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(54) Stove with siphon-shaped flue

(57) An improved internal combustion stove (1) is disclosed, comprising at least one combustion chamber (3) of a fuel equipped with at least one opening (5) for supplying the fuel and with at least one thermal recovery flue (4), the flue (4) being shaped in at least one siphon-shaped volute adapted to slow down in itself the transit speed of combustion gases generated in the combustion chamber (3).

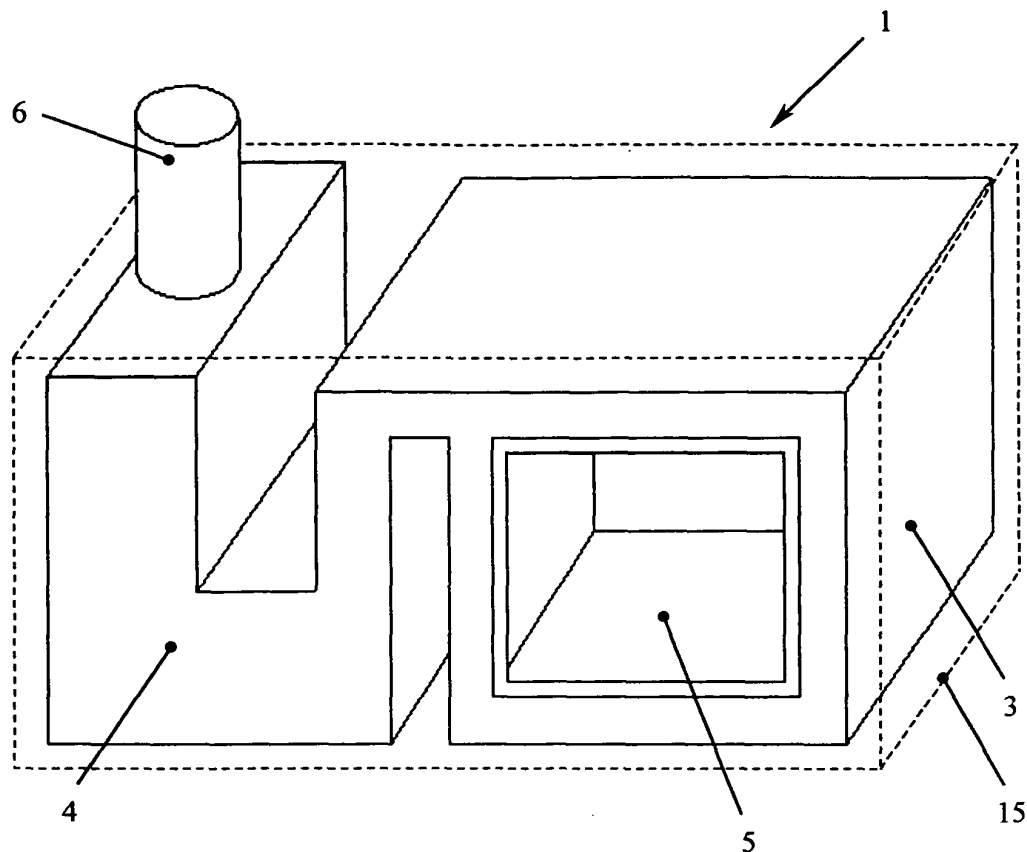


FIG. 1

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Description

[0001] The present invention refers to an improved internal combustion stove.

[0002] As known, the art proposes an extremely high number of stoves and chimneys equipped with active or passive devices or particular arrangements, aimed to increase the thermal efficiency, to optimise the fuel consumption and to increase the thermal recovery from combustion gases.

[0003] Even if, in the latest years, electric stoves have progressively replaced internal combustion heating devices, above all due to their comfortability and easiness of use, it is known that unfortunately they have the disadvantage of a high electric energy consumption, with consequent increases in bill costs and creating high consumption fluctuations on the electric delivery mains between hot season and cold season, creating undoubted problems for managing and producing energy and for dimensioning the production systems.

[0004] Moreover, in a period like the current one in which energy resources are limited and therefore precious, any waste, including the electric energy one, should scrupulously be avoided. It is for such reason that internal combustion stoves are being re-evaluated, in particular of the wood or pellet type, above all as home heating means. In such context, it is therefore natural that the art evolves, aiming to obtain solutions which offer stoves characterised by a higher and higher degree of thermal recovery, efficiency and fuel consumption optimisation, both due to economic questions and to alleviate the burden of having to excessively frequently supply the stoves themselves.

[0005] Therefore, object of the present invention is solving the above prior art problems, by providing an improved internal combustion stove equipped with a thermal recovery flue which allows increasing the amount of heat recovered from combustion fumes, consequently increasing the fuel efficiency.

[0006] The above and other objects and advantages of the invention, as will appear from the following description, are reached by an improved internal combustion stove as claimed in claim 1. Preferred embodiments and non-trivial variations of the present invention are claimed in the dependent Claims.

[0007] The present invention will be better described by some preferred embodiments thereof, given as a nonlimiting example, with reference to the enclosed drawings, in which:

- FIG. 1 shows a front perspective view of an embodiment of the improved internal combustion stove according to the present invention; and
- FIG. 2 shows a front sectional view of the stove in FIG. 1.

[0008] With reference to the Figures, it is possible to note that the improved internal combustion stove 1 according to the present invention comprises at least one combustion chamber 3 in which fuel is contained during its combustion; the combustion chamber 3 is obviously equipped with an opening 5 for inserting fuel inside it, such opening being preferably equipped with a closure door (not shown).

[0009] In order to scavenge the combustion gases, the combustion chamber 3 is advantageously connected with the external environment by interposing a thermal recovery flue 4; as is possible to note from the Figures, the thermal recovery flue 4, preferably connected in an upper portion of the combustion chamber 3 for a more efficient combustion gases extraction, is advantageously shaped in at least one volute, possible of shaped as a serpentine in a plurality of volutes, adapted to slow down the transit speed (designated in FIG. 2, in different sections of the flue 4, by progressively decreasing vectors F , F' , F'' , F''') of the combustion gases towards the outside, thereby allowing a greater heat recovery transported thereby by conduction through the flue 4 towards the environment surrounding the stove 1, such heat otherwise being expelled outside together with combustion gases, and therefore uselessly wasted. In the Figures, the flue 4 is preferably shaped in a single volute, consequently assuming a siphon shape.

[0010] In order to create the negative pressure differential between combustion gases expulsion environment and combustion chamber 3 interior necessary for the correct draught, the flue 4 is further preferably equipped with an internal duct having a diameter which progressively, in a continuous or discrete way, increases towards the exterior, in such a way as to create an expansion box for combustion gases and their consequent decompression. Merely as an example, in the preferred embodiment, the following flue 4 diameters, designated in FIG. 2 respectively by references A, B, C, D, which discretely increase towards the exterior, have been found efficient, but obviously in a non limiting way:

- the first diameter A preferably included between 40 and 60 mm, still more preferably equal to 50 mm;
- the second diameter B preferably included between 40 and 60 mm, still more preferably equal to 50 mm;
- the third diameter C preferably included between 90 and 110 mm, still more preferably equal to 100 mm;
- the fourth diameter D preferably included between 90 and 110 mm, still more preferably equal to 100 mm.

[0011] It is clear that the terminal end of the flue 4 can be connected, as usual, to a chimney or a chimney cap 6 for expelling the combustion gases to the atmosphere.

[0012] If a passive comburent supply is not enough to guarantee an optimum operation of the stove 1, this latter one

can further be equipped with comburent supply means; preferably, in the preferred embodiment of the stove 1 shown in particular in FIG. 2, the comburent supply means comprise a forced air ventilation system into the combustion chamber 3 which is preferably composed of at least one electric fan 9 which draws air from the environment and, through a channeling 11, supplies it to the combustion chamber 3 by interposing a diffuser 13, preferably arranged on the ceiling of the combustion chamber 3 itself, such diffuser 13 being equipped with a plurality of delivering holes which are homogeneously arranged on the interface surface with the combustion chamber 3 interior, in such a way as to uniformly diffuse air inside the combustion chamber 3, making the combustion more efficient and regular.

[0013] Obviously, the electric fan 9 operation can be driven by known electronic managing means, in such a way as to control, for example, the comburent flow-rate supplied to the combustion chamber 3 depending on the combustion temperature. It is also clear that the diffuser 13 can be arranged in any other position inside the combustion chamber 3, such as for example along the side walls or under the brazier. It is as well evident that it is possible to place many diffusers 13 in different positions inside the combustion chamber 3, supplied by a single electric fan 9 or many different electric fans 9, which are individually or coordinately driven by the electronic managing means.

[0014] Moreover, the diffuser 13 can be equipped with at least one bulkhead (not shown) which, being actuated manually and/or by the electronic managing means allows partially closing the delivering holes, consequently allowing to shut the comburent supply to the combustion chamber 3.

[0015] The stove 1 can further be equipped with at least one containing housing 15 adapted to contain therein at least the flue 4; in this way, at least one first fluid (air, water or any other thermally adequate fluid) which can be found inside the containing housing 15 and heated by its contact with the flue 4 and possibly with the combustion chamber 3, can be used for heating at least one second fluid (air, water or any other thermally adequate fluid) which is suitably channeled, through direct conduction or, for example, by interposing a first fluid/second fluid heat exchanger, such second fluid being able to be transferred through the most suitable known thermal transferring systems, such as ducts, electric pumps, radiators or convectors, in order to make the heat transmission in the room where the stove 1 stays, more uniform, and therefore not concentrated only next to the stove 1 itself, or in remote rooms; in such a way, the stove 1 according to the present invention can be efficiently used, in its due proportions, similarly to a traditional boiler.

[0016] It is evident that the stove 1 according to the present invention, as previously described, can be supplied, with suitable modifications, all being able to be easily devised by a common technician, with any type of fuel, of the solid type, like wood, coal or pellet, or of the liquid or gaseous type.

[0017] It is further obvious that the stove 1 according to the present invention can be equipped with any other known connection related to stoves and not shown here for conciseness, such as ash recovering drawers, draught shutters, etc.

Claims

1. Internal combustion stove (1) comprising at least one combustion chamber (3) of a fuel equipped with at least one opening (5) for supplying said fuel and with at least one thermal recovery flue (4), **characterised in that** said flue (4) is shaped in at least one siphon-shaped volute adapted to slow down in itself the transit speed of combustion gases generated in said combustion chamber (3).
2. Stove (1) according to claim 1, **characterised in that** said flue (4) is shaped as a plurality of serpentine volutes.
3. Stove (1) according to claim 1, **characterised in that** said flue is equipped with at least one internal duct having an internal diameter which progressively increases towards the outside.
4. Stove (1) according to claim 3, **characterised in that** said internal duct is equipped with a first diameter
 - (A) preferably included between 40 and 60 mm, still more preferably equal to 50 mm, with a second diameter
 - (B) preferably included between 40 and 60 mm, still more preferably equal to 50 mm, with a third diameter
 - (C) preferably included between 90 and 110 mm, still more preferably equal to 100 mm, and with a fourth diameter
 - (D) preferably included between 90 and 110 mm, still more preferably equal to 100 mm.
5. Stove (1) according to claim 1, **characterised in that** it comprises comburent supply means to said combustion chamber (3).
6. Stove (1) according to claim 5, **characterised in that** said comburent supply means comprise at least one forced air ventilation system into said combustion chamber (3), said forced ventilation system comprising at least one electric fan (9) which draws air from an environment, said air being supplied to said combustion chamber (3) through at least one channeling (11) and by interposing at least one diffuser (13) equipped with a plurality of delivering holes.

7. Stove (1) according to claim 5, **characterised in that** said comburent supply means are driven by electronic managing means.
- 5 8. Stove (1) according to claim 5, **characterised in that** said diffuser (13) is equipped with at least one bulkhead for shutting said delivering holes.
9. Stove (1) according to any one of the previous claims, **characterised in that** it comprises at least one containing housing (15) adapted to contain therein at least said flue (4).
- 10 10. Stove (1) according to claim 9, **characterised in that** said containing housing (15) contains a first fluid heated by said flue (4) and/or by said combustion chamber (3), said first fluid adapted to heat at least one second fluid transferred through at least one thermal transferring system.

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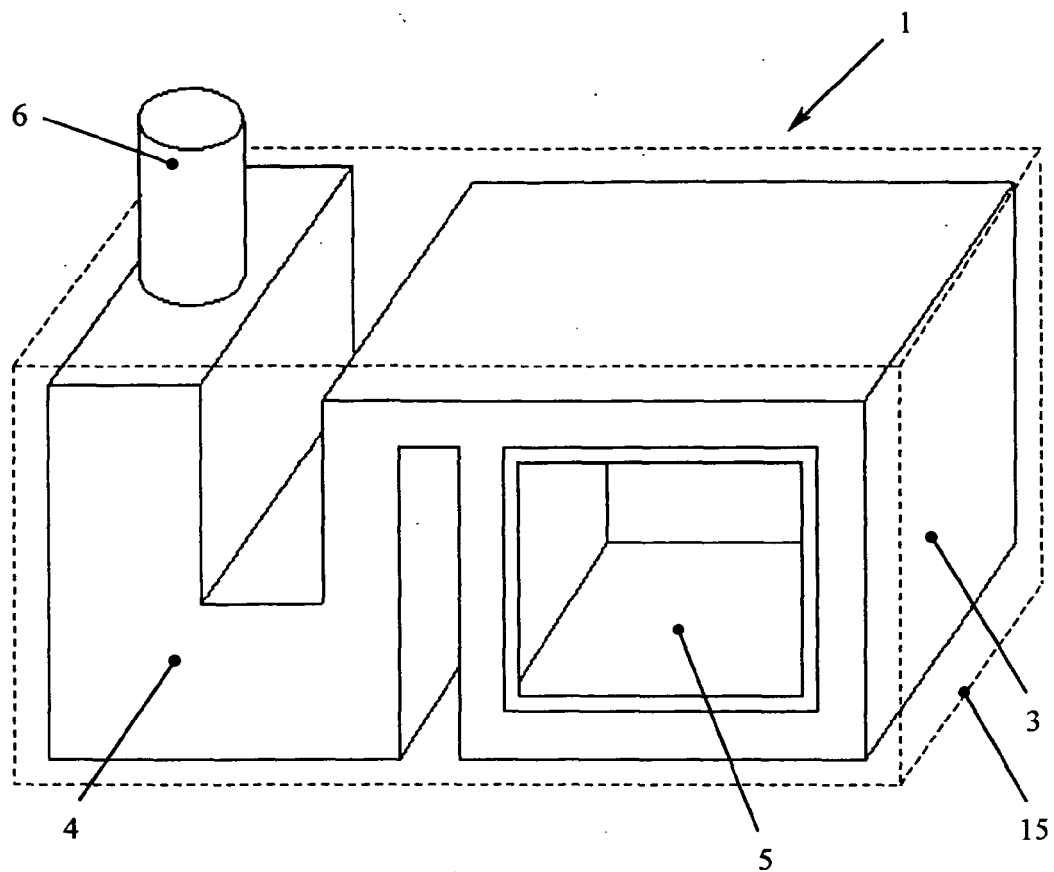


FIG. 1

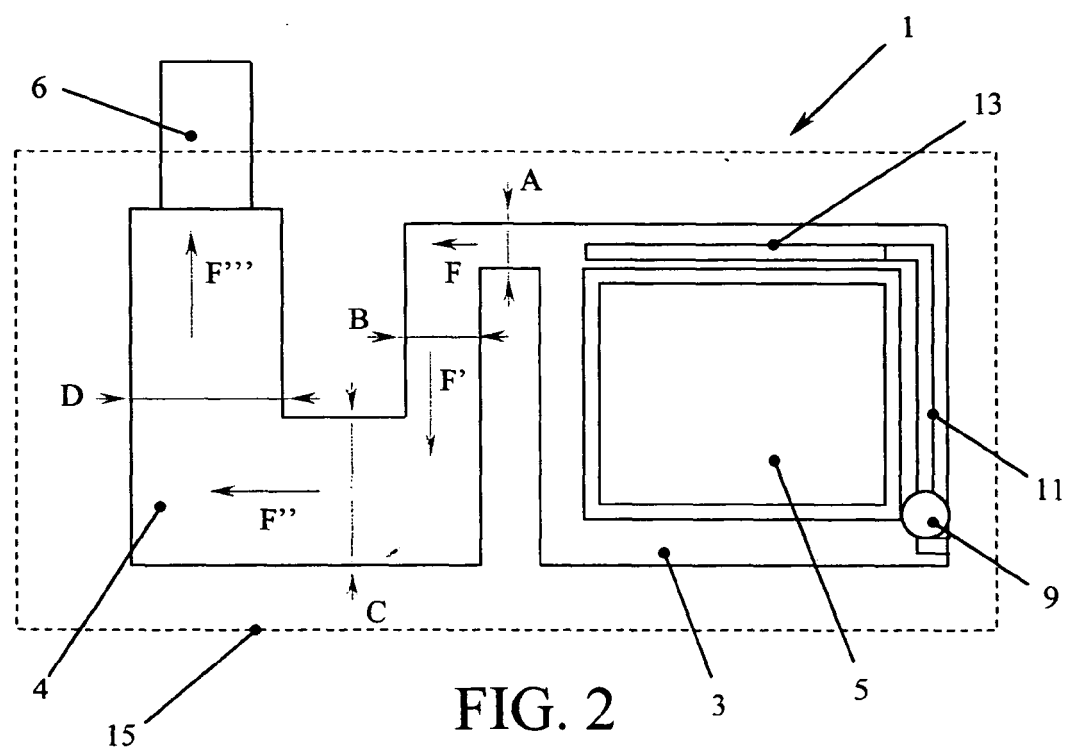


FIG. 2