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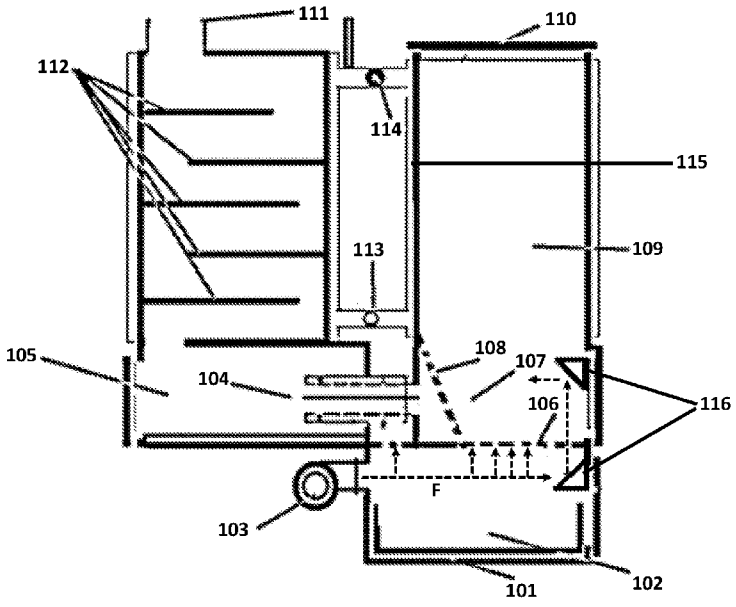
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(54) **Title:** SMOKE-FREE HEATING SYSTEM THAT BURNS HIGH CALORIE SOLID FUELS WITH HIGH EFFICIENCY

Figure – 1



(57) **Abstract:** The invention relates to a smoke-free, environmentally friendly, and economical heating boiler and stove system that burns high-calorie solid fuels with high efficiency.

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SMOKE-FREE HEATING SYSTEM THAT BURNS HIGH CALORIE SOLID FUELS WITH HIGH EFFICIENCY

Technical field of the invention

The invention relates to a smoke-free, environmentally friendly, and economical heating boiler and stove system that burns high-calorie solid fuels with high efficiency.

State of the art

One of the biggest environmental problems today is air pollution. Especially during winter months, the smoke coming out of stoves and central heating boiler chimneys pollutes the air. Harmful particles mixed into the air are inhaled and taken into the human body and threaten human health. In existing heating systems, both air pollution and heat loss occur due to smoke emission from the chimney. In boiler and stove systems used to burn solid fuels, unburned fuel is also exposed to heat. Since the fuel is not exposed to oxygen and heat at the right time, excess calories are expelled through smoke.

The invention that is the subject of the application numbered "CN201787607"in the state of the art relates to a wood-saving stove with a double combustion chamber and a stove body. In the invention, due to the structural mode in which the main combustion chamber and the secondary chamber are arranged in the stove body, the flammable gas formed as a result of combustion is sufficiently used, thus effectively saving fuel. However, no matter how much fuel is added, all of it is exposed to heat and oxygen at the same time, which causes heat and energy loss.

The invention that is the subject of the application numbered "CN204739622U" in the state of the art relates to an energy-saving and environmentally friendly double combustion chamber heating stove. In the invention, the main and auxiliary dual combustion chambers include a main combustion chamber and an auxiliary combustion chamber. However, only light and small size fuel is used. Fuel does not mix fully with oxygen.

In the studies in the state of the art, there is no heating boiler or stove system that is environmentally friendly, smoke-free and burns fuel with high-efficiency. For this reason, there is a need for a smoke-free, environmentally friendly, and economical heating boiler and stove system that minimises environmental pollution and saves 60% of fuel, burns high-calorie solid fuels (coal, wood, etc.) with high efficiency.

The aim of the invention

The invention relates to a smoke-free, environmentally friendly, and economical heating boiler and stove system that burns high-calorie solid fuels with high efficiency.

The most important aim of the invention is to ensure that the fuel is exposed to oxygen and heat when it burns, and that there is no smoke or heat output at the chimney exit.

Another aim of the invention is to ensure efficient combustion of fuel by being exposed to flame where it is exposed to heat. In this way, fuel savings are achieved.

Another aim of the invention is to reduce environmental pollution by not emitting smoke from the chimney.

The structural and characteristic features of the invention and all its advantages will be understood more clearly by means of the figures given below and the detailed description written with reference to these figures. For this reason, the evaluation should be made by taking these figures and detailed description into consideration.

Description of the drawings

Figure – 1 is a drawing showing the schematic view of the smoke-free heating system with a fan added.

Figure – 2 is a drawing showing the schematic view of the smoke-free heating system.

Reference numbers

101. Base and adjustable feet

102. Ash pan

103. Fan

104. Turbo passage

105. Fire chamber

106. Grate

107. First combustion chamber

108. Second grate

109. Fuel tank

110. Fuel tank cap

111. Chimney outlet

112. Heat retainer

113. Water inlet

114. Water outlet

115. Water reservoir

116. Air diverter

117. Opening

F. Flow Direction

Description of the invention

The invention relates to a smoke-free, environmentally friendly and economical heating boiler and stove system that burns high-calorie solid fuels with high efficiency.

The base and adjustable feet (101) are the area of the system in contact with the ground and ensure that the surface on which the system (100) will be installed is protected from heat. The reason why it has adjustable feet is that it ensures that the stove remains balanced and stable even on uneven ground.

The ash pan (102) provides storage of burnt fuel waste in the fuel tank (109). The ash pan (102) is removed and the burnt fuel waste is removed from the system. There is an opening (117) located above the ash pan (102) that allows the system to breathe. Oxygen entry is provided through this opening. Although the air coming from this opening (117) is sufficient when used as a stove, a fan (103) is used optionally when this heating system is installed in a central heating boiler.

The fan (103) is positioned on the opening (117) and provides oxygen into the system. The air diverter (116) ensures that the oxygen coming from the opening (117) is directed onto the grate (106). In systems in the state of the art, oxygen is given only under the grate (106) on which the fuel is located, while oxygen is also given on the grate (106) by means of the air diverter (116). In this way, more efficient combustion is achieved.

The fuel tank (109) is the chamber in which the solid fuel to be burned is filled, with a fuel tank cap (110) on it. High-calorie solid fuels such as coal and wood are filled into the fuel tank (109). The fuel placed in the fuel tank (109) is stacked on the grate (106). As the fuel burns on the grate (106), the solid fuel in the fuel tank descends towards the grate (106).

The grate (106) ensures that oxygen is delivered to the fuel from the correct angle. The grate (106) is positioned under the fuel tank (109) and above the ash pan (102), ensuring that the solid fuel coming from the fuel tank (109) is stacked on it. In this way, the fuel on the grate (106) comes into contact with the air coming from the grate openings.

The first combustion chamber (107) is the section where fuel burns in the area between the fuel tank (109) and the grate (106).

The turbo passage (104) passes through the smoke formed in the first combustion chamber (107) and enables it to ignite. The ignited smoke passing through the turbo passage (104) creates heat in the fire chamber (105). In this way, efficient combustion is achieved.

The second grate (108) prevents the fuel from blocking the turbo passage (104) inlet. Heat retainers (112) ensure that the heat generated in the fire chamber (105) is retained. In this way, heat remains in the system for a longer time.

The chimney outlet (111) allows the smoke coming out of the fire chamber (105) to be evacuated.

The water inlet (113) allows the water to be heated to enter the water reservoir (115). The water reservoir (115) provides heating of the water with the heat coming from the first combustion chamber (107) and the fire chamber (105). The water outlet (114) ensures that the water heated in the water reservoir (115) leaves the system.

Figure 1 shows the flow direction (F) of oxygen coming from the opening (117). The flow direction (F) of the oxygen coming from the opening (117) is towards the air diverter (116) passing under the turbo passage (104) and grate (106). The oxygen hitting the air diverters (116) reaches the upper part of the grate (106).

The air diverter (116) is located between the ash pan (102) and the first combustion chamber (107). The air diverter (116) mixes oxygen into the fuel at the right angle, causing efficient flame.

Since the turbo passage (104) is made of thin and high-temperature resistant material, the fire passes through it, heats the thin layer and thus provides oxygen mixture from small vents. Thus, when heat, fuel and oxygen come together, it causes ignition.

The water reservoir (115) is located on the entire exterior of the machine. The reason why the water reservoir (115) is on the exterior of the machine is to cool the machine and heat the water efficiently with very little heat loss.

Water outlet (114) and water inlet (113) can be sent to radiators (for the heating system) with a circulation pump or can be sent to a hot water tank, different methods can be used for different purposes.

Water inlet (113) and water outlet (114) are used only in central heating boilers, they cannot be used for stoves.

There are at least two thermostats as automation in the heating system. A thermostat automatically turns the fan on and off between 0-90 degrees C (optionally). The other

thermostat automatically turns the circulation pump on and off between 0-40 degrees C (optionally). (For example, when the first thermostat is set to 60 degrees, the fan automatically turns off when the water temperature reaches 60 degrees. When the second thermostat is set to 30 degrees, the circulation pump automatically turns on when the water reaches 30 degrees.)

In terms of safety, different systems can be used for different purposes (For example, when high pressure operation is required, an automatic filling device can be installed in the water inlet (113) section and thus an automatic safety valve can be installed in the water outlet (114). (For example, when automatic filling is set to 2 bars, the safety valve should be 3 bars. When the pressure is more than 3 bars, the automatic safety valve opens automatically and releases the excess pressure.) A closed expansion tank is mandatory in this system.

The open expansion tank automatically supplies the water used by the system without the need for pressure. In this system, the expansion tank, radiators and the heating boiler must be mounted a little higher on the machine, and at the same time, they discharge the steam and ensure the safe operation of the machine.

CLAIMS

1. Smoke-free heating system that allows high-calorie solid fuels to be burned with high efficiency, comprising:
   - at least one ash pan (102) that stores burnt fuel waste in the fuel tank (109),
   - at least one fuel tank (109), with a fuel tank cap (110) on it, into which the solid fuel to be burned is filled,
   - at least one grate (106) positioned under the fuel tank (109) and above the ash pan (102), allowing the solid fuel coming from the fuel tank (109) to be stacked on it,
   - at least one first combustion chamber (107) in the area between the fuel tank (109) and the grate (106), where fuel burns,
   - at least one turbo passage (104) that passes through the smoke formed in the first combustion chamber (107) and enables it to ignite,
   - at least one second grate (108) that prevents the fuel from blocking the inlet of the turbo passage (104),
   - at least one air diverter (116) that ensures that the oxygen coming from the opening (117) is directed onto the grate (106),
   - at least one heat retainer (112) that allows the heat generated in the fire chamber (105) to be retained,
   - at least one chimney outlet (111) evacuating the smoke from the fire chamber (105),
   - at least two water inlets (113) that allow the water to be heated to enter the water reservoir (115),
   - at least one water reservoir (115) that enables the water to be heated with the heat coming from the first combustion chamber (107) and the fire chamber (105), and
   - at least two water outlets (114) that allow the heated water in the water reservoir (115) to leave the water reservoir (115).

2. Heating system according to Claim 1, comprising the ash pan (102) which can be removed and allows burnt fuel waste to be removed from the system.

3. Heating system according to Claim 1, comprising the fuel tank filled with high-calorie solid fuels (109).

4. Heating system according to Claim 1, comprising the turbo passage (104) that allows the ignited smoke to pass through and create heat in the fire chamber (105).

5. Heating system according to Claim 1, comprising at least one fan (103) positioned on the opening (117) to provide oxygen to provide extra power when used in the heating boiler.

Figure – 1

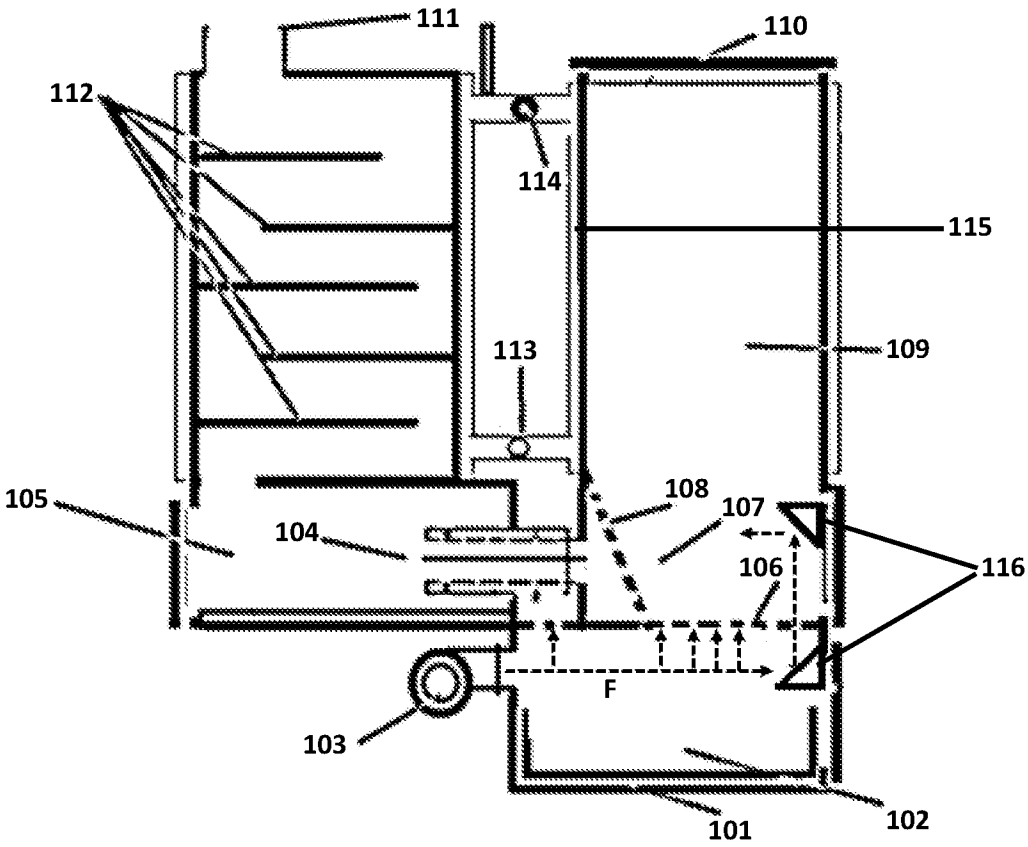


Figure-2

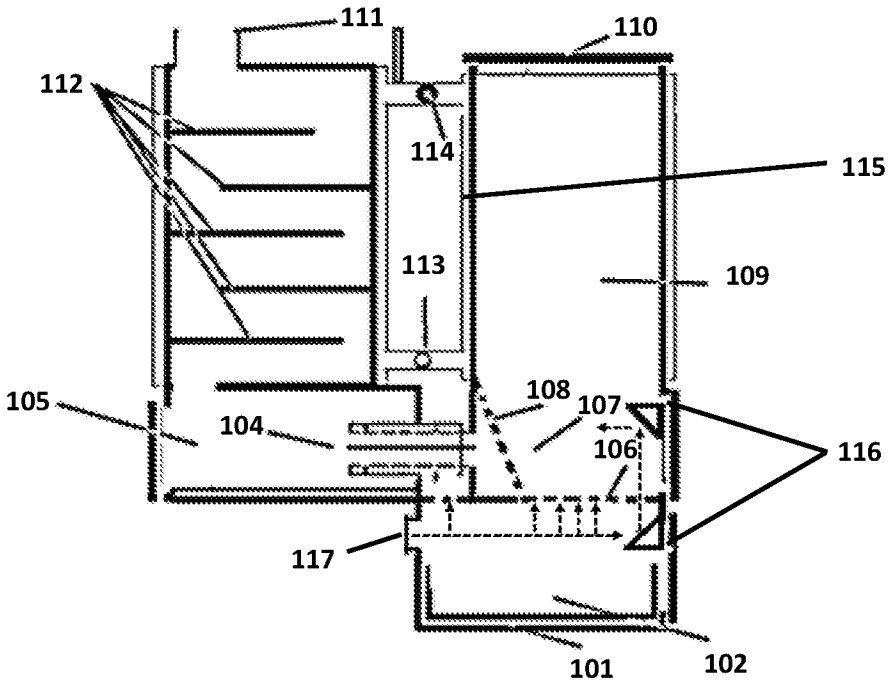


Figure-3

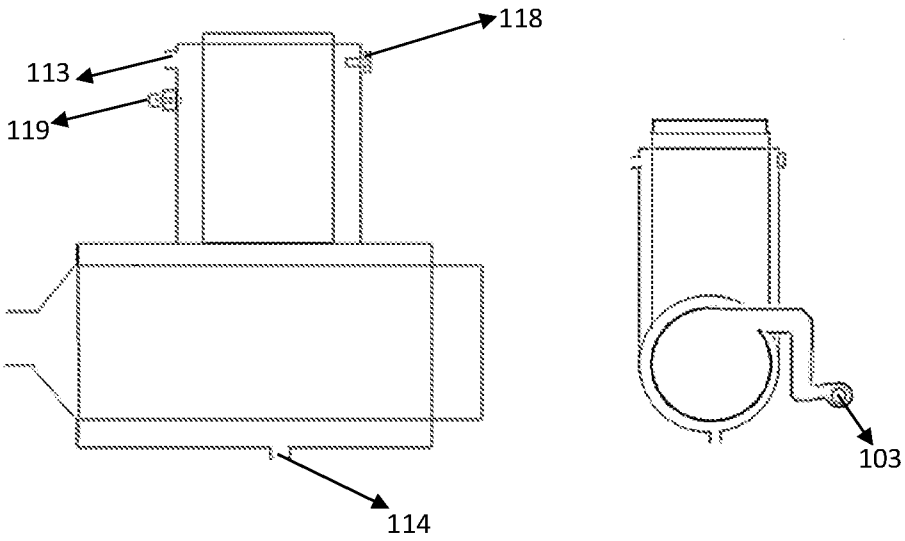


Figure-4

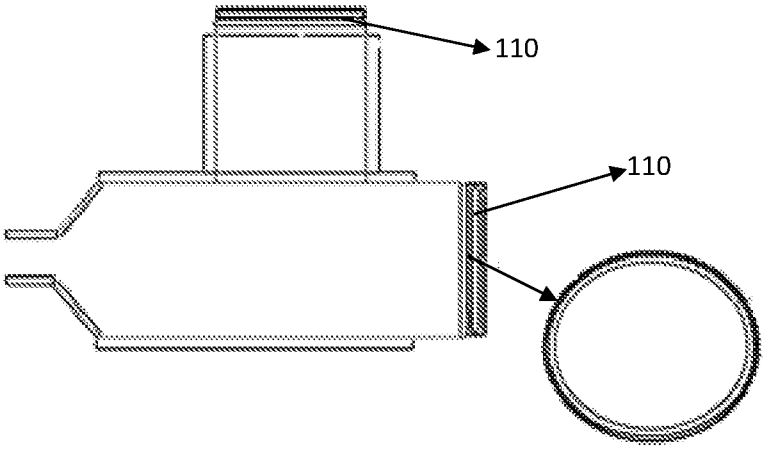
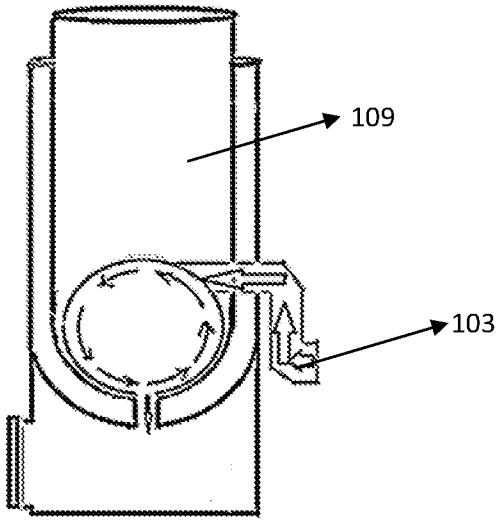


Figure-5



INTERNATIONAL SEARCH REPORT

International application No.
PCT/TR2024/050114

A. CLASSIFICATION OF SUBJECT MATTER

F23B 10/02(2011.01)i; ***F23B 40/08***(2006.01)i; **F23B 80/04**(2006.01)i; *F23M 9/02*(2006.01); F24H 9/00(2022.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F23B; F23M; F24H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Published patent and utility model applications of Turkey, 2005-2024

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO Abstract & Fulltext Databases, WPI & Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN 112833383 A (LIU CHUANXIANG) 25 May 2021 (2021-05-25) Whole document	1-5
Y	CN 111120999 A (HEBEI YECHUANG TECH CO LTD) 08 May 2020 (2020-05-08) Whole document	1-5
Y	KR 20150125288 A (KIH ILL HWAN [KR]) 09 November 2015 (2015-11-09) Whole document	1-5

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance
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Date of the actual completion of the international search	Date of mailing of the international search report
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Name and mailing address of the ISA/TR	Authorized officer
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