R. D. BALDWIN.

AIR DEFLECTOR FOR FIRE BOX DOORS.

APPLICATION FILED DEC. 13, 1917.

1,330,972. Patented Feb. 17, 1920.

Fig. 1.

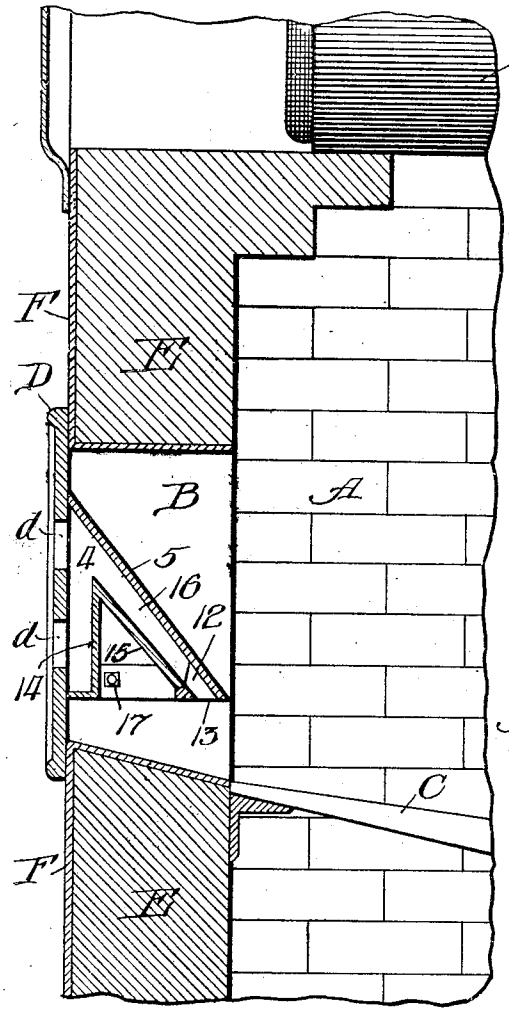


Fig. 2.

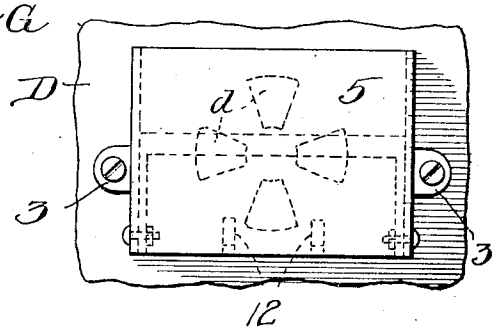
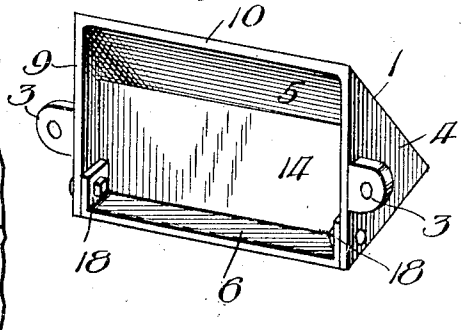


Fig. 3.



Witness:

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AIR-DEFLECTOR FOR FIRE-BOX DOORS.

1,330,972. Specification of Letters Patent. Patented Feb. 17, 1920.

Application filed December 13, 1917. Serial No. 206,879.

To all whom it may concern:

Be it known that I, RICHARD D. BALDWIN, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Air-Deflectors for Fire-Box Doors; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to air deflectors for use in connection with fire box doors.

The object of my invention is to provide means which will deflect the cold air entering through a damper or other opening at the front end of the fire box, in such manner as to produce efficient combustion of the fuel in the fire box. The efficiency of fuel consumed in a furnace is, to a great extent, diminished by reason of the escape of partly burned gases or finely divided particles of unconsumed fuel through the stack.

One of the objects of my invention is to provide a device adapted for attachment to any fire box door back of the damper or other opening, which will deflect the incoming cold air downwardly and rearwardly and also with some force, so as to cause a proper amount of air to be mixed with the gases and the particles of fuel, whereby a more complete combustion occurs, thus not only increasing the efficiency of the furnace by rapidity of action but also greatly reducing the amount of smoke issuing from the stack.

Another object of my invention is to provide a device such as is described, which may be quickly and easily attached to any fire box door back.

Another object of my invention is to produce such a construction of deflector and to so locate it with reference to the fire box, as to cause it to become heated to such an extent that the incoming cold air will receive a preliminary heating before coming in contact with the fuel surface.

This pre-heating of the air greatly facilitates the operation and increases the efficiency of the furnace.

The invention consists in the matters hereinafter described and more particularly pointed out in the appended claims; and its many advantages will be apparent as I proceed with my specification.

In the drawings:

Figure 1 illustrates a longitudinal, vertical, fragmental, sectional view through a steam boiler fire box having my improved air deflector attached to the rear of the fuel door.

Fig. 2 is a rear elevation of the deflector.

Fig. 3 is a view in perspective showing the deflector detached from the fire-box door.

In order to more fully explain my invention, I will now refer more in detail to the device illustrated in Figs. 1 to 3 inclusive. In so doing, I point out that A represents as a whole, an ordinary steam boiler furnace having a fuel door opening B, grate bars C and door D. The front wall E is provided with the usual metal facing or furnace front F, to which latter the door D is suitably secured and through which the fuel opening B extends rearwardly from the face F to the interior of the fire box of the furnace. G represents the boiler. These parts being of ordinary construction and to which, *per se*, I make no claim, may be of any familiar type of construction and need not be further herein described, excepting to say that the fuel opening B is normally closed by the door D and that the latter is provided with the damper openings *d* which are adapted to be closed in whole or in part, as occasion requires, by means of a butterfly damper D′ of familiar type.

The numeral 1 indicates as a whole my improved air deflector, adapted to be attached to the rear or inner face of the door D by means of bolts 2 passing through suitable apertures in lugs 3, said lugs extending from each side of the deflector or otherwise as convenient. The deflector 1 is in effect a shell open in front and partially open at the bottom. It is made either of cast or sheet metal and comprises, substantially, two triangular side walls 4, 4, a rear wall 5 and a bottom wall 6. The bottom wall 6 may be cast integral with the side walls 4, 4, but as shown in the drawings, the preferred construction is to make the bottom wall 6 a separate piece.

As will be noticed, the upright front edges 9 of the side walls 4, 4 and the upper front edge 10 of the rear wall 5, contact with the rear face of the door D when the device is bolted to said door. The rear wall 5 is inclined to said front edge 10 downwardly and rearwardly from its top to its bottom so that when the shell is attached to the door,

the rear wall extends downwardly and away from and to the rear of the door. It will be noticed that the rear or bottom wall 6 does not extend the full width of the bottom of the shell but its inner or rear margin 11 is spaced apart from the inner surface of the inclined wall 5 by being in contact with two dividing and spacing lugs 12, 12. These spacing lugs are cast integral with the shell proper. The inner face of the inclined wall 5, the rear margin of the bottom 6, the inner lower portions of the side walls 4 and these two spacing and dividing lugs 12, 12 form the boundaries of a plurality (in this instance, three in number), of relatively narrow elongated openings or apertures 13, through which contracted openings, the air coming into the shell through the damper openings *d* will be discharged into the fire chamber of the furnace.

When the device thus described is attached to the inner face of a fire box door, the inlet or damper opening *d*, the inlet opening of the shell is positioned centrally with relation to the damper opening *d*. Of course, it will be understood that the contacting edges or surfaces of the shell and of the rear of the door, are suitably sealed by cement or otherwise.

Mounted within the shell 1 is a vertically arranged wall member 14, extending from one side wall 4 to the other side wall 4, and joining at its top with a second wall member 15. The wall member 15 extends from the top of the member 14 rearwardly and downwardly and in substantial parallelism to the inclined wall 5 of the shell, and also extends transversely from one side wall 4 to the other. The outer or rear surface of this inclined wall 15 and the inner surface of the inclined wall 5 of the shell, together with a portion of the side walls 4, 4, forms the relatively contracted and inclined passage or conduit 16, above referred to, the area of the inlet portion of which is less than the area of the inlet opening of the shell and of the damper openings *d*, *d*. This vertical wall 14 is set back within and in the rear of the horizontal surfaces 9 and 10 of the shell, and its lower margin rests upon the bottom plate 6. As shown, it is integral with the bottom plate 6 and the bottom plate and the baffle plate members 14 and 15, may be secured to the shell by nuts and bolts 17, the bolts passing through suitable apertures in the end walls of the baffle plate, and the end walls 4 of the shell, or if desired, by some bolts which extend through apertures in flanges 18, which correspond with the flanges 7 of the construction first described.

The particular construction whereby the bottom plate 6 and the baffle plate 14 may be secured to the shell is more or less immaterial and will depend upon the necessities of the particular installation, and hence may be varied as circumstances may require.

The air entering through the damper openings first passes into the inlet opening or mouth of the shell and, most of it, strikes the baffle plate 14, is deflected upwardly by the said wall 4, to the conduit 16 and then to the restricted discharge opening 13.

I find that the restriction of this discharge opening 13 causes the air passing through it to be discharged at an increased velocity of speed over the speed of the incoming air, and thus it is acting at an increased velocity at points where it initially comes in contact with the hot fuel on the grate C. Further, that the air traveling at increased velocity, rather than passing downwardly through the fuel and through the grate bars into the ash pit, has practically no such tendency, but spreads more evenly over a greater area of the fuel.

Moreover, I find that the shell deflector construction becomes more or less heated, and that, therefore, the incoming air by contact with this hot inwardly projecting deflector, becomes heated. Thus there is a greater tendency of the warm air to more thoroughly mix with the unconsumed gases in the fire chamber, with the result that the combustion as a whole is more perfect and smoke is practically eliminated.

While I have said the deflector becomes more or less hot, I must also state the fact that I find in practice, that the incoming cool air and also the opening and closing of the fire box door D from time to time, sufficiently tempers the deflector so that it is relatively cool and does not "burn out." That is to say, I find that the deflector is cool enough to prevent being burned out, while hot enough to effect a preliminary heating of the incoming cold air.

In a fire box, the fuel door of which is provided with my improved deflector, the poorer kinds as well as the better grades of fuel burn to a powdery ash, thereby doing away with the formation of clinkers, insuring longer life of the grate bars and greatly reducing the amount of fuel needed to maintain the proper degree of heat within the fire box.

The foregoing and other advantages will be recognized by persons skilled in the art, as I have recognized them in the practical application of the device.

I claim as my invention:

1. A deflector adapted for attachment to the back of a fire-box door provided with a damper opening, comprising, in combination, a shell of substantially triangular cross sectional configuration, having a mouth in substantial alinement with said opening, and a member of similar cross-sectional configuration mounted within said shell, said member being provided with a substantially

vertical flat face forming a baffle for the incoming air, and with an inclined rear wall in substantial parallelism to the rear wall of said shell and spaced therefrom, to form therewith a passage adapted to discharge air obliquely downward into the fire-box.

2. A deflector adapted for attachment to the back of a fire-box door provided with a damper opening, comprising a shell of substantially triangular cross-sectional configuration having a mouth in substantial alinement with said opening and a member of similar cross-sectional configuration mounted in said shell and spaced from the top of said shell and in parallel spaced relation to the rear wall thereof, to form therewith a passage adapted to discharge air obliquely downward into the fire-box.

In testimony that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 10th day of December, A. D. 1917.

RICHARD D. BALDWIN.

Witnesses:
TAYLOR E. BROWN,
B. L. MACGREGOR.