J. H. DEAN.

STOVE.

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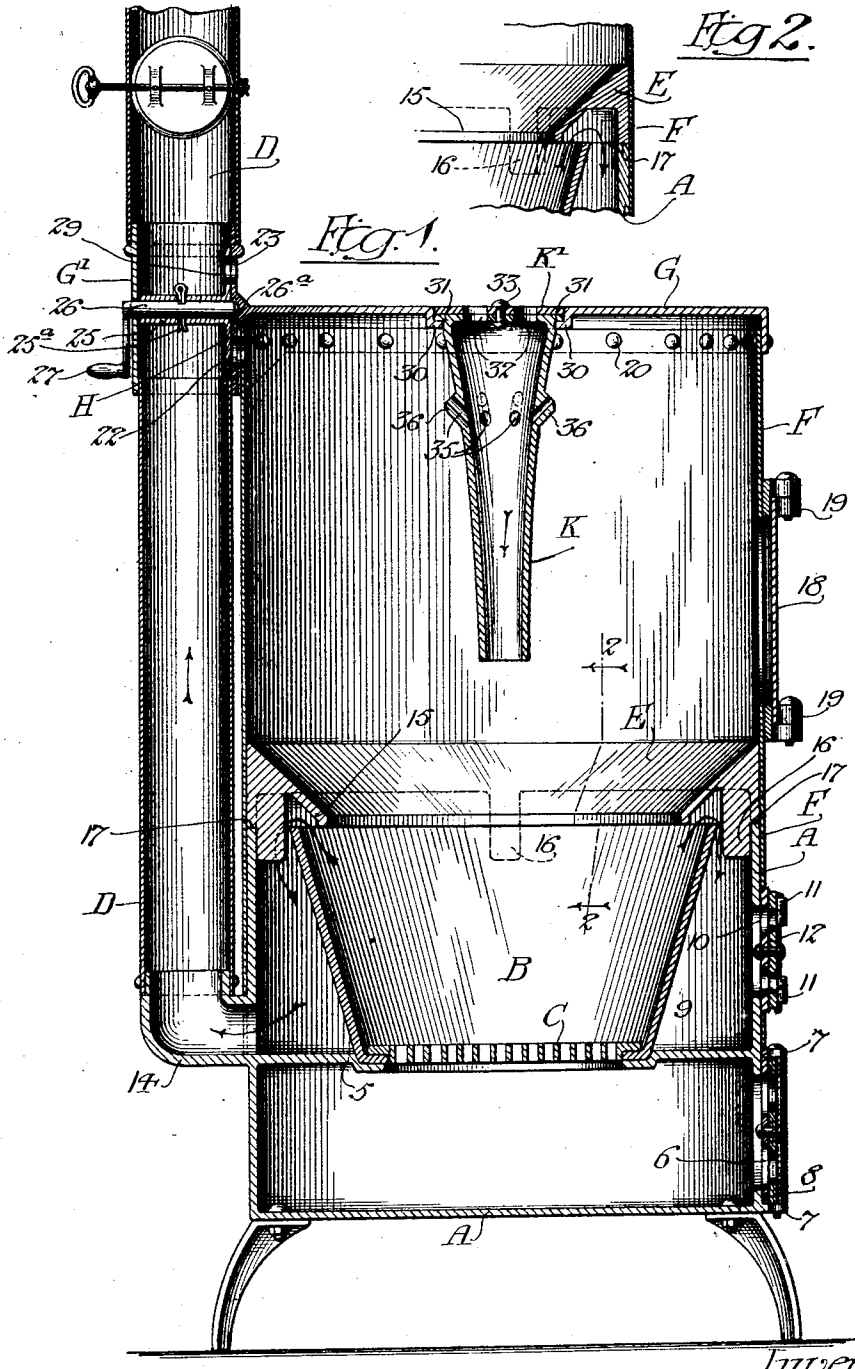
1,409,679. Patented Mar. 14, 1922.

Fig 2.

Fig. 1.



Inventor:-

James H. Dean.

By:- Fisher, Fowle, Clapp & Soans

Attys.

UNITED STATES PATENT OFFICE.

JAMES H. DEAN, OF CHICAGO, ILLINOIS.

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1,409,679. Specification of Letters Patent. Patented Mar. 14, 1922.

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To all whom it may concern:

Be it known that I, JAMES H. DEAN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Stoves, of which I do declare the following to be a full, clear, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

The present invention has relation more particularly to that class of stoves known as "hot blast" stoves, and the invention consists in the features of novelty hereinafter described, illustrated in the accompanying drawing and particularly pointed out in the claims at the end of this specification.

Figure 1 is a view in central vertical section through a stove embodying my invention. Figure 2 is a sectional view of a portion of the stove, the view being taken on the line 2—2 of Fig. 1.

In the drawing, A designates the base or lower portion of the stove, this portion consisting preferably of a casting divided by the transverse plate 5. That part of the base portion A beneath the plate 5 constitutes the ash pit at the front of which there is a door 6 mounted upon hinges 7 and provided with suitable air admission openings controlled by a revoluble valve 8 of familiar construction. The transverse plate 5 is formed with a central opening above which is set the fire pot B having at its bottom a grate C, this fire pot being arranged within the upper chamber 9 of the lower portion of the stove. In the front of the chamber 9 is formed an opening in front of which there is a door 10 mounted upon hinges 11, and this door is preferably formed with openings that are controlled by a pivoted valve 12 of familiar construction. The base portion of the stove is shown as having formed integral therewith an elbow 14 to which is connected the lower end of a smoke flue D.

The fire pot B which is preferably a casting of a truncated conical shape, is smaller in diameter than the diameter of the upper chamber 9 of the stove base wherein it is arranged and upon the upper edge of the stove base A is mounted a rim E having a conical fuel-deflecting surface 15 and depending lugs 16 the shoulder portions 17 of which rest upon the edge of the top of the base portion A. Preferably, there are four of these lugs 16 spaced at intervals around the rim E. The space between the top of the fire pot B and the lower portion of the rim E and the space between the fire pot and the outer wall of the upper portion of the base A afford a passageway for products of combustion to pass therethrough from the fire pot into the chamber 9 of the base A and thence by the elbow 14 into the smoke flue D.

The chamber 9 of the upper portion of the base A and the rim E are encircled by the lower portion of the body casing F of the stove that is preferably formed of sheet metal. In the front of this casing F is formed an opening normally closed by a door 18 mounted upon hinges 19.

Across the top of the casing F extends a top plate G that is preferably formed of cast metal having a depending flange united by rivets 20 to the top of the casting F. Preferably, there is formed integrally with this top plate G a pipe section G′ that forms part of the smoke flue D and this section extends both above and below the top plate G. The part of the section G′ depending below the top plate G is provided with an opening 22 that is arranged opposite a similar opening formed in the upper part of the casing F at its back. The part of the flue section G′ that rises above the top plate G is formed with an opening 23 to the atmosphere. The openings 22 and 23 are controlled by a single valve H that is preferably arranged within the flue section G′ and the flue section G′ may be rectangular in section or the wall of the flue section against which this valve H is placed may be flattened to permit the valve to be turned. As shown, the valve H is formed with a tubular sleeve 25 through which passes a shaft 26 having at its outer end a handle 27 whereby the valve H may be turned. The sleeve 25 is connected by a cotter pin 25ª to the shaft 26 and the inner end of this shaft 26 is journaled in a seat 26ª. The valve H is formed with a single opening 29 that may be brought into register to a greater or less extent with either of the openings 22 or 23 to thereby regulate the flow through one of said openings and close the other, or the valve may be positioned to close both openings.

Within the casing F is mounted an open-ended hot blast pipe the purpose of which is to conduct air mingled with the light and unconsumed gases from the upper portion of the casing F down on to the bed of fuel.

In the preferred embodiment of my invention, the hot blast pipe consists of a tubular casting K that is suspended from the top plate G and extends over the combustion chamber or casing F of the stove. As shown, the top plate G is formed with a central opening having a depending angular flange 30 whereon rests a flange 31 formed at the top of the hot blast pipe K. The top of the hot blast pipe K is shown as formed with a plurality of openings 32 and on the top of the pipe K is mounted a valve K′ that is pivoted, as at 33, to the top of the pipe K. This valve K′ is formed with openings corresponding with the openings 32 in the top of the pipe K and these openings serve to admit air into the top of the pipe. At a short distance below the top of the pipe K there are formed a plurality of openings 35 for the admission to the pipe of the light and unconsumed gases that rise to the top of the combustion chamber wherein the pipe K is suspended. Preferably, the pipe K is formed with lugs or offsets 36 and the openings or ports 35 extend from the upper portions of these lugs or off-sets and are inclined inwardly and downwardly therethrough. The air passing through the pipe K is highly heated and is delivered with considerable force on to the central portion of the fire pot, as it must be in order to effectively consume the gases given off from the coal. To increase the force of the blast, the pipe K gradually decreases in diameter from its upper to its lower end, as shown, and preferably, each element of the inner wall of the pipe is the arc of a circle the center of which lies in a horizontal plane extending through the lower end of the pipe. This form gives a venturi effect and aids in effectively drawing in the combustible gases through the inclined openings or ports 35. An advantage incident to suspending the pipe K from the top plate G is that the pipe K can be readily removed and replaced by withdrawing it from the opening in the top plate.

From the foregoing description, the operation of my improved stove will be understood to be as follows: When a fire is laid upon the grate C of the fire pot B, the valve K′ at the top of the hot blast pipe K and the valve H in the flue section G′ will be in closed position and the valve 8 at the front of the ash pit chamber of the stove base A will be opened. Products of combustion will then pass from the fire pot and from the combustion chamber of the casing F in the direction of the arrows Figs. 1 and 2 of the smoke flue D. After the fire has been started, the flue K′ at the top of the hot blast pipe K will be turned more or less to admit air through the openings 32 and the air thus admitted will pass downwardly through the hot blast pipe K and will be mingled with the light gases which rise from the heated fuel into the upper part of the combustion chamber and which pass thence through the openings 35 into the hot blast pipe K. These light gases mingled with the air thus admitted through the openings 32 will pass downwardly through the hot blast pipe K on to the bed of fuel below the open lower end of the pipe K and will be consumed within the lower portion of the combustion chamber. The products of combustion will pass from the combustion chamber through the space between the upper edge of the fire pot B and the upper part of the base A into the chamber 9 within which the fire pot is located and will pass thence through the elbow 14 to the smoke flue D. In this passage of the products of combustion through the chamber 9, the fire pot B and the fuel contained therein will be intensely heated and the effective burning of the fuel will be thereby greatly facilitated. It will be understood, of course, that after the fire has been started, the valve 8 in the ash pit may be closed more or less. By means of the valve K′, the amount of air admitted to the hot blast pipe K can be accurately regulated and the intensity of the down blast through this pipe can thereby be controlled.

It should be noted that the hot blast pipe has a discharge outlet at its lower end only which opens into the lower portion of the combustion chamber in proximity with the fuel bed and that it is provided only in the vicinity of the upper portion of the combustion chamber with inlet ports or passages through which any light unconsumed gases are drawn by the blast of heated air passing through the pipe, these gases being mixed with the air and so delivered into the zone of greatest heat in the lower portion of the combustion chamber and so effectively consumed. The arrangement is particularly of advantage for the effective consumption of the gases given off from bituminous coal. After all of the gases have been driven off from such coal and it is thoroughly coked, the hot blast pipe is preferably closed and the air necessary for combustion admitted from the ash-pit below the fire-box. The valve H within the smoke flue section G′ has a two-fold purpose. When this valve is in the position indicated in Fig. 1 of the drawing, atmospheric air will be admitted to the smoke flue D, thereby serving to check the draft. When, however, fuel is being delivered to the stove through the door 18 of the combustion chamber or casing F, the valve H should be turned so as to bring its opening 29 opposite the opening 22 in the upper part of the combustion chamber and thus prevent any "out-puffing" of the gases or products of combustion from the casing F

through the door while fuel is being delivered to the stove.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. A stove of the character described comprising a combustion chamber having a top plate, a smoke pipe having a section extending above and below said top plate and provided above said top plate with an opening communicating with the atmosphere and below said top plate with an opening communicating with the combustion chamber, and a single valve for controlling said openings and adapted to close one of said openings and regulate the flow through the other or to close both of said openings.

2. A stove of the character described comprising a combustion chamber having a top plate, a smoke pipe having a section extending above and below said top plate and provided above said plate with an opening communicating with the atmosphere and below said plate with an opening communicating with the combustion chamber, and a valve provided with a single opening adapted to be brought opposite either of said openings in said smoke pipe section.

3. A stove of the character described comprising a combustion chamber having a top plate, a smoke pipe provided above said top plate with an opening communicating with the atmosphere and below said top plate with an opening communicating with the combustion chamber, a valve pivotally mounted within said smoke pipe, and a handle arranged outside said smoke pipe and connected to said valve whereby it may be shifted to close either or both of said openings.

4. A stove of the character described comprising a combustion chamber, a top plate, a smoke pipe section formed integral with said top plate and extending above and below said top plate and provided above said plate with an opening communicating with the atmosphere and below said plate with an opening connecting with the combustion chamber, and a single valve arranged within said pipe section for controlling said openings whereby the extent of either of said openings may be modified or both may be closed.

5. A stove comprising a fire-pot, a combustion chamber above the same, and a hot blast pipe in communication at its upper end with an air inlet and extending downwardly in said combustion chamber, said pipe having a discharge outlet at its lower end only opening into the lower portion of said combustion chamber and also having portions through which gases are drawn from the upper portion of the combustion chamber and caused to pass with the air through said pipe.

6. A stove of the character described comprising a fire-pot, an enclosing casing forming a combustion chamber above the fire-pot, a central hot blast pipe communicating at its upper end with an air inlet and extending downwardly in said combustion chamber, said pipe having a discharge opening at its lower end only opening into the lower portion of said combustion chamber, and said pipe having ports for admitting gases into the body of air passing therethrough from the upper portion only of the combustion chamber.

7. A stove of the character described comprising a fire-pot, a combustion chamber above the fire-pot having a top plate with an opening therein for the admission of air, a valve for controlling said opening and a hot blast pipe extending downwardly from said opening and having a discharge outlet at its lower end only opening into the lower portion of said combustion chamber, said pipe being provided only adjacent its upper inlet end with ports whereby light gases may be drawn from the upper portion of the combustion chamber and caused to pass with the air down through said pipe.

8. A stove comprising a fire-pot, a combustion chamber above the fire-pot, a smoke flue communicating with the lower portion of the combustion chamber and a hot blast pipe communicating at its upper end with an air inlet, extending downwardly through the combustion chamber and having a discharge outlet at its lower end only at the lower portion of the combustion chamber, said pipe having ports through which light gases may be drawn from the upper portion of the combustion chamber and caused to pass with the air down through said pipe.

9. A stove of the character described comprising a fire-pot, a casing around said fire-pot and extending above the same to form a combustion chamber, said fire-pot being spaced from said casing to afford an exit for the products of combustion from the lower portion of the combustion chamber, a smoke flue leading from the space about the fire-pot and a hot blast pipe communicating at its upper end with an air inlet, extending downwardly through the combustion chamber and having a discharge outlet opening into the lower portion of the combustion chamber in proximity with the fuel bed, said pipe having ports leading from the upper portion of the combustion chamber for the admission of gases therefrom into the air passing through the pipe.

10. A stove of the character described comprising a fire pot and a combustion chamber above said fire pot having an opening in its upper portion for the admission of air, and a hot blast pipe extending downwardly from said opening, said blast pipe being provided with downwardly and in-

wardly inclined ducts or openings whereby light gases may be admitted from the combustion chamber and be caused to pass with the air down through said hot blast pipe.

11. A stove comprising a fire-pot and a combustion chamber above the fire-pot, a hot blast pipe communicating at its upper end with an air inlet, extending downwardly through the combustion chamber and having a discharge outlet at its lower end opening into the lower portion of the combustion chamber, said pipe gradually decreasing in cross section from its upper to its lower end and having inwardly and downwardly inclined ducts through which light gases are drawn from the upper portion of the combustion chamber and caused to pass with the air down through the pipe.

JAMES H. DEAN.