H. B. BOZARD.

FUEL BURNING APPARATUS.

APPLICATION FILED MAR. 11, 1915.

1,154,606. Patented Sept. 28, 1915.

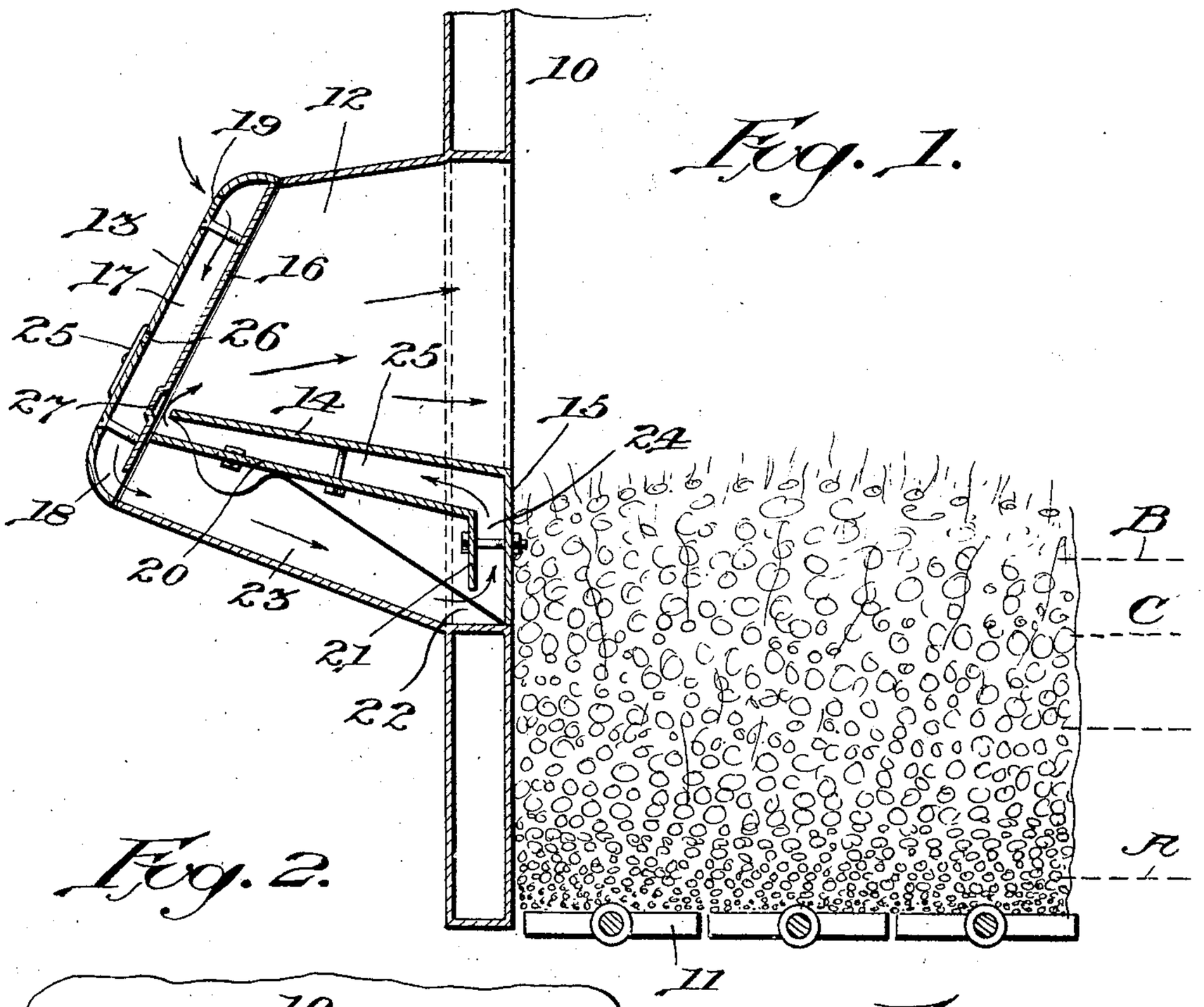


Fig. 1.

Fig. 2.

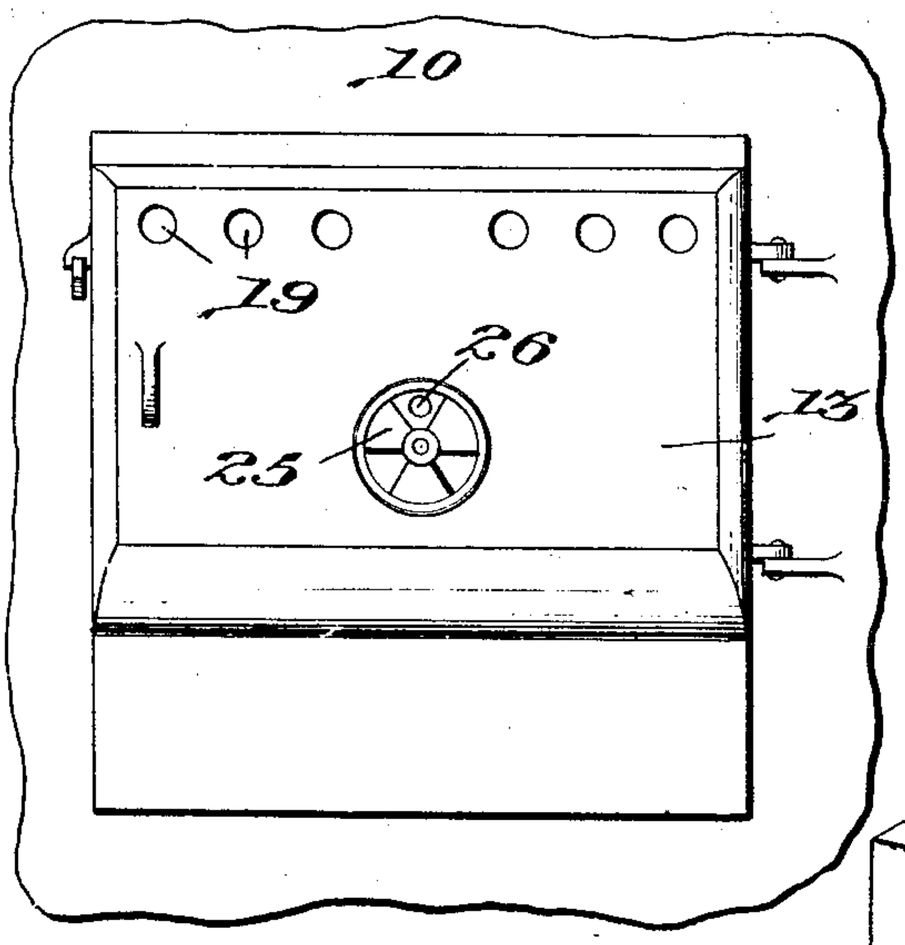


Fig. 3.

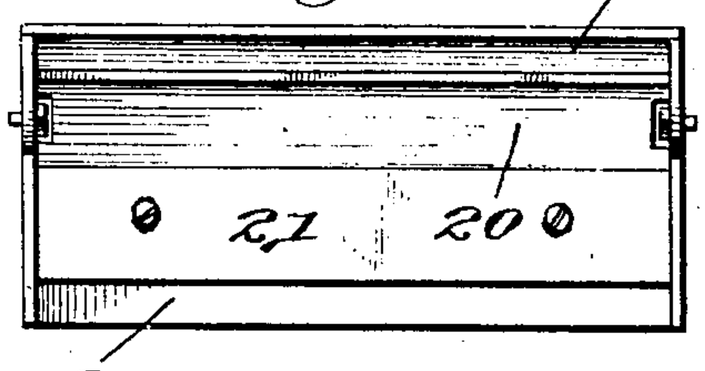
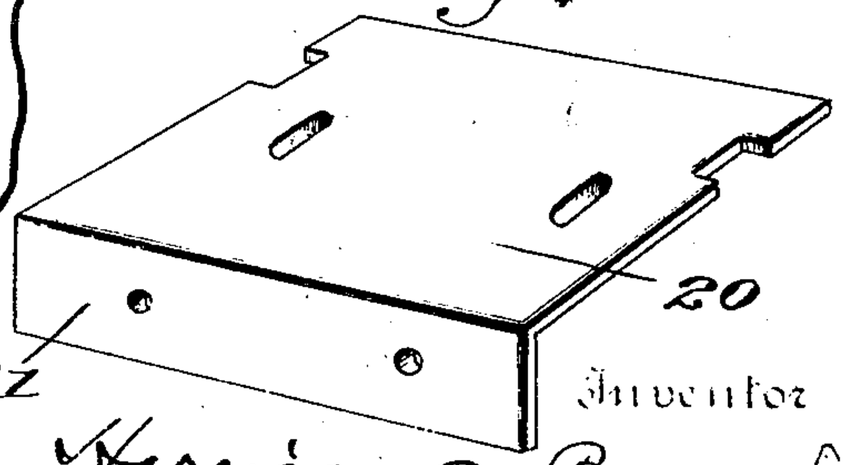


Fig. 4.



Witnesses

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FUEL-BURNING APPARATUS.

1,154,606. Specification of Letters Patent. Patented Sept. 28, 1915.

Application filed March 11, 1915. Serial No. 13,674.

To all whom it may concern:

Be it known that I, HARRISON B. BOZARD, a citizen of the United States, and resident of La Crosse, in the county of La Crosse, and in the State of Wisconsin, have invented a certain new and useful Improvement in Fuel-Burning Apparatus, and do hereby declare that the following is a full, clear, and exact description thereof.

The object of my invention is to provide means for fuel burning apparatus (by which I include stoves, furnaces and other heat producing devices, whatever their construction and use may be) whereby great economy in the fuel used may be secured by the utilization to a high degree of all of the combustible elements in the fuel for the generation of heat, and besides this general and very important object, I have in view the production of a construction which will be simple and inexpensive, and have other advantages which will be evident to those skilled in the art when they understand from the further disclosure herein the nature of my invention.

In the accompanying drawings Figure 1 is a vertical section of enough of an ordinary water heater to illustrate one embodiment, or adaptation of my invention; Fig. 2 a front elevation thereof; Fig. 3 a front end elevation of certain of the parts; Fig. 4 a detail view in perspective of the form of baffle plate employed in the structure shown in Fig. 1.

Referring to the drawings in connection with the detailed description of the construction illustrated therein, 10 designates a water boiler adapted for burning coal and provided with a fuel-supporting grate 11, and a hopper, or feed pouch 12 projecting forwardly from the front of the boiler with its outer end provided with a hinged door 13. Within the feed pouch, and forming in effect an elevated false bottom therein, is a shut off 14 consisting of a plate that extends from the outer end of the pouch at an incline downward and forward, and at its inner end has a vertical flange 15 that extends down to the bottom of the pouch opening at its inner end and forms in effect a vertical extension of the fire pot, and thereby increases the fuel holding capacity of the fire pot. The outer edge of the shut off 14 reaches to within a short distance of a plate, or diaphragm 16, which is secured by bolts and cement to the inner edges of the door 13, so as to form within the door a chamber 17, or to make the door 13 a hollow body, the plate 16 extending not quite to the bottom of the door, so that a passage 18 from within the door into the pouch below the shut off 14, is provided. The door 17, preferably near its top, is provided with one, or more air inlet holes 19 so that air from the outside may pass into the chamber 17 in the door and from the chamber 17 through the passage 18 into the space within the pouch beneath the shut off 14. Within the space between the shut off 14 and the bottom of the pouch, is a baffle plate 20 which extends from the door 13 downward and inward at a slight incline, and at its rear end has a downwardly projecting flange 21 spaced in front of, or away from the flange 15 of the shut off, and reaching downward only a part of the way so as to provide an opening 22 leading from the space 23 below the baffle plate 20 into the vertical space 24 between the shut off flange 15 and the baffle flange 21, and thence into the space 25 between the baffle plate 20 and the horizontally extending portion of the shut off 14, above the same. It will thus be seen that air entering the hole, or holes 19 in the door will pass downward through the chamber 17 therein in contact with the heated back wall 16 of the door, thence backward through the passage 23 and into the vertically extending passage 24, and, thence, forward through the passage 25 and finally emerge through the narrow space between the front edge of the shut off 14 and the back wall 16 of the door into the pouch having in its circuitous course come in contact with the heated surfaces which the various plates forming the devious draft passage offer, so that by the time the air is delivered into the region of combustion within the furnace it is highly heated and in a condition that will promote the combustion of the fuel gases to a high degree, and yet this preheating of the air is accomplished without using any of the heating surface of the fire pot, or the dome, or the sides of the boiler, and hence, without any impairment of the normal heating capacity of the apparatus. Besides this, although located in the feed pouch, it constitutes no obstruction, or impediment to the

ready placing of fuel into the fire box, and, indeed, by the vertical extension of the fire box, which is produced by the vertical flange 15 of the shut off, the capacity of the fire pot for fuel is actually increased and increased by raising of the level of the fuel within the pot and bringing the zone of combustion closer to the boiler dome, or other part of the heating apparatus, above the fire to which heat is to be applied. No bottom draft, that is a draft upward through the grate is required, because of the high degree of combustion which I obtain by my means of preheating the air, so that the layer of ashes below the plane designated by the letter A in Fig. 1 may be retained to check the draft from below. By the use of my shut off 14, the coal in the apparatus shown in Fig. 1 of the drawing may be piled as high as the level B, whereas without my invention the coal should not be placed higher than the level C.

The mixing of the preheated air with the gas from the fire begins in the rear part of the pouch 12 and in the upper portion of the combustion zone with the result that the mixing takes place at the point most efficacious for producing a large flame of high temperature. The baffle plate 20 is secured in position by suitable bolts, and such provision for adjustment to regulate the proper spacing thereof to provide the air passages is provided for by suitable slots through which the attaching bolts pass. Preferably to provide the air space between the front edge of the shut-off 14 and the inner wall 16 of the door, the inner wall 16 is provided with a transversely extending groove or channel 27 contiguous to the front edge of the shut off 14.

It will be noted that the space between the baffle 20 and the shut off 14 narrows, or contracts forward, or in the direction in which the air is traveling, and that the passage around the forward edge of the plate 14 is contracted. The result of this is that the air is checked in its passage forward through the space 23, and, hence, is kept in contact with the highly heated vertical flange 15 of the shut off, and the horizontally extending portion 14 thereof so that by the time the air is delivered for mixing with the fuel gases it is in a very highly heated condition.

The door 13 is provided with the usual rotary damper 25, and within the space covered by said damper a hole 26 may be provided in the door to serve as a peep hole to enable the state of combustion within the furnace to be noted. In such matters as this and the provision of slides, or dampers to control the air inlet openings, it is to be understood variations in construction and arrangement may be resorted to without departure from my invention, and as I have before indicated the scope of my invention as set forth in my broadest claims is not to be restricted to any particular form of construction of fuel burning apparatus wherein air is supplied in a heated condition for mixing with the fuel gas.

Careful and long conducted tests of apparatuses embodying my invention have shown a very great saving in fuel and the production of a more even and steadier fire.

Having thus described my invention what I claim is—

1. A fuel burning apparatus having a chambered outer wall formed of spaced upwardly and downwardly extending outer and inner plates, the outer plate having an opening through which communication between the chamber and the external air may be had, and an opening being provided from said chamber at one end thereof, and a devious passage extending from said opening inward toward the combustion chamber and then outward whose exit is contiguous to said inner plate and is formed between the front edge of a horizontally extending plate and said inner plate whereby air entering said outer wall chamber passes vertically between the plates thereof and thence horizontally in opposite directions and is finally discharged to the combustion zone of the apparatus.

2. A fuel burning apparatus comprising a fire pot, a fuel feeding opening leading into said fire pot, and a devious air passage leading from outside the apparatus contiguous to said feed opening and into the combustion zone, the terminal portion of said passage extending horizontally outward and the exit therefrom being at its outer end, said devious passage being formed by spaced plates in the lower part of the feed opening, said plates being placed one above another, the terminal portion of the passage being beneath the uppermost plate and extending forwardly away from the fire pot and leading to an exit opening at the outer end of such terminal portion.

3. A fuel burning apparatus comprising a fire pot, a fuel feeding opening leading into said fire pot, and a devious air passage leading from outside the apparatus contiguous to said feed opening and into the combustion zone, the terminal portion of said passage extending horizontally outward and the exit therefrom being at its outer end, said devious passage being formed by spaced plates in the lower part of the feed opening, said plates at their inner end having a downwardly projecting flange, one of which forms a vertical prolongation of the fire pot.

4. A fuel burning apparatus comprising a fire pot, a feed pouch leading into the fire pot having its outer end closed by a chambered door having inner and outer walls, the chamber within the door being in communication with the external air and with the in-

terior of the pouch, and spaced plates in the lower part of the pouch, one above the other, the upper plate having its front edge spaced from the inner wall of the door providing a discharge opening for heated air that delivers the air above the uppermost plate into the feed pouch.

In testimony that I claim the foregoing I have hereunto set my hand.

HARRISON B. BOZARD.

Witnesses:
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