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(54) Title: COOKING AND HEATING STOVE FUELLED BY PELLET OR BIOMASS GRAIN APT TO COOK AND TO HEAT WATER FOR DOMESTIC HEATING

(57) Abstract: Cooking and heating stove fuelled by pellet or biomass grain apt to cook and to heat water for domestic heating comprising a hearth fuelled by pellets or biomass grains, at least one plate to cook food and two heat exchangers to heat water for domestic heating wherein the cooking plate is located above the hearth fuelled by pellets or biomass grains, said two heat exchangers are positioned at the sides of the cooking plate, that on one side of said heat exchangers two inclined deflection plate are mounted that forces the combustion fumes to go up to touch the cooking plate and then to flow on the heat exchangers, the heat exchangers are two bundles with parallel pipes, on said pipes of said bundle heat exchangers at least one fixed deflection plate is located, said fixed deflection plates are perpendicular to said pipes of said bundle heat exchangers, each fixed deflection plate has a unique gateway that is positioned above or below each pipe bundle.



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Cooking and heating stove fuelled by pellet or biomass grain apt to cook and to heat water for domestic heating

Technical field of the invention

The present invention concerns the construction of a cooking and heating stove fuelled by pellet or biomass grain apt to cook and to heat water for domestic heating.

State of the art

Cooking and heating stoves used so far have been mainly wood stoves. Their main purpose was to heat the cooking plate or plates and to produce small amounts of hot water.

However, there are examples of cooking stoves fuelled by pellet.

GB2461580 describes a burner that feeds a stove for cooking and heating water. The disadvantage of such a stove is to have dimensions so large not to allow its integration into a modular kitchen. The hot water production is not enough and can not be used as a heat carrier for home heating.

EP 1022512 describes a cooking device that uses as heat source a material in grains such as wood pellet with a burner and a storage tank for the fuel.

Also this cooking stove has dimensions so large not to allow its inclusion in a modular kitchen. The described cooking stove has a heated chamber. The hot water is small and can not be used as a heat carrier for home heating. The cooking stove described does not foresee to use pipe bundle heat exchangers.

All the stoves on the market can not allow to obtain, with the same device, a high temperature of the cooking plate, such to allow the cooking of food and an effective water heating to be used for home heating. Moreover, the cooking stoves on the market were too large that they could not be inserted into a modular kitchen, thereby complying with its

size.

Description of the invention

The present invention aims to build a cooking stove that can be inserted into a modular kitchen and such that, with the same device, can heat at least one cooking plate and to exchange heat with at least one heat exchanger that feeds home heating. The problem that the present invention intends to solve is to realize a cooking stove to be inserted in a modular kitchen in which the combustion fumes are guided in order to improve the heat transfer to the cooking plate as well as to the pipe bundle heat exchanger positioned on the side of said cooking plate in order to save space and to make possible that the cooking stove can fit in a modular kitchen. To achieve such purpose, the cooking stove object of the present invention must have a plate directly and effectively heated by the fire hearth fuelled by wood pellets or other biomass material in grain and a pipe bundle heat exchanger that collects heat of combustion fumes by passing said combustion fumes at least twice on the pipes of heat exchanger.

The main objective of the present invention is to overcome the difficulties and drawbacks found in the solution present on the market.

The main purpose of the present invention is to produce a cooking and heating stove fuelled by pellet or biomass grain apt to cook and to heat water for domestic heating comprising a hearth fuelled by pellets or biomass grains, at least one plate to cook food and at least one heat exchanger to heat water for domestic heating characterized by the fact that the cooking plate/s is/are located above hearth fuelled by pellets or biomass grains, that said heat exchanger/s is/are positioned at the side/s of the cooking plate/s, that on one side of said heat exchanger/s at least one inclined deflection plate is mounted that forces the combustion fumes to go up to touch the cooking plate/s and then to flow on the heat exchanger/s, that the heat exchanger/s is/are a bundle with parallel pipes, that on said pipes of said bundle heat exchanger/s at least one fixed deflection plate is

located, that said fixed deflection plate/s is/are perpendicular to said pipes of said bundle heat exchanger/s, that each fixed deflection plate has a unique gateway that is positioned above or below each pipe bundle.

Another feature is the fact that the pipes of said bundle heat exchanger/s tube are parallel between them and all pipes are placed perpendicular to the front and back surfaces of said stove

Another feature is the fact that the pipe bundles are two and are placed one on one side of the cooking and heating stove and one on the other side.

Another feature is the fact that on the pipes of each bundle is mounted at least a movable plate to remove ash, deposits and also other combustion products from the pipes.

Another feature is the fact that that the movable plates to remove ash, deposits and also other combustion products from the pipes are in number equal to the number of fixed deflection plates plus one.

Another feature is the fact that the movable plates can be controlled from outside through a handle.

Another feature is the fact that in each heat exchanger is placed a collection box of ashes and other combustion products that is extracted from outside.

Another feature is the fact that each collection box of ashes and other combustion products has an additional compartment located under the fan for dust collection.

Other features and advantages of the present invention will appear clear from the description below of a way of creation of the present invention given by way of example but not limited by the figures 1, 2, 3, 4 and 5.

Brief description of the figures.

Figure 1 represents a view from above of a cooking stove, object of the present invention.

Figure 2 shows a cross section X-X parallel to the front surface of the cooking stove, object of the present invention.

Figure 3 represents a cross section Y-Y perpendicular to the front surface of a cooking stove, object of the present invention.

Figure 4 represents an other cross section Y-Y perpendicular to the front surface of a cooking stove, object of the present invention.

Figure 5 is a detail of the previous cross section Y-Y perpendicular to the front surface of a cooking stove, object of the present invention.

Detailed description of an embodiment of the present invention

Referring to Figure 1 a top view of a cooking stove, object of the present invention, is shown. In this view it can be seen, in the front, a cooking plate 1 and in the back the door of the pellet storage container 2 and a double wall coaxial pipe 3 with the combustion air inlet 4 and outlet of the combustion fumes 5.

With reference to Figure 2, which shows a cross section of the cooking stove along the X-X plan, the fire hearth 6 is placed in a central position, in the embodiment shown in Figure 2, said hearth 6 receives the pellets from a pipe fed by a conveyor 7 such as a screw 15. The heat produced by the combustion of the pellets in the fire hearth 6 is forced to go up and, for the presence on at least one side wall of at least one inclined deflection plate 8, the combustion fumes must first flow under the bottom surface of the cooking plate 1 and then down along the inclined deflection plates 8 to flow on the heat exchanger 10. The combustion fumes are aspirated by a fan 12 and are forced by at least one fixed deflection plate 9, crossed by the heat exchanger pipes 10, in the embodiment represented substantially perpendicular to the pipes of the bundle heat exchanger 10, to pass at least twice on these pipes 10 of the bundle heat exchanger for transferring heat to the water contained in the pipes and used for domestic heating. In Figure 3 there are two fixed deflection plates 9 which force the combustion fumes to pass three times on pipes

10. Each fixed deflection plate 9 forms a unique gateway for the combustion fumes that is positioned above or below each pipe bundle 10.

The pipes 10 are advantageously arranged as a parallel pipe bundle 6 on a side of the fire hearth in the direction that goes from the front surface to the rear surface of the cooking stoves.

This arrangement allows additional benefits. Additional movable plates 11 are mounted about pipes 10 of each pipe bundle, in the embodiment represented in the figures movable plates are substantially perpendicular to these pipes, in order to remove from pipes ash, deposits as well as other combustion products. The movable plates 11 are parallel to the fixed deflection plates 9 and are equal in number to the number of fixed deflection plates 9 plus one. For example, if there is only one fixed deflection plate 9, the movable plates 11 are two and if the fixed deflection plates 9 are two movable plates 11 are three. The movable plates can be controlled from outside through a handle 13. The fixed deflection plates 9 force the combustion fumes to have a pathway of combustion fumes 17 that changes direction from top to bottom or vice versa depending on the number of fixed deflection plates 9. In the case of Figure 4 fixed deflection plates 9 oblige the combustion fumes that go down to change direction and to go up for the presence of a first fixed deflection plate 9, see first part of the pathway of the combustion fumes 17, while in the second part of the pathway of combustion fumes 17 the presence of a second fixed plate deflection 9 obliges the fumes to change direction again causing them to go down in the ash drawer 14 that has an additional drawer for the dust 16 through which combustion fumes are aspirated by fan 12. Each fixed deflection plate 9 has a unique pathway for the combustion fumes above or below the pipes 10 of pipe bundles and allow the change of the direction of the pathway of combustion fumes 17.

Moreover under the pipes 10 of each pipe bundle is an ash and other combustion products collection drawer 14 that can be extracted from the outside and helps to keep

clean each heat exchanger in the example the heat exchanger is a pipe bundle, and requires the passage of smoke. The drawer 14, as can best be seen in Figures 4 and 5 also features an additional compartment 16, which collects dust and is placed under the combustion fumes fan 12.

In this way there can be made a cooking stove of reduced size and ease of maintain by reducing the use of skilled personnel for routine maintenance.

The discovery, it should be noted, is not limited to the representations given in the figures, but may be perfected and modified by those skilled in the art without, however, exceeding the limits of patent.

The discovery permits numerous advantages, and to overcome difficulties that could not otherwise have been overcome with the systems on sale at present.

CLAIMS

1. Cooking and heating stove fuelled by pellet or biomass grain apt to cook and to heat water for domestic heating comprising a hearth fuelled by pellets or biomass grains, at least one plate to cook food and at least one heat exchanger to heat water for domestic heating characterized by the fact that the cooking plate/s is/are located above hearth fuelled by pellets or biomass grains, that said heat exchanger/s is/are positioned at the side/s of the cooking plate/s, that on one side of said heat exchanger/s at least one inclined deflection plate is mounted that forces the combustion fumes to go up to touch the cooking plate/s and then to flow on the heat exchanger/s, that the heat exchanger/s is/are a bundle with parallel pipes, that on said pipes of said bundle heat exchanger/s at least one fixed deflection plate is located, that said fixed deflection plate/s is/are perpendicular to said pipes of said bundle heat exchanger/s, that each fixed deflection plate forms a unique gateway for the combustion fumes that is positioned above or below each pipe bundle.

2. Cooking and heating stove fuelled by pellet or biomass grain apt to cook and to heat water for domestic heating according to claim 1 characterized by the fact that the pipes of said bundle heat exchanger/s tube are parallel between them and all pipes are placed perpendicular to the front and back surfaces of said stove.

3. Cooking and heating stove fuelled by pellet or biomass grain apt to cook and to heat water for domestic heating according to claim 2 characterized by the fact that the pipe bundles are two and are placed one on one side of the cooking and heating stove and one on the other side.

4. Cooking and heating stove fuelled by pellet or biomass grain apt to cook and to heat water for domestic heating according to claim 2 or 3 characterized by the fact that on the pipes of each bundle is mounted at least a movable plate to remove ash, deposits and also other combustion products from the pipes.

5. Cooking and heating stove fuelled by pellet or biomass grain apt to cook and to heat water for domestic heating according to claim 4 characterized by the fact that the movable plates to remove ash, deposits and also other combustion products from the pipes are in number equal to the number of fixed deflection plates plus one.

6. Cooking and heating stove fuelled by pellet or biomass grain apt to cook and to heat water for domestic heating according to claim 5 characterized in that the movable plates can be controlled from outside through a handle.

7. Cooking and heating stove fuelled by pellet or biomass grain apt to cook and to heat water for domestic heating according to claim 1 characterized by the fact that in each heat exchanger is placed a collection box of ashes and other combustion products that is extracted from outside.

8. Cooking and heating stove fuelled by pellet or biomass grain apt to cook and to heat

water for domestic heating according to claim 1 characterized that each collection box of ashes and other combustion products has an additional compartment located under the fan for dust collection.

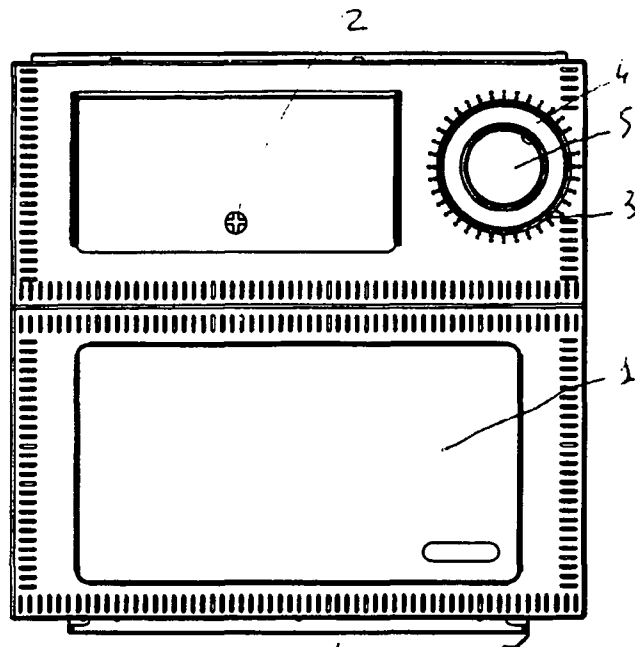


Fig. 1

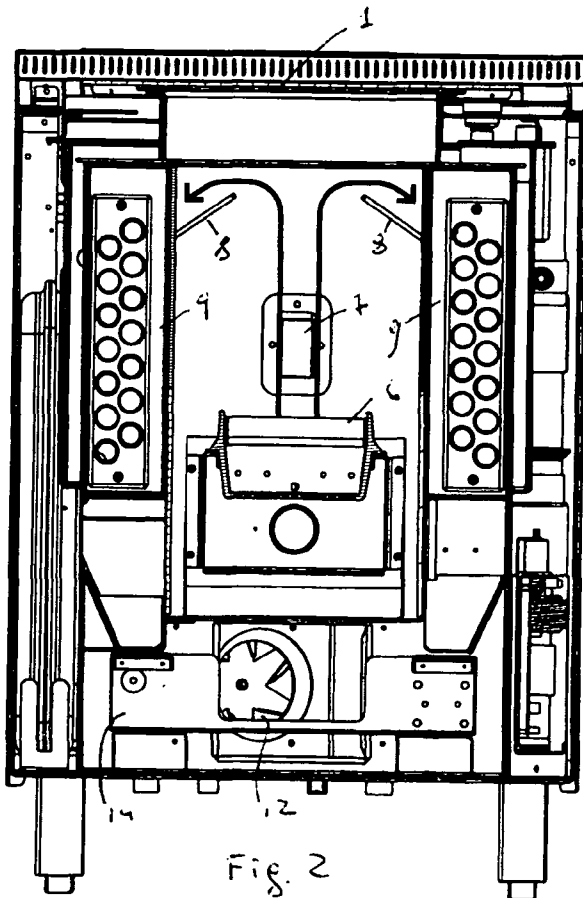


Fig. 2

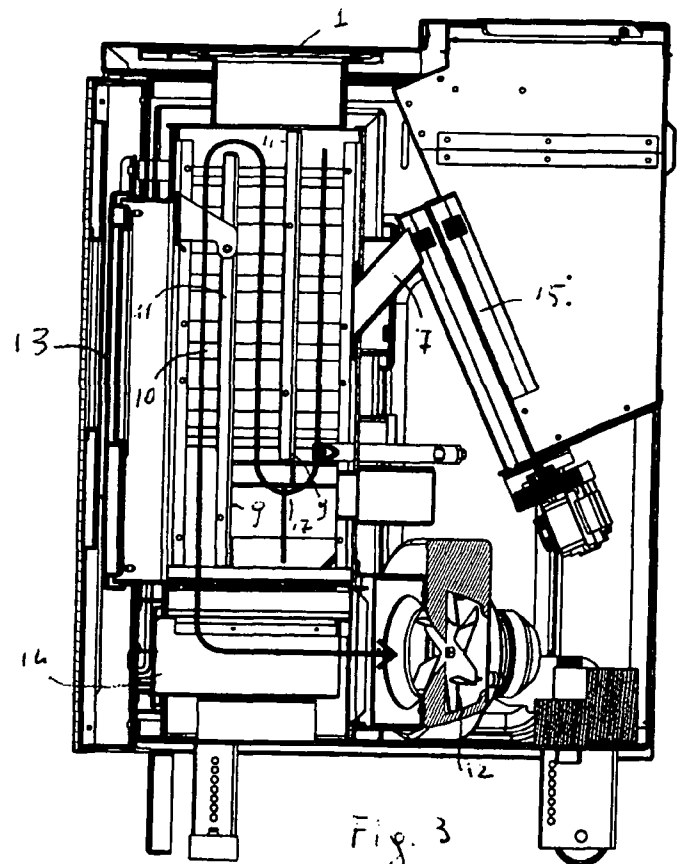


Fig. 3

