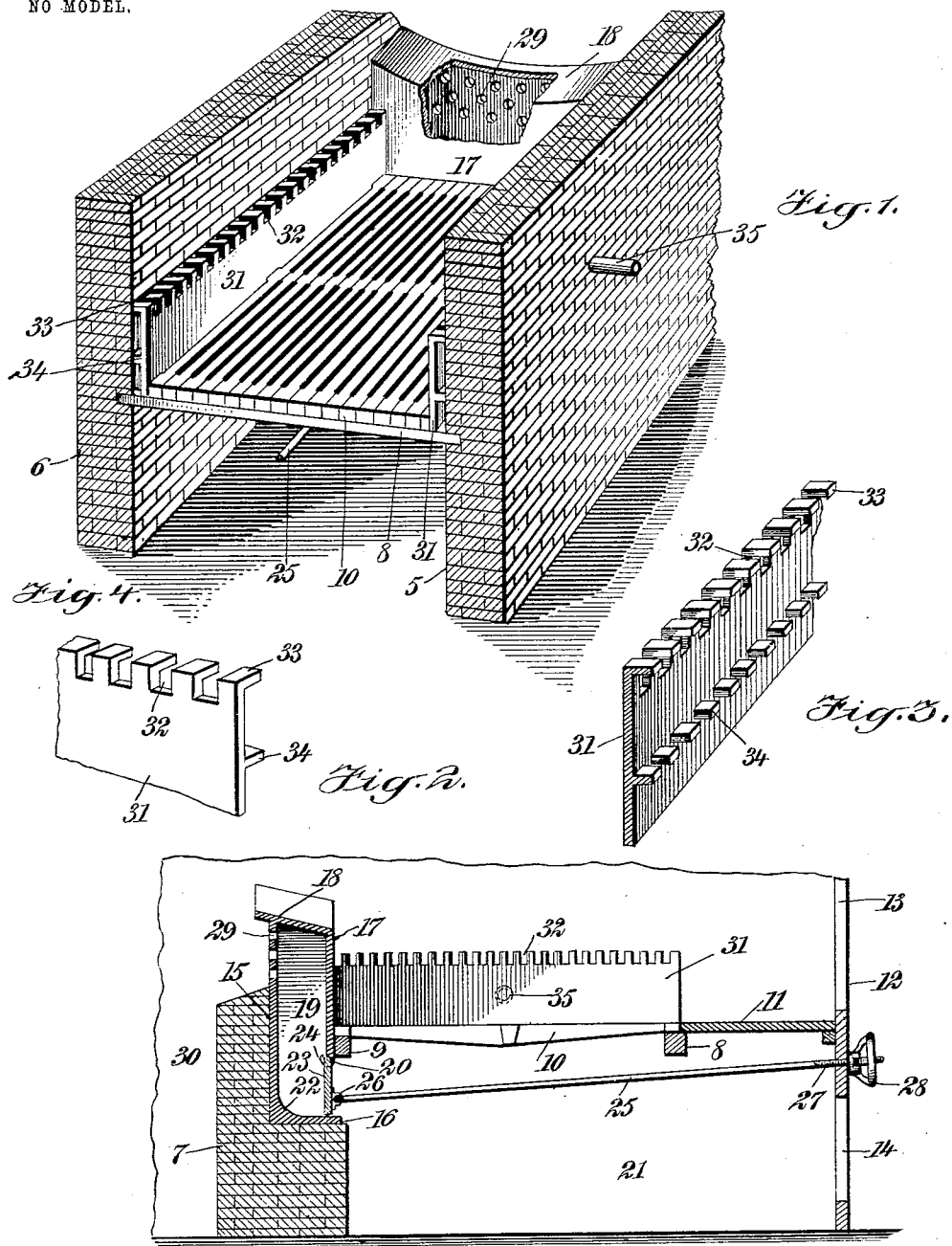


E. F. COMBER.
BOILER FURNACE.

APPLICATION FILED FEB. 21, 1903.

NO MODEL.



WITNESSES:

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BOILER-FURNACE.

SPECIFICATION forming part of Letters Patent No. 746,031, dated December 8, 1903.

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To all whom it may concern:

Be it known that I, EDWIN FREDERICK COMBER, a subject of the King of Great Britain, and a resident of Selkirk, in the Province of Manitoba and Dominion of Canada, have invented a new and Improved Boiler-Furnace, of which the following is a full, clear, and exact description.

This invention relates to improvements in boiler-furnaces, the same being specially adapted for use in connection with steam-boilers, although the improvements may be used in hot-water boilers and in connection with any kind of furnaces for power and heating purposes.

One object that I have in view is the provision of a bridge-wall of peculiar design by which warm air in regulated volumes may be supplied to the combustion-chamber of a furnace at a point back of the fuel-grate, the air being free to commingle with the gaseous products of combustion and calculated to promote the combustion of the gases and of the carbon in the smoke.

Another purpose of this invention is to provide simple, cheap, and durable devices by which atmospheric air is supplied to the grate-chamber at points above the bed of fuel thereon, the inflowing currents of air being diffused and heated before their discharge into the gaseous products of combustion which are present in said grate-chamber.

Further objects and advantages of the invention will appear in the course of the subjoined description, and the novelty will be defined by the annexed claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a perspective view of a portion of a boiler-setting and a furnace, illustrating the application of my improvements. Fig. 2 is a vertical section taken longitudinally through the furnace shown by Fig. 1. Figs. 3 and 4 are perspective views showing the respective sides of a flue-plate, one of which is adapted to be used on each side of the grate-chamber.

5 6 designate the walls of a boiler-setting, which in Fig. 1 are disposed parallel to each other, and 7 is the bridge-wall. The side

walls of the boiler-setting support the transverse bars 8 9, which carry a grate consisting of a series of longitudinal parallel bars 10. 55 As shown by Fig. 2, a dead-plate 11 is arranged between the boiler-front 12 and the grate-supporting bar 8, and this boiler-front is provided with a charging-opening 13 and an ash-pit opening 14, said openings adapted 60 to be closed in the ordinary way by suitable doors. The bridge-wall 7 is formed with a vertical recess 15, which terminates in a horizontal seat 16, and in the recessed portion of the bridge-wall is arranged a hollow or cham- 65 bered metallic bridge-wall member 17. This member 17 is preferably cast in a single piece of metal in a shape to fit snugly in the recess 15 and to rest upon the seat 16, the upper wall 18 of said member being curved substan- 70 tially as shown by Figs. 1 and 2. This member of the bridge-wall has a chamber 19, and said member extends a suitable distance above the top edge of the bridge-wall 7 and likewise rises a suitable distance above the 75 horizontal plane of the grate 10.

The front wall of the chambered member 17 has an opening 20 formed therein, said opening lying below the horizontal plane of the grate and adapted to establish communication between the ash-pit 21 and the chamber 19. The bottom of the chambered bridge-wall member 17 is curved at 22, and this curved bottom is adapted to be traversed by the free edge of the swinging damper 23, the 85 latter being hung or pivoted at 24 on the front wall of the member 17 and in a position to close the opening 20 therein. The damper 23 is operated by means of a rod 25, having a loose or pivotal connection at 26 with said 90 damper. The free projecting end of the damper-rod 25 is threaded externally at 27 and arranged to pass through a suitable opening in the boiler-front 12, said threaded end of the damper-rod being engaged by a nut 28, 95 which bears against the boiler-front and serves as a means for imparting endwise movement to the rod 25 and a swinging movement to the damper 23, thus making provision for regulating the position of the damper to control 100 the admission of air from the ash-pit 21 into the chamber 19 of the hollow member 17. The back wall of this hollow member 17 is provided with a multiplicity of openings 29,

which are situated above the top edge of the bridge-wall 7 and are adapted to discharge atmospheric air into the combustion-chamber 30, which is provided in the boiler-furnace 5 in rear of the grate-chamber thereof.

It will be understood that air from the ash-pit passes in regulated volumes through the opening 20 into the chamber 19 of the hollow member, and this air is heated by passing 10 through said hollow member. The air is discharged through the openings 29 into the combustion-chamber 30, thus making provision for supplying heated atmospheric air into the gaseous products of combustion contained in or traveling through the chamber 15 30, whereby the necessary volume of oxygen may be supplied to the gaseous products of combustion to effect more thorough combustion thereof and the carbon which is present 20 in the smoke.

In addition to the devices heretofore described for admitting air to the combustion-chamber of the furnace I have also provided additional means whereby atmospheric air 25 may be supplied to the grate-chamber on lines above the bed of incandescent fuel resting on the grate 10. These means consist of plates 31, arranged between the side walls 5 6 and the side portions of the grate 10. Each plate is flat throughout its length and is provided with a series of notches 32 in its top 30 edge, said top edge of the plate having a series of laterally-extending fingers 33, also located at the top edge. The plate is furthermore provided with a plurality of fingers or lugs 34, arranged in a horizontal row at a point intermediate of the height of the plate, said lugs or fingers 34 being disposed in the vertical planes of the notches 32 and alternating 40 in position with the fingers 33 at the top edge of the plate. Each plate 31 is disposed in a vertical position and longitudinally of the grate-chamber for the fingers or lugs 33 34 to engage with a side wall of the furnace, said 45 plate resting on the grate-supporting bars 8 9. The plates 31 are spaced laterally with relation to the furnace-walls 5 6 by the fingers 33 34, and these plates form with the furnace-walls longitudinal air-chambers which are in communication with the ash-pit 21. The plates 50 also extend a suitable distance above the horizontal plane of the grate 10, so that the air passing upwardly through the chambers will be heated by the plates and the furnace-walls. 55 The heated air is discharged through the rows of openings formed by the notches 32, the air passing freely through the open-top ends of the plates and being discharged into the grate-chamber to commingle with the gaseous products of combustion as they arise from the bed 60 of fuel contained on the grate 10.

The construction of the plates 31, heretofore described, contemplates the provision of

chambers which are supplied with air from the ash-pit when the doors to the ash-pit 65 openings 14 are open; but it is frequently necessary to close these doors, and this requires that an independent source of air-supply shall be provided. I employ one or more 70 air-inlet pipes 35, which are indicated in full lines by Fig. 1 and in dotted lines by Fig. 2, the said pipes extending through the side walls of the furnace and opening into the air-chambers at points below the baffles provided by the lugs or fingers 34 on the flue-plates 31. 75 The baffles 34 have staggered relation to the fingers 33 and are in the vertical planes of the air-exit openings or notches 32, thus causing the ascending current of air to flow in irregular lines through the chambers and 80 throttling in a measure the free passage of air through said chambers and the discharge of air through the notches 32.

Having thus described my invention, I claim as new and desire to secure by Letters 85 Patent—

1. The combination with a bridge-wall, and a grate, of a metallic chambered member supported by said bridge-wall and extending above the latter, said member being provided 90 with an arched crown and with a plurality of air-exit openings in the back wall thereof, said openings being located above the bridge-wall, the member also having an air-inlet opening in the front wall and located below the grate, a 95 damper pivoted to the member for controlling the inlet-opening thereof, and means for operating said damper.

2. The combination with a furnace-wall, and a grate, of a flue-plate spaced laterally 100 with relation to said wall and forming an intermediate air-chamber, said flue-plate having a series of exit-openings above the grate and also provided with a series of vertical baffles on the outer face of said wall, said 105 baffles being located below and in the vertical plane of the exit-openings.

3. The combination with a furnace-wall, and a grate, of a flue-plate having spacing-fingers and exit-openings at its upper edge 110 and a series of baffles below said exit-openings and in the vertical plane thereof, said baffles having staggered relation to the spacing-fingers, said flue-plate being assembled relatively to the wall and forming therewith 115 an intermediate air-chamber, and means for admitting atmospheric air to said chamber at a point below the baffles.

In testimony whereof I have signed my name to this specification in the presence of 120 two subscribing witnesses.

EDWIN FREDERICK COMBER.

Witnesses:

L. S. VAUGHAN,
EDWIN COMBER.