W. C. SKINNER.

FUEL BURNING DEVICE.

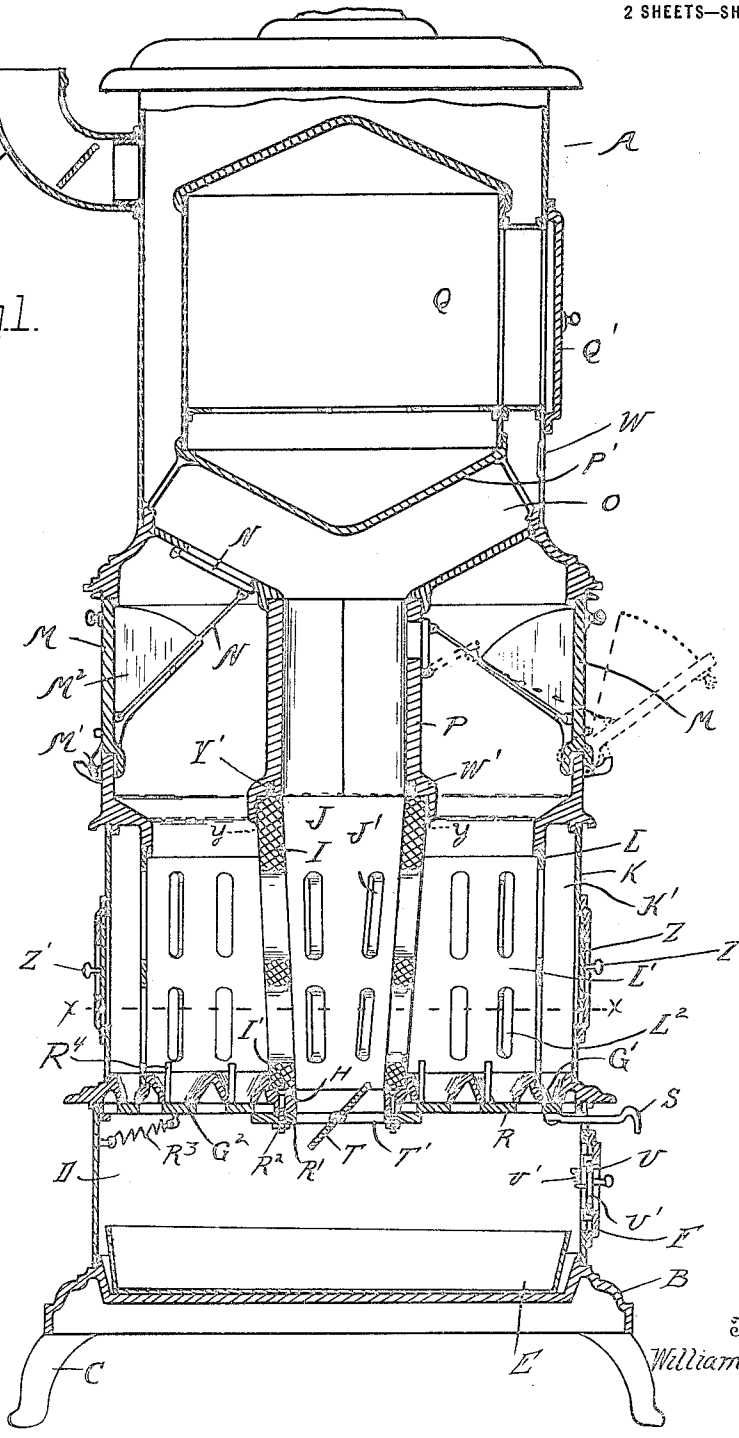
APPLICATION FILED FEB. 28, 1916.

1,225,280.

Patented May 8, 1917.

2 SHEETS—SHEET 1.

Fig. 1.



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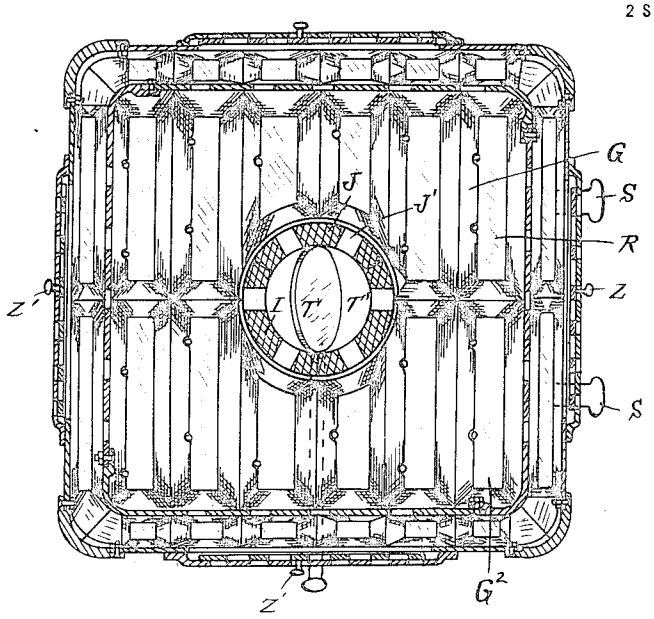
2 SHEETS—SHEET 2.

Fig. 2.



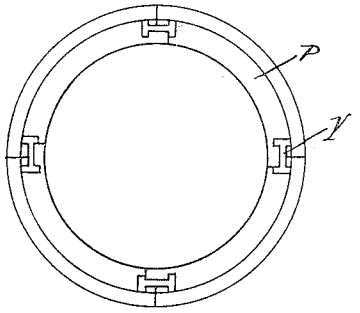


Fig. 3.

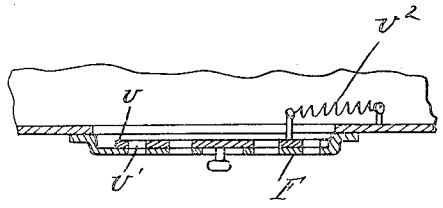


Fig. 4.

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UNITED STATES PATENT OFFICE.

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FUEL-BURNING DEVICE.

1,225,280. Specification of Letters Patent. Patented May 8, 1917.

Application filed February 28, 1916. Serial No. 80,833.

To all whom it may concern:

Be it known that I, WILLIAM C. SKINNER, a citizen of the United States of America, residing at Toronto, in the Province of Ontario and Dominion of Canada, have invented certain new and useful Improvements in Fuel-Burning Devices, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to fuel burning devices such as stoves, furnaces or the like, and refers more particularly to an improved construction for burning solid fuel of various kinds and grades.

Among the objects of the invention are to provide a construction in which a more complete and effective combustion is obtained than can be produced by the stoves, furnaces or like devices now in use; to provide a construction in which even the lowest grades of fuel can be consumed without the production of any appreciable amount of smoke and in which the maximum amount of heat units are obtained from the material burned; to provide means for preventing escape of gas into the room when putting fuel into the fire box; to so construct and arrange the parts that a gravity feed of the fuel takes place without the necessity of passing the air vertically through the fuel, one of the main features of the invention being the novel arrangement whereby the air is fed to the combustion chamber transversely through the fire box; to provide a combustion chamber which is surrounded by the fire box and so arranged that the gases which are fed into the combustion chamber are fed from the outside toward the center, thus avoiding any chance of escaping gas; to provide a construction in which the fuel is burned in the combustion chamber in the form of gas and in which there is supplied to this burning fuel an auxiliary supply of air thus producing an effect similar to that obtained in a Bunsen burner; to provide a fuel burning device in which there are no clinkers or cinders produced and the ashes forming practically a negligible quantity, such ashes as are produced being in the form of a fine powder; to provide a new and improved form of grate; and in general to provide an improved means and method for burning fuel by which substantially all the heat units are available for the purpose of the device.

The invention further resides in various features of construction and such arrangements and combinations of parts as will more fully hereinafter appear.

In the drawings:

Figure 1 is a vertical sectional view through a stove embodying my invention.

Fig. 2 is a cross-sectional view on the line x—x of Fig. 1.

Fig. 3 is a cross-sectional view on the line Y—Y of Fig. 1.

Fig. 4 is a detail view of the lower door construction.

In the particular embodiment of my invention illustrated in the drawings, A designates a heating stove mounted upon a suitable base B. The latter may or may not be provided with legs C while above the base there is positioned a chamber D adapted to receive the usual ash-pan or tray E. Access to this chamber is had through a door F. Upon the upper end of the chamber D there is mounted a grate G, the novel construction of which forms one of the features of my invention.

As shown in detail in Figs. 1 and 2 this grate is apertured at its center and provided with a seat H upon which rests the lower end I′ of the wall I. The latter divides the combustion chamber J from the fire box and since there is intense heat generated in the combustion chamber J, the wall I is formed of a refractory material and also arranged in sections, as shown in Fig. 2, to prevent injury by expansion. Surrounding the wall I and spaced therefrom a sufficient distance to receive the fuel is a wall L which forms the outer wall of the fire box. This wall is preferably spaced from the outer wall K to provide an air chamber K′. The latter is in communication with the fuel chamber L′ through a plurality of slots L^2 distributed entirely around the fire box. In turn a fire box L′ is in communication with the combustion chamber J through apertures J′ in the refractory wall I.

Fuel is fed into the fire box through one or more doors M which are pivoted at M′ and provided with sides M^2 so that when opened the door forms a hopper through which fuel can be fed to the fire box. In the particular construction shown there are four of these doors since the stove is formed in a shape of a square, although it is obvious that any other shape could be employed.

In order to prevent escape of gases into

the room when the fuel is being fed through the door M, I preferably connect the latter by a link or arm N to a gas escaping valve or door N'. Thus, when the door M is opened the valve or door N' will be simultaneously opened and if there is any gas pocketed above the fire box it will pass directly into the drum portion O of the stove. The latter is connected to the combustion chamber by a conduit P above which a suitable baffle plate P' is located. The purpose of the latter is to compel the heat products of combustion to pass outwardly adjacent to the heat radiating surface of the drum, and if desired an oven Q can be positioned within the drum, access to this oven being had through a hinged door Q'.

Describing in detail the construction of the grate G, it will be noticed that the latter comprises a plurality of inclined surfaces G' between which are a plurality of openings G^2 controlled by a sliding grate R. At its center this grate slides over a plate R' secured to the main portion of the grate by suitable chair bolts R^2. It will be noticed that the movable member R of the grate has spaced apertures adapted when the grate pull S is drawn forward to register with the apertures in the grate G, and thus permit the ashes to pass into the pan or tray E. The movable member R is normally held in closed position by means of a spring R^3, while from its upper surface there projects a plurality of pins R^4 or other agitating members adapted to loosen the ashes so as to cause them to pass through the grate. As the combustion is so complete in this device that there are no clinkers formed and the ashes are in the form of a fine powder, a grate of this character is peculiarly adapted to my device and by locating the movable member at the bottom any binding of the parts through ashes getting beneath the movable member is avoided.

At the lower end of the combustion chamber there is an opening T' controlled by a mixer valve T, the purpose of this opening and valve being to supply an additional amount of air to the mixture in the combustion chamber. In order that there will always be a supply of air in the lower chamber D the valve U controlling the air inlet openings U' is normally held open by a spring, such as V^2. Passage of air through the opening T' is however adjustably controlled by the valve T. While I have shown a valve of the butterfly type, a gate or other suitable valve could of course be employed.

The air that passes through the fuel to form the combustible mixture is fed into the air chambers K' through apertures controlled by the slide Z, each of which are provided with operating handles or knobs Z'. Thus the air is fed laterally into the fuel, through the fuel, and into the combustion chamber, and is there augmented by an additional supply of air in a manner similar to a Bunsen burner. There an intense heat is generated which passes up through the conduit P, that forms an extension of the combustion chamber, and from the latter is discharged into the drum, though it is obvious that from the extension P they might be delivered to a laterally extending pipe or an oven positioned at the side or elsewhere if desired.

The baffle plate P' is supported on a plurality of legs, and after passing the baffle plate the products of combustion will be discharged through the flue outlet Y. A suitable sight opening or peep hole W covered with mica or the like is employed so that the operator can tell without opening the stove if the proper combustion is taking place. In the normal operation of the device, there should be such complete combustion that practically no smoke or soot reaches the flue opening Y.

Also as previously mentioned any escape of gas into the room is avoided by the automatically controlled valves or door N', which may be positioned either above the fuel hopper as shown at the left in Fig. 1 or in the extension P as shown at the right of this figure. In either case the valves or doors N' will be located in different vertical planes than the fuel hoppers so as to avoid any danger of fuel being thrown through the doors N'. In assembling the parts the three sections of the main combustion chamber wall I, are held in place at their upper ends by a flange W' formed on the lower edge of the sections of the extension P. The latter is also formed in sections as shown in Fig. 3, the sections of this member being locked together by securing members Y'.

The invention however is not limited to these features of construction except as specified in the claims, and while I have shown and described the invention as applied to a stove it is not limited to such use, since in its broader aspects it applies also to furnaces, boilers, car heaters and other fuel burning devices.

What I claim as my invention is:

1. In a fuel burning device, the combination with the fuel chamber, of a combustion chamber located centrally of said fuel chamber, an air chamber outside of said fuel chamber, there being openings for permitting air to pass laterally from the air chamber through the fuel chamber to the combustion chamber, and a normally closed grate beneath said fuel chamber and air chamber, said grate being adjustable to provide openings through which finely divided ash can be removed from the fuel chamber and the air chamber.

2. In a fuel burning device, the combination with the fuel chamber, of a combus-

tion chamber, an air chamber outside of said fuel chamber, there being openings for permitting air to pass laterally from the air chamber through the fuel chamber to the combustion chamber, and a normally closed grate beneath said fuel chamber and air chamber, said grate being adjustable to provide openings through which finely divided ash can be removed from the fuel chamber and the air chamber, said grate having an upper stationary part and a lower movable part.

3. In a fuel burning device, the combination with an outer wall, an inner wall and a central wall spaced from each other a sufficient distance to provide a combustion chamber, a fuel chamber outside of said combustion chamber and an air chamber outside of said fuel chamber, said combustion chamber having an outlet for the heated gases, and an air inlet at its lower end, said walls being provided with apertures to permit a transverse draft from the air chamber, through the fuel chamber to the combustion chamber, the draft apertures being arranged to prevent the discharge from the air chamber of ash or dust through such apertures, and means for cleaning the air chamber from ash or dust.

In testimony whereof I affix my signature.

WILLIAM C. SKINNER.