 3 is provided to post-combust at least part of the flue gasses from the first part 2 by means of the second air stream, wherein the first and the second parts pass into each other and wherein said dome comprises a multiplicity of openings 8 to allow said second air stream to flow inwards into the second part, such that on mixing of the second air stream with at least part of the flue gasses, turbulence occurs.

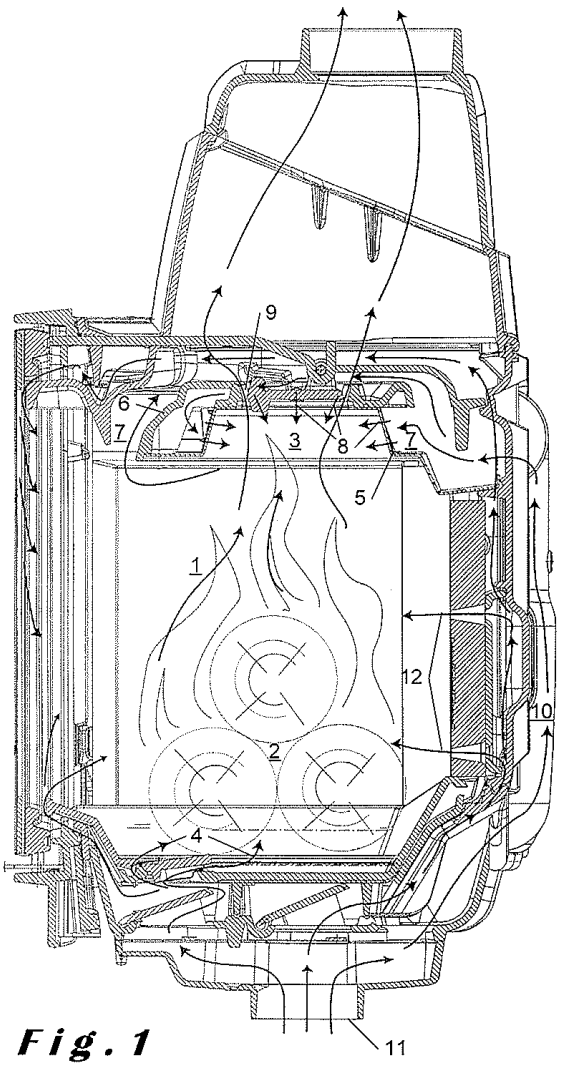

Fig. 1

EP 2 116 773 A1

Description

[0001] The invention concerns a stove, comprising a combustion chamber with a first part and a second part, which second part is delimited at a top by a dome, wherein the first part at a bottom has a first air supply to allow a first air stream to flow into the first part in order to allow combustion of a fuel, in particular wood, in the first part, during which combustion flue gasses are generated, and wherein the second part has a second air supply to allow a second air stream to flow into the second part and which second part is provided to post-combust at least part of the flue gasses coming from the first part by means of the second air stream.

[0002] Such a stove is known from DE 199 11 998. The first and second parts are separated from each other by a flame plate and the flue gasses pass along a channel between the flame plate and the inner wall of the stove. In the known stove there are two air streams. A first air stream flows towards the inside along the bottom in a first part of a combustion chamber. Here the fuel is burned, creating flue gasses. These flue gasses rise up and via the channel reach the second part of the combustion chamber. The second part is provided to let in a second air stream which is injected via spray heads into the flue gasses leaving the first part. The addition of the second air stream allows post-combustion of at least part of the flue gasses.

[0003] One disadvantage of such a stove is that the post-combustion of the flue gasses is not optimum, so the flue gasses leaving the stove still contain a relatively high proportion of unburned particles. Because the first and second parts are separated from each other by the flame plate, the flue gasses which enter the second part already have a high speed and the injected air from the second air stream has insufficient time to mix with the flue gasses.

[0004] The object of the invention is to realise a stove which is provided to post-combust the flue gasses such that the flue gasses leaving the stove contain a smaller quantity of unburned particles.

[0005] A stove according to the invention is therefore **characterised in that** the first and second parts pass into each other and that said dome comprises a multiplicity of openings provided to allow said second air stream to flow into the second part so that on mixing of the second air stream with at least part of the flue gasses, turbulence occurs. The flue gasses that are formed in the first part rise to the second part. Because the first and second parts transform into each other, the flue gasses enter the dome at the speed with which they were generated. Because the flue gasses, on rising, collide with the dome and rebound, the forward flow of the flue gasses is interrupted. This rebound also extends the duration of the flue gasses in the combustion chamber. The dome is furthermore fitted with openings through which a second air stream can flow into the second part. The second air stream flows into the dome and mixes with the flue gasses. The second air stream also collides with the flue gasses, whereby the forward flow is disrupted more and turbulence occurs. This turbulence which occurs in the flue gasses greatly improves the mixing of the second air stream and the flue gasses. The fact that the second air stream mainly flows down from the dome, and that the flue gasses from the first part mainly flow upwards, makes the collision between the second air stream and the flue gasses even stronger, further reinforcing the turbulence, and hence improving the mixing. Because the duration is also extended, the reaction time for post-combustion is also extended. As a result the flue gasses can be post-combusted better than in a conventional stove, and the flue gasses leaving the stove contain fewer unburned particles.

[0006] It should be noted here that in DE 199 11 998, due to the presence of the flame plate forming the separation between the first and second parts, the second part forms as if to say a hearth and not a space where adequate post-combustion can occur. Furthermore US 4 903 616 describes a dome with a multiplicity of openings. However in the latter document the second air stream is directed into the flame and not into the flue gasses. A combination of DE 199 11 998 and US 4 903 616 does not lead to the present invention as this would lead to the openings being made in the flame plate, whereby mixing occurs not in the second but in the first part, and hence can lead to extinguishing of the flame.

[0007] In a first preferred embodiment of the invention, the dome is formed by a first and second plate, where the first plate forms an inner wall of the second part and is fitted with the said openings, and between the first and second plate is formed a space forming an air chamber provided to build up said second air stream so that this can flow through said openings into said second part. The assembly of this first and second plate offers a way of constructing a reservoir for the second air stream and distributing this over the openings. Allowing the second air stream to flow between the two plates has the secondary advantage that, because the first plate forms an inner wall of the second part and hence forms a wall of the combustion chamber, this air stream is preheated before it flows in through the openings of the combustion chamber. As a result the kinetic energy of this second air stream increases, resulting in better mixing. Consequently, after mixing with the flue gasses, it is easier to reach the optimum combustion temperature.

[0008] In a second preferred embodiment of the invention, the stove is provided to allow said second air stream to flow while in contact with the first part so that this is preheated, and the stove is provided for the first and second air stream to enter the stove through the same air opening. The advantage of using a same air opening for the two streams is that if a forced air flow is to be created, this can be done centrally with only one device for both air streams. Also if the two air streams are to be drawn from a place other than where the stove is located, this can be done by connecting just one air opening with this

other place.

[0009] The invention will now be described in more detail with reference to the embodiments shown in the drawing.

[0010] The drawing shows:

figure 1 a cross section of a stove according to the invention;
figure 2 a perspective view of a dome according to the invention.

[0011] In the drawing the same or similar elements have the same reference numerals.

[0012] Figure 1 shows a stove with a combustion chamber 1 comprising a first part 2 and a second part 3. In the first part 2, the fuel, preferably wood, is burned. This combustion takes place under the supply of a first air stream 4 which flows into the combustion chamber 1 at a bottom of the first part 2. As a result of combustion flue gasses are generated, which rise and enter the second part 3. The first and second parts pass into each other, more particularly at the height of the transition from the first to the second part there is no partition wall or similar, whereby the flue gasses can flow unhindered from the first to the second part.

[0013] The second part 3 is delimited at a top by a dome which preferably comprises a first plate 5 and a second plate 6. The dome functions as a flame plate in the stove. The first plate 5 forms an inner wall of the combustion chamber 1. The first plate 5 and second plate 6 are joined together such that between the first plate 5 and the second plate 6 is formed an air chamber 7. The first plate 5 is furthermore provided with a multiplicity of openings 8 through which a second air stream can flow into the combustion chamber 1. The function of the air chamber 7 is to build up the second air stream so that this can flow through the openings 8 into the second part 3.

[0014] Preferably the openings are spread over the complete surface of the first plate 5 as shown in figure 2. As a result the supply of the second air stream can be distributed evenly in the second part 3.

[0015] The dome preferably has a passage opening 9 through which at least part of the flue gasses can escape to the outside. This passage opening 9 preferably has a valve system so that the flow of escaping flue gasses can be regulated.

[0016] Preferably the stove has a channel 10 which runs in contact with an inner wall of the first part 2. This channel 10 allows the second air stream to flow from the underside of the stove up into the air chamber 7. Preferably the channel 10 has a control member to control the flow rate of the second air stream. More preferably this control member is designed to regulate the flow rate of the second air stream as a function of the temperature predominating in the stove. Preferably the stove is provided at the bottom with a suction opening 11 to allow both the first and second air streams to flow into the stove.

[0017] The stove is furthermore preferably provided with openings in the upstanding walls of the first part 2, preferably in the rear wall of the first part 2, so that a third air stream 12 can flow through these openings. Preferably the third air stream also flows into the stove via the suction opening 11.

[0018] A stove as described above and as shown in figures 1 and 2 has the following advantages:

[0019] The dome is preferably formed from a first plate 5 and a second plate 6 between which the second air stream can be built up, and wherein the first plate 5 is provided with openings 8 to allow the passage of this second air stream. The advantage of this is that the second air stream can flow approximately evenly through the openings 8 at various points on the first plate 5 because this air stream can be built up in a chamber between the two plates. A further advantage is that the quantity of openings 8 in the first plate 5 has no effect on the construction manner of the dome. Because of the two plates, with the air chamber 7 in between, the second air stream can flow through the openings 8 in the first plate 5 approximately evenly.

[0020] Because the second part 3, where the flue gasses enter after rising, is delimited by a dome, the flue gasses collide with the dome wall and rebound, which disrupts the upward flow. Because the wall has a dome shape and the flue gasses initially rise, the flue gasses rebound in the direction of a focal point or centre point of the dome. As a result the complete dome is filled with flue gasses. The collisions are reinforced further because a second air stream flows out of the dome and also collides with the flue gasses. The second air stream flows out of openings 8 which are preferably distributed over the dome, whereby the flow direction of the second air stream from the various openings 8 is different and lies in the direction of the focal point or centre point of the dome. This means that the collisions between the second air stream and the flue gasses occur in several directions in the dome. As a result of these collisions, turbulence occurs. Because of this turbulence and the mixing of the flue gasses and the second air stream, the flue gasses are well mixed with the second air stream.

[0021] The second air stream provides fresh air, allowing post-combustion of the flue gasses. The turbulence which occurs firstly ensures good mixing, leading to optimum post-combustion, but secondly also the duration of the mixture in the second part 3 is extended. Due to the longer post-combustion time, more unburned particles in the flue gasses have the chance to burn and fewer such particles are present in the flue gasses leaving the stove, meaning that the flue gasses are cleaner.

[0022] Because the second air stream flows through a channel 10 which is adjacent to the first part 2, the advantage is that the second air stream is preheated. As a result the second air stream, as it flows through the openings 8, is warmer than if it had not been preheated. Because the second air stream is warmer, in the second part 3 after mixing with the flue gasses, the optimum com-

bustion temperature is reached more quickly. As a result post-combustion can start earlier and hence it lasts longer. More unburned particles in the flue gasses can then be post-combusted. A second advantage is that on heating, the kinetic energy and hence the movement energy of the second air stream is increased, so mixing of the second air stream and flue gasses takes place more quickly.

[0023] The control member in the channel 10 allows the flow rate of the second air stream to be regulated. The optimum flow rate of the second air stream can be set via the control member depending on the temperature predominating in the stove, in order to allow optimum post-combustion. If the temperature in the stove is relatively low, the control member remains almost closed. If there is a sufficiently high temperature in the stove, the control member will adjust so that sufficient second air stream can flow into the stove to allow post-combustion. A second advantage is that this control member can also serve as a non-return valve. This is necessary if the temperature in the stove is not sufficiently high to generate the natural draught of the second air stream. The non-return valve prevents the flue gasses flowing back towards the outside through an inlet for the second air stream.

[0024] To keep the quantity of unburned particles in the flue gasses as low as possible, preferably primary combustion takes place as optimal as possible. For this a third air stream 12 enters the stove and ensures that during combustion of the fuel, preferably wood, the combustion process receives an extra quantity of fresh air to allow primary combustion to occur.

[0025] The fact that the dome has a passage opening 9 allows part of the flue gasses to flow out. In this way it is possible to create an equilibrium in the stove between the quantity of incoming air, which is a combination of the first, second and third air streams, and the quantity of escaping flue gasses. Because this passage opening 9 has a valve system, it is not only possible to create an equilibrium but it is also possible to influence this equilibrium. Thus by opening the valve system further, more flue gasses can leave the stove whereby the total air stream into the stove becomes greater. However the valve system is preferably set such that the combustion time of the flue gasses is sufficiently long.

Claims

1. A stove comprising a combustion chamber (1) with a first part (2) and a second part (3), which second part is delimited at a top by a dome, wherein the first part (2) has at a bottom a first air supply to allow a first air stream (4) to flow into the first part (2) in order to combust a fuel, in particular wood, in the first part (2), during which combustion flue gasses are generated, and wherein the second part (3) has a second air supply to allow a second air stream to flow into the second part (3) and which second part (3) is provided to post-combust at least part of the flue gasses coming from the first part (2) by means of the second air stream, **characterised in that** the first and the second parts pass into each other and that said dome comprises a multiplicity of openings (8) to allow said second air stream to flow inwards into the second part, such that on mixing of the second air stream with at least part of the flue gasses, turbulence occurs.

2. Stove according to claim 1, **characterised in that** said dome is formed by a first plate (5) and a second plate (6), of which the first plate (5) forms an inner wall of the second part (3) and is provided with said openings (8), and wherein between first and second plates is formed a space which forms an air chamber (7), provided to build up said second air stream so that this can flow through said openings (8) into said second part (3).

3. Stove according to claim 2, **characterised in that** said first and second plates have a passage opening (9) through which part of the flue gasses can flow out.

4. Stove according to claim 3, **characterised in that** said passage opening (9) has a valve system.

5. Stove according to any of claims 1 to 4, **characterised in that** said openings (8) are spread over a complete surface of said dome.

6. Stove according to any of claims 1 to 5, **characterised in that** the stove is provided to allow said second air stream to flow in contact with the first part (2) in order to preheat the second air stream.

7. Stove according to any of claims 1 to 6, **characterised in that** the stove is provided with a control member provided to control a flow rate of said second air stream.

8. Stove according to claim 7, **characterised in that** said control member is provided to control said flow rate as a function of temperature predominating in the stove.

9. Stove according to any of claims 1 to 8, **characterised in that** the stove is provided to allow said first and second air streams to enter through the same air opening (11).

10. Stove according to any of claims 1 to 9, **characterised in that** an upstanding wall, preferably a rear wall of said first part (2), comprises openings which are provided to allow a third air stream (12) to flow into said combustion chamber (1).

11. Stove according to claim 10, **characterised in that** said air opening (11) is also provided to allow said third air stream (12) to flow into the stove.

12. Stove according to any of claims 9 to 11, **characterised in that** said air opening (11) is on the underside of said stove.

13. Stove according to claim 12, **characterised in that** said second air stream flows via a channel (10) in the rear wall of the said stove.

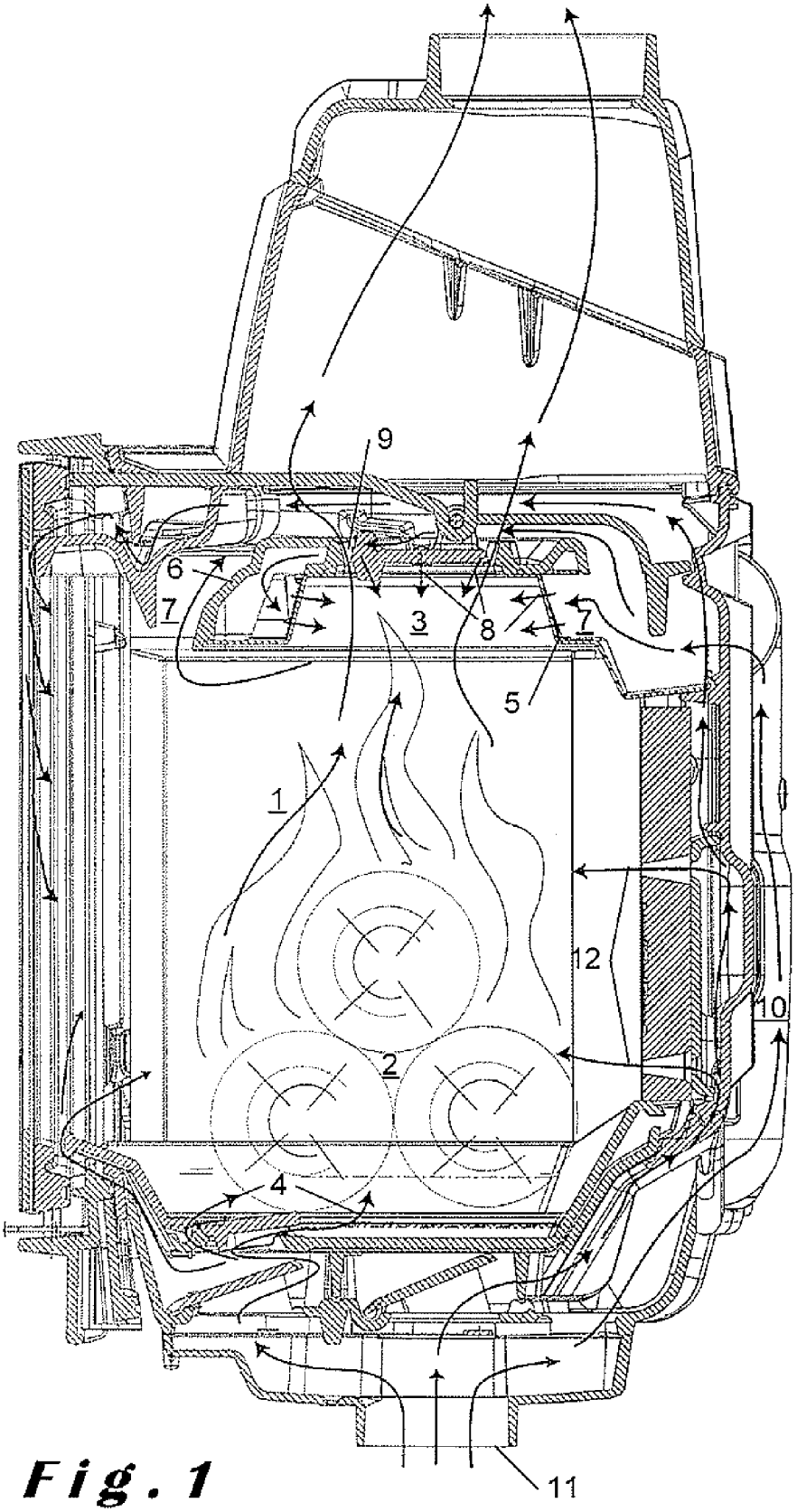

Fig. 1

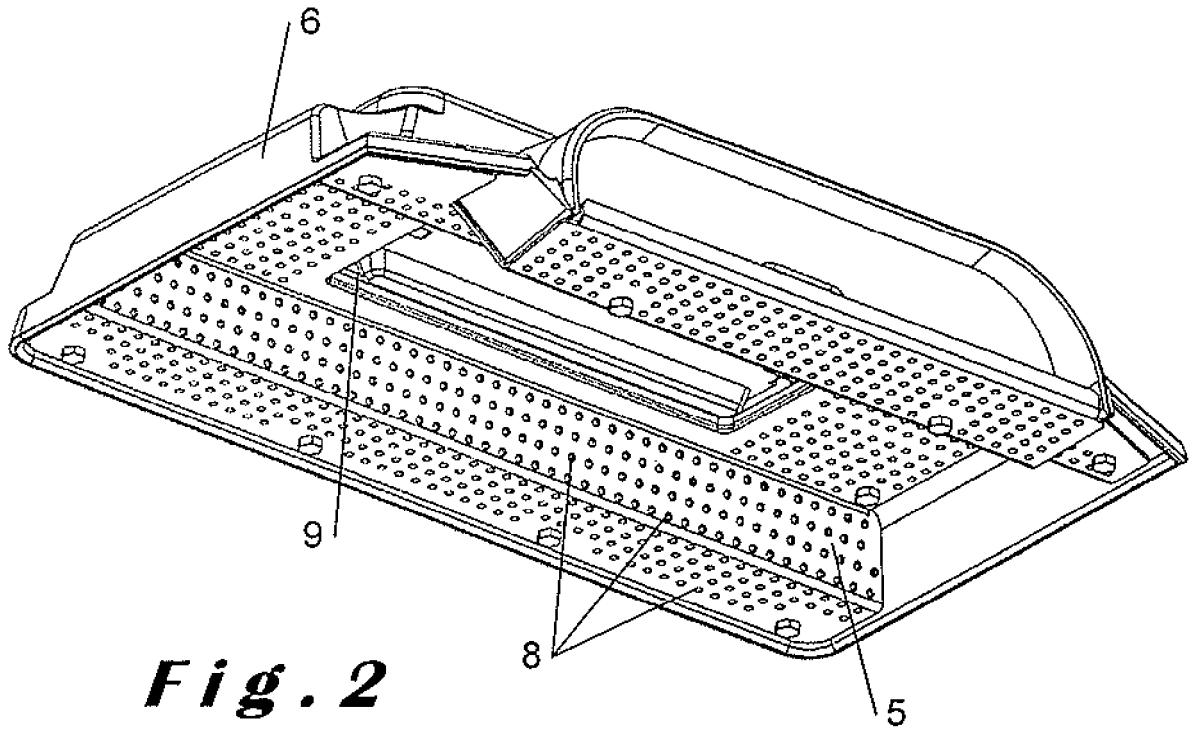

Fig. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 09 15 8873

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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	21 September 2009	Verdoodt, Luk

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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