L. D. WEST.
FUEL SAVING AND SMOKE CONSUMING DEVICE.
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1,267,297.

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3 SHEETS—SHEET 1.

Inventor

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Witness

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Attorneys
To all whom it may concern:

Be it known that I, LEONIDAS D. WEST, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented certain new and useful Improvements in Fuel-Saving and Smoke-Consuming Devices; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

My invention relates to that class of devices intended to increase combustion in stoves and furnaces, by the injection of a sufficient quantity of highly heated air, into such device so arranged that such air shall mingle with the hot gases in the fire box or other combustion chamber to form a highly combustible mixture. This mixture, in burning, consumes the smoke and this prevents the accumulation of soot and carbon in the stove, furnace or other device with which the invention is employed.

I am aware that devices of the same general nature as my own, have heretofore been used, but the general policy has been to mount the air-supplying device on the furnace door. This can easily be done in such cases as permit the door being opened without danger of the air-supplying device striking the door frame, but on other designs of those devices, this is not possible. The principal object of the present invention therefore, is to provide an air-supplying device formed in two sections, one of the sections being fixedly carried in the stove or furnace, whereas the other one is carried on the furnace door.

Another object of the invention is to so construct the device as to permit the same to be extended a greater or less amount into the fire box or combustion chamber, whereby it may be subjected to the necessary amount of heat for properly raising the temperature of the air passing therethrough.

A still further object is to supply air currents at different temperatures, so that a circulation is caused in the stove or furnace, such circulation serving to form a thorough mixing of the incoming air with the hot gases and smoke in the stove or furnace.

With the foregoing general objects in view, the invention resides in the novel features of construction and unique combinations of parts to be hereinafter fully described and claimed, the descriptive matter being supplemented by the accompanying drawings which form a part of the specification and in which:

Figure 1 is a perspective view of the invention applied to a furnace, the door of the latter being shown in an open position;

Fig. 2 is a vertical longitudinal section of the air-supplying device, showing the door of the furnace closed;

Fig. 3 is a vertical transverse section on the plane of the line 3-3 of Fig. 2; and

Fig. 4 is a vertical section of a furnace showing a slightly different manner of supplying air to the two passages of the device.

In the drawings above briefly described, the numeral 1 designates the door frame of a stove or furnace, it being through this frame that the fuel is fed to the fire box, and 2 designates the usual hinged door of the frame 1, it being upon this door that part of the present invention is mounted.

Secured to the inner side of the frame 1 or to any other suitable part, by means of screws or the like 8, is a flat vertically disposed casing 4 having a downwardly and outwardly inclined inner end 5, the outer end 6 of said casing being disposed in a vertical plane and having upper and lower air inlets 7 and 8. The inlets 7 and 8 register with upper and lower air supplying pipes 9 and 10 respectively, said pipes passing slidably through suitable guides 11, secured to the door 2 and being clamped in fixed position by set screws or other suitable devices 12. The outer end of pipe 9 is provided with a valve 13 having a pivoted member 14 for controlling the amount of air passing therethrough, whereas the outer end of pipe 10 is provided with a valve 15 having a slit 16 for admitting a greater or less amount of air. The inner ends of the passage members or pipes 9 and 10 are provided with collars 17 which are so shaped as to come into fluid tight contact with the end 6 of the casing 4, so as to be sure that the incoming air shall pass into said casing through the inlets 7 and 8 with which said pipes register.

The upper pipe discharges into a comparatively short air heating passage 18 which extends across the upper end of the casing 4, the extreme rear end of this passage being directed downwardly at 19 and having its delivery end flush with the face of the inclined end 5. Said delivery end of passage 18, receives therein a reduced neck.
20 on the rear end of a suitable pipe connection 21, said neck being secured in place by a set screw or the like 22. The opposite end of the connection 21 receives a neck 23 on the front end of a suitable air spraying device 24. The neck 23 being held in place by a set screw 25 or by other suitable means.

The air spraying device 24 may be of any suitable construction but it preferably consists of a casing 24', open at one end and having at its other end an opening 26, the open end of said casing being closed by a suitable cap 27 having a tubular passage 28 passing through the casing 24'. The member 28 extends through the casing 24' and projects through the opening 26 to form the neck 23. The member 28 and cap 27 are both provided with perforations 29 for discharging the air into the fire box or combustion chamber. This air is heated to the required extent by passage through 18, but is heated to a greater extent as it is discharged into the casing 24', the latter being subjected to the flames in the fire box or to the hot gases in any other location at which the device may be positioned.

The air inlet 11 communicates with a comparatively long air heating passage 30, said passage being of zigzag formation as shown clearly in Fig. 2, being formed by alternately arranged staggered partitions 31 and 32 respectively, the former projecting inwardly from the end 6 of casing 4, whereas the partitions 32 extend from an inclined partition 33 which diverges upwardly in respect to the inclined end 5 of the casing. Adjacent its lower end, the rear end 5 of the casing 4 is formed with an outlet opening 34, said opening receiving a reduced neck 35 on the front end of a suitable air spraying device 36, said device being preferably of the shape shown and having perforations 37 in its head for discharging the heated air. A set screw or the like 38 is employed for clamping the neck 32 in place.

It is to be observed that the two passages 18 and 30 differ greatly in length and that the latter is so positioned that it will be more highly heated by contact with the flames or the like in the furnace or stove. By this arrangement, the air passing through passage 30 will be heated to a greater extent than that going through the other passage, the result being that the two currents of hot air, at different temperatures, will start a violent circulation within the combustion chamber or fire box, this circulation serving to insure thorough mixing of the incoming air with the hot gases and smoke in the stove, furnace or the like. The two currents of air are sprayed in a plurality by the spraying devices 24 and 36, and it will be understood that these devices may vary in size and contour according to requirement.

Similarly, the size of the entire device may be increased or decreased as occasion may require. Regardless of size and shape however, the device will be highly efficient for the purposes intended. I attach great importance to the fact that the air supply pipes 9 and 10 are carried bodily by the door 2, whereas the remainder of the device is mounted within the stove or furnace. By this construction, the entire structure may be of the required size, but it may be made larger than would be possible if it were carried totally by the door. Whenever the door 2 is opened the pipes 9 and 10 are disengaged from the inlets of the casing 4, but upon the closing of said door, the parts are again registed so that the incoming air will be directed into the two passages 18 and 30.

I also wish to lay particular emphasis upon the fact that the pipes 9 and 10 are slidable through the guides 11. By this arrangement the casing 4 may be located at a comparatively great distance in rear of the door, if found necessary, yet said pipe may be of sufficient length to cooperate properly with the inlets 7 and 8, it being only necessary to slide the pipes through the guides 11 and then tighten the thumb screws or the like 12. Another rather important feature is that the restricted necks 30 and 35 of the air spraying devices 24 and 36 respectively, serve to choke down the discharge of air from the casing 4. This air is thus caused to linger a greater length of time in the casing, so that thorough heating thereof is insured. This choking down of the air increases the efficiency of the device rather than decreasing the same, since actual use has shown that a restricted quantity of air heated to the proper temperature, produces much better results than an abundant quantity of air which is poorly heated.

Other advantages of the invention are that the same is formed in a plurality of parts any of which may be easily replaced if broken or damaged, it being simply necessary in such cases, to remove a set screw or the like in order that the injured part may be removed. Furthermore, by connecting the several parts substantially as shown and described, parts of suitable size and shape may be readily applied to the device when the same is being installed.

In Fig. 4, the application of the invention is shown to a furnace or the like, having an unusually wide dead plate 10 at the bottom of the door frame 1. When furnaces of this character are used, in order to prevent the carrying of exceptionally long air supply pipes on the door 2 the pipes 9 and 10 preferably branch from a vertical pipe 10 which leads through the dead plate 10 to the ash pit 2. This arrangement not only overcomes difficulties which would other...
wise be encountered, but supplies warm air to the device so that when it is ultimately discharged from the spraying devices 36 and 27, it will be in a highly heated state.

5 From the foregoing, taken in connection with the accompanying drawing, it will be obvious that although the improved device is of comparatively simple and inexpensive construction, the same will be highly efficient and durable. Probably the best results are obtained by the specific arrangement of parts shown and described, which arrangement constitutes the preferred form of the fuel saving and smoke consuming device. I wish it understood, however, that within the scope of the invention as claimed, numerous minor changes may be made without sacrificing the principal advantages.

15 I claim is herein made to means broadly for supplying heated air at different temperatures and elevations to the fire box, nor to the construction of the spraying device 24, as my copending application, Serial No. 174,319, filed June 12, 1917, is intended to cover these features.

I claim:

1. A fluid feeding device for combustion chambers of stoves and furnaces, said device being adapted to be fixedly mounted in the stove or furnace and comprising a body subjected to heat and having a downwardly and outwardly inclined rear end wall, said wall having at each of its upper and lower ends a hot air outlet, the front end wall of said body having an air inlet in each of its upper and lower ends, the upper portion of said body having a horizontal air heating passage leading from the upper inlet to the upper outlet, a partition in said body leading upwardly from the rear end of its bottom to a point below said passage, and staggered horizontal partitions extending from said first named partition and from said front end wall to form a zig-zag air heating passage leading from the lower inlet to the lower outlet; together with air spraying devices extending from both of said outlets, said spraying devices being secured to said body and communicating with said outlets.

2. A fluid feeding device for the combustion chambers of stoves and furnaces, said device being adapted to be fixedly mounted in the stove or furnace and comprising a body subjected to heat and having a downwardly and outwardly inclined inner end formed with upper and lower outlet openings, the outer end of said body having a pair of vertically spaced inlet openings, said body having fluid heating passages of different lengths leading from the inlet openings to the outlet openings, and fluid spraying devices at said outlet openings, said spraying devices being secured to said body and communicating with said outlet openings.

3. A fluid feeding device for the combustion chambers of furnaces comprising a hollow substantially flat vertically disposed body having a downwardly and outwardly inclined rear end wall, said wall having at each of its upper and lower ends a hot air outlet, the front end wall of said body having an air inlet in each of its upper and lower ends, the upper portion of said body having a horizontal air heating passage leading from the upper inlet to the upper outlet, a partition in said body leading upwardly from the rear end of its bottom to a point below said passage, and staggered horizontal partitions extending from said first named partition and from said front end wall to form a zig-zag air heating passage leading from the lower inlet to the lower outlet; together with air spraying devices extending from both of said outlets, said spraying devices being secured to said body and communicating with said outlets.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

LEONIDAS D. WEST.

Witnesses:

Geo. A. Hinds,

W. M. Wallace.