

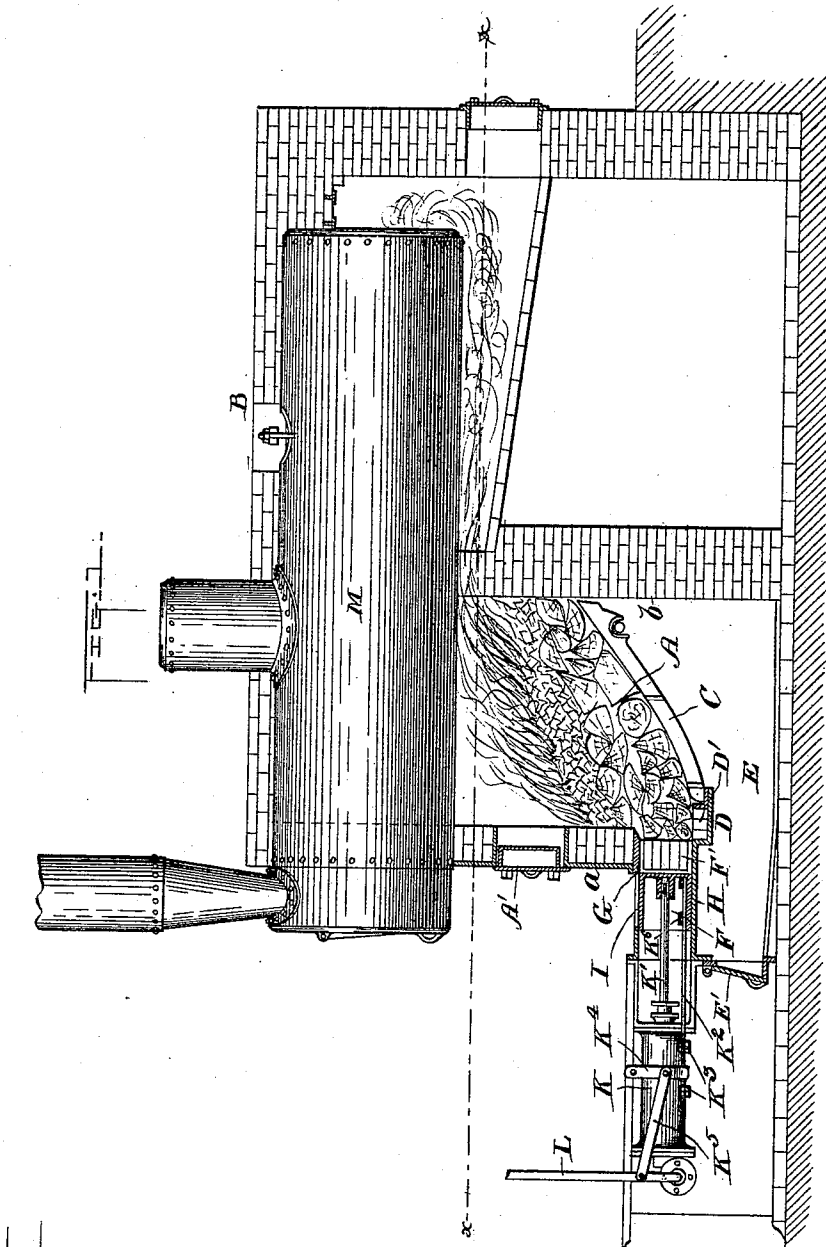
(No Model.)

2 Sheets—Sheet 1.

E. W. JONES.
BOILER OR OTHER FURNACE.

No. 470,053.

Patented Mar. 1, 1892.



Witness:
C. J. Fenwick

Witness:
Evan H. Jones
by his Attorneys
Mason, Fenwick & Lawrence

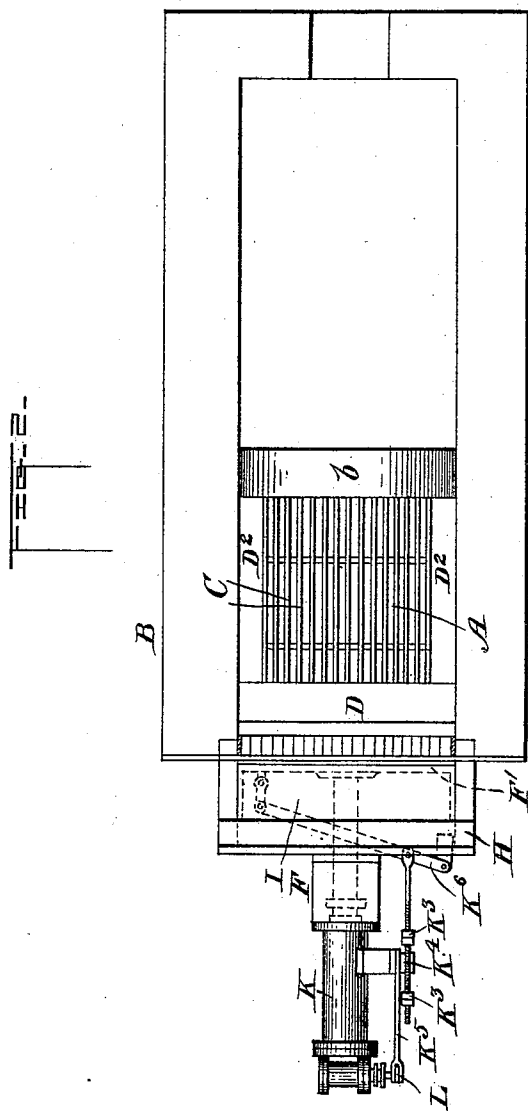
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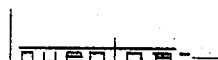
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UNITED STATES PATENT OFFICE.

EVAN W. JONES, OF PORTLAND, OREGON.

BOILER OR OTHER FURNACE.

SPECIFICATION forming part of Letters Patent No. 470,053, dated March 1, 1892.

Application filed June 29, 1891. Serial No. 397,800. (No model.)

To all whom it may concern:

Be it known that I, EVAN W. JONES, a citizen of the United States, residing at Portland, in the county of Multnomah and State of Oregon, have invented certain new and useful Improvements in Boiler or other Furnaces; 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 appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to boiler and other furnaces, and is an improvement on the furnace patented to me August 27, 1889, No. 409,792.

My present invention consists in certain novel features of construction and combinations in my aforesaid patented furnace, as will be hereinafter described and specifically claimed, whereby the furnace is rendered more enduring at the front part of the fire-bed and more effective for burning cord-wood or other coarse fuel, the larger pieces of wood or fuel being supplied from beneath the mass of burning fuel on top and the air in governed quantities supplied from below the fire-bed, through the grate, from the ash-pit below.

In the accompanying drawings, Figure 1 shows a broken longitudinal section of my improved furnace as employed in connection with a boiler, and Fig. 2 is a horizontal section on a line a little below the boiler.

The fire and fuel chamber A of the furnace B is provided with a door A' for starting the fire, and the bottom of this fuel-chamber is formed of a series of concave or sloping grate-bars C and a front fire-brick-lined dead-plate D, and said bottom or fire-bed is mounted on suitable substantial supports of the furnace above an ash-pit E, the said ash-pit being provided with a draft-regulating damper E', which may be operated by a wire or lever from above the floor whenever necessary to govern the amount of air admitted through the grate. The grate-bars C and the dead-plate D are inclined upwardly on a gentle slope from the front wall a to the bridge-wall b of the fire-chamber, thus forming a partially-grated fuel-supporting bed, on which the fuel is made to

move from front to rear and therefrom by a crowding action of a fire-brick-lined feeding-ram F, caused to roll over amid the mass of burning coals above it, and thus is insured perfect combustion of the fresh or green fuel brought into contact with the red-hot coals and flame above and about it. The bottom of the front dead-plate D is constructed so as to lie on a plane below the supply-opening in the wall of the furnace and that the top of its lining of brick D' shall be on a plane with the lowest part of said opening, and in rear of the ridge-bar, against which the brick-lining abuts, the dead-plate is extended backward, so as to form a resting and supporting ledge for the front ends of the grate-bars, said ledge being low enough down to allow of the upper surfaces of the bars at their front ends being just about as high as the top surfaces of the bricks, and thus a continuous or unbroken inclined bed shall be formed by the dead-plate and grate-bars, as shown. The dead-plate is made heavy enough to support the grate-bars at their front and, with said bars, to bear the load without a standard under the center of the grate, as the the foundation-walls of the furnace are extended laterally toward the center of the plate, leaving a narrow intermediate space under the plate just wide enough to supply air and get out the ashes.

On a plane above the front end of the grate and dead-plate an opening G is provided for the passage of the ram into the fire-chamber or through the front wall thereof, and in the top of the fuel-box H, in which the ram moves, an opening I is provided, and through it the fuel is introduced forward of the ram at such times as when the ram is drawn fully back. The ram may be operated by steam, compressed air, or hydraulic pressure, or by cam, eccentric, crank, rack and pinion, or screw. The drawings show the ram as arranged to be operated by the rod K' of the piston in the steam-cylinder K. A hand-lever L is shown for controlling the admission of steam to either end of the cylinder for forcing the ram forward and backward. The rod K² and tappets K³, pendent vibrating tappet-acted link K⁴, rod K⁵, and jointed lever K⁶, which are employed in connection with the ram for shutting off the steam at the end of the stroke,

may be as in the drawings, or the construction may be the same as in my aforesaid Letters Patent, or the construction and operation may be the same as in my application No. 2, or any other appropriate construction and arrangement may be adopted. The ram in the present construction, as well as in my aforesaid patent, is adapted for forming a bottom to the fuel-hopper when moved fully forward and for opening the hopper for discharge of fuel into the fuel-box when it is moved fully back. The fuel-box is made of a suitable size to accommodate sticks of wood or coarse fuel. The fire-brick lining F' protects the ram F from deleterious effects or destruction from very high temperature of the furnace at such times as when the fire is allowed to burn down to the fire-brick-lined dead-plate D and grate C, forming the fire-bed, and the same benefit is afforded to the metal of the dead-plate D by the fire-brick lining D' of said plate.

The boiler M is shown arranged above and partly over the fuel-chamber, and the means for forcing in the fuel as arranged at the front of the furnace in the same manner as in my aforesaid patent; but the arrangement of the boiler or boiler-flues and fuel-forcing means may be otherwise than as shown, as will also be seen in said patent. In fact, the furnace-chamber may be used in connection with any known water-leg fire-box boiler, and the furnace may be of brick and used not only for boilers, but in any locality where high temperature is required, and its feed-opening may be at the front, as shown in my present drawings, or at either the front or side of the furnace, as illustrated in my aforesaid patent. At the point where the supply-opening is formed in the furnace-wall a substantial supporting metal lintel is provided for the purpose of supporting the boiler-front and the brick-work over the opening for supply of fuel and passage of the ram through the furnace-wall, said lintel being supported by the wall of the furnace. The series of grate-bars C may extend all the way over the fire-chamber, or there may be left a dead-plate space at each side of the chamber, which spaces may be filled with fire-brick-lined dead-plates D² instead of grate-bars.

In constructing the furnace with the side dead-plates the spaces occupied by them are built up solid from the bottom of the ash-pit to the top surfaces of the grate-bars. These side dead spaces or plates are for the purpose of preventing the ends of the wood from burning off before the central portions are burned through, thereby maintaining a solid even fire.

It will be observed that the concave or sloped bottom of the fire-chamber is depressed to nearly a horizontal plane just in rear of the fuel-supply opening, and that it gradually rises on a curve until it terminates at the bridge-wall b, and thus formed it serves as a firm support for the fuel in the fire-cham-

ber and permits the ready insertion of fresh fuel and movement of the mass of fuel in rear of the incoming fresh fuel. If the dead-plate D is made proportionately wider with respect to the length of the grate-bars than represented, the said bars will have to be decreased in length, and if it is deemed desirable a dead-plate may be provided at the rear of the grated surface as well as at the front thereof. Such rear dead-plate might be similar to that shown in my aforesaid patent, but of less width. In practice a fuel-hopper for holding the fuel which is to be forced into the fire-chamber may be applied above the box in which the fuel is dropped, the same as in my aforesaid patent.

By the construction herein described the front portion of the fire-bed is effectually guarded from rapid destruction under high temperature of the furnace and the fresh or green fuel can be forced up into the body of the fire and the gases which are liberated from this fuel caused to pass through the body of burning coals above the fresh fuel, and by the location of the grate-bars below the fresh fuel and over the ash-pit having a draft-supply and regulating-damper a supply of air is secured at proper points for supporting combustion and insuring the carrying forward of the gases liberated from the fresh fuel through the hottest part of the fire.

My invention as herein described and as in my aforesaid patent differs, essentially, from other furnaces provided with fuel-forcing means wherein the fire-bed is not made a support for both the underlying mass of fuel and the superincumbent fuel and for conducting the fresh fuel up amid the mass of burning coal at such times as fresh green fuel is being forced into the fire-chamber by the ram or suitable forcing means.

What I claim as my invention is—

1. A furnace provided with an ash-pit, a draft-regulating damper, a fuel-supply opening above the ash-pit and beneath the fire, a fire-bed or supporting-bottom for the fire in rear of the supply-opening and sloping upward and backward from the base of the said supply-opening, said bed being formed of grate-bars and a front fire-brick-lined dead-plate, the latter constructed to support the grate-bars at their front ends and forming the front portion of said supporting-bottom, and a fuel-forcing device applied outside the furnace and in coincidence with the supply-opening and adapted for forcing the fuel directly into the fire-chamber through said opening, this combination being such that the sloping bottom forms a support for the fuel independently of the position of the feeding mechanism and the dead-plate of the bottom is at the front of the grate and supports the front of the grate-bars, substantially as described.

2. A furnace provided with an ash-pit having a draft-passage, a fuel-supply opening above the ash-pit and beneath the fire, a fire-

bed or supporting-bottom for the fire in rear
of the supply-opening in the wall of the fur-
nace and sloping upward and backward from
the base of said supply-opening, the said bot-
5 tom being formed of grate-bars and a front
fire-brick-lined dead-plate constructed with a
rear supporting-ledge for the front ends of
the grate-bars to rest upon and side dead-
plates, a fuel-hopper and a fuel-forcing de-
10 vice applied outside the furnace and in coin-
cidence with the supply - opening, the said
forcing device being adapted for forcing the
fuel into the fire-chamber through said open-
ing, this combination being such that the

bottom of the hopper is formed by the fuel- 15
forcing device and the sloping bottom forms
a support within the fire-chamber for the fuel
independently of the position of the feeding
mechanism and the dead-plates are in front
and at the sides of the grate-bars, substan- 20
tially as described.

In testimony whereof I affix my signature in
presence of two witnesses.

EVAN W. JONES.

Witnesses:

W. H. WOOD,
CHAS. PHILLIPS.