

(No Model.)

3 Sheets—Sheet 1.

E. W. JONES
FURNACE.

No. 409,792.

Patented Aug. 27, 1889.

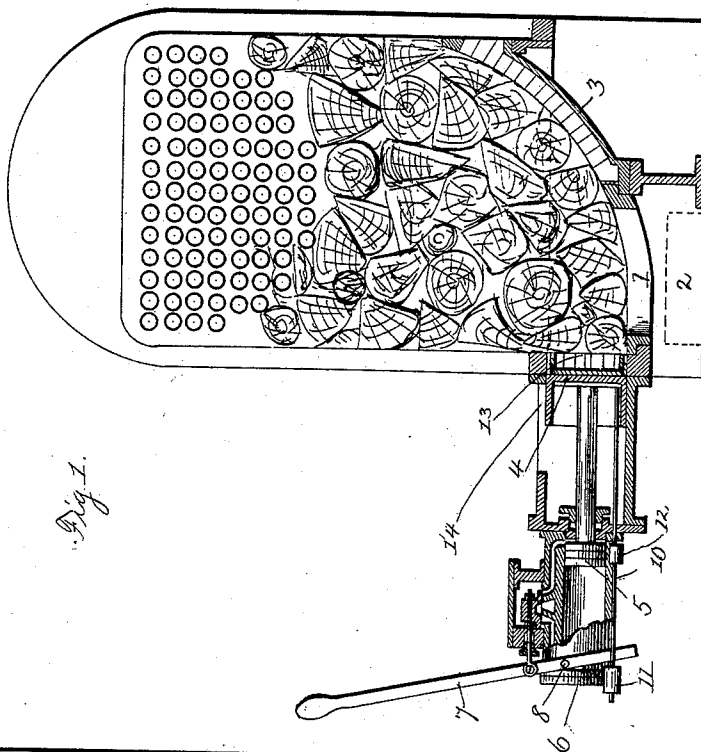


Fig. 1.

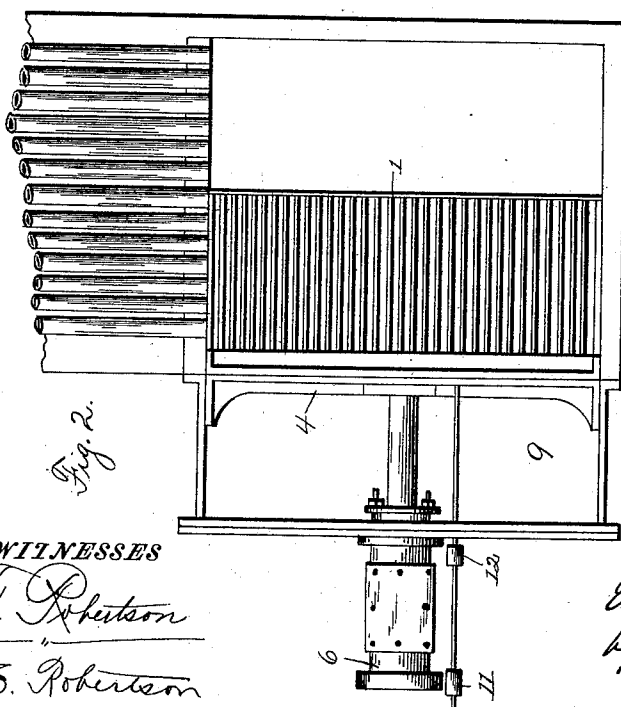


Fig. 2.

WITNESSES

John T. Robertson
Chas. E. Robertson

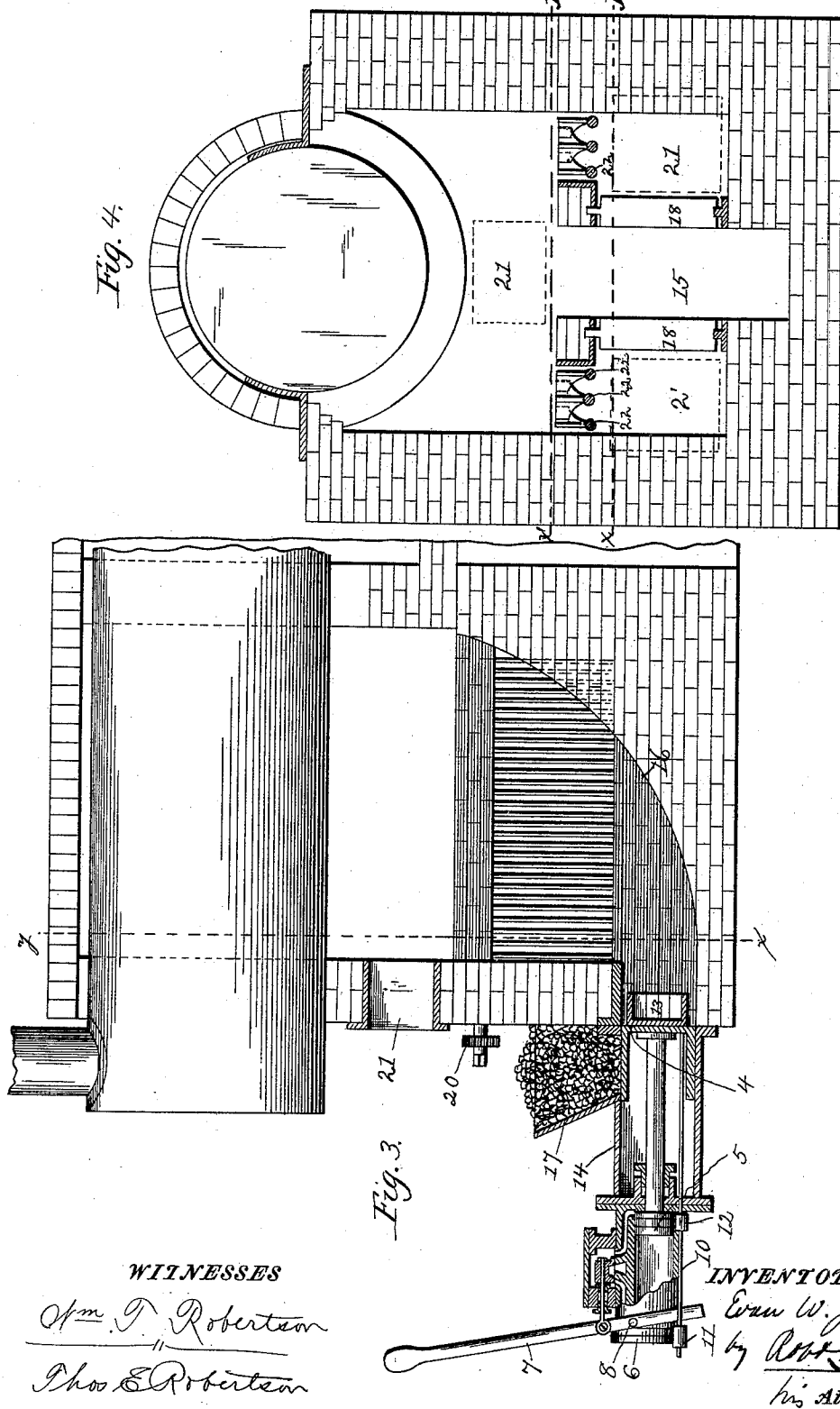
INVENTOR

Evan W. Jones
by Robert H. Lee
his Attorney

E. W. JONES.
FURNACE.

No. 409,792.

Patented Aug. 27, 1889.



(No Model.)

3 Sheets—Sheet 3.

E. W. JONES.
FURNACE.

No. 409,792.

Patented Aug. 27, 1889.

Fig. 6

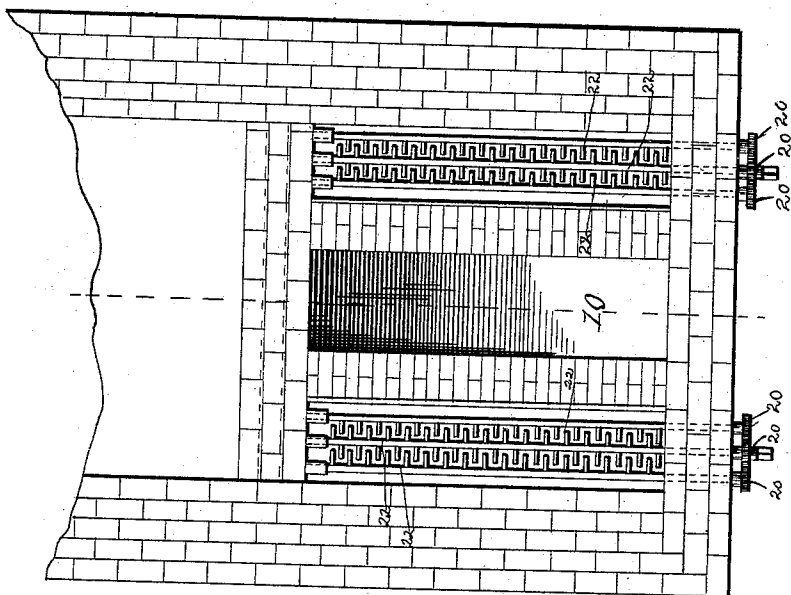
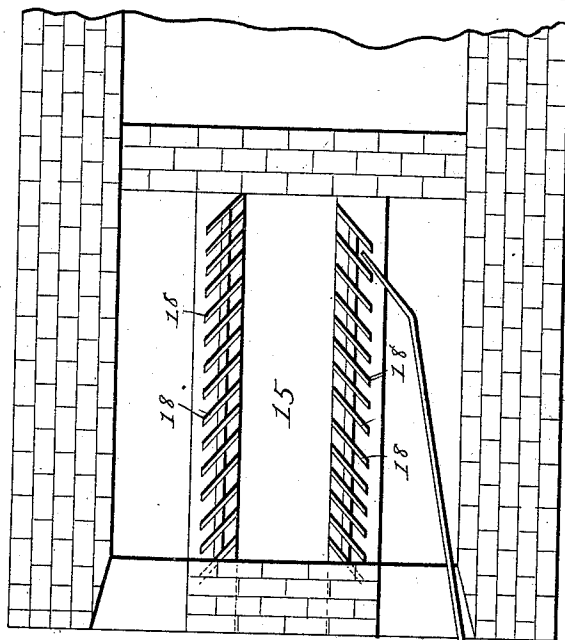


Fig. 5



WITNESSES

John J. Robertson

Thos. E. Robertson

INVENTOR

Evan W. Jones

by Robert Head
his Attorney

UNITED STATES PATENT OFFICE.

EVAN W. JONES, OF PORTLAND, OREGON.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 409,792, dated August 27, 1889.

Application filed June 7, 1889. Serial No. 313,480. (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-Furnaces and 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 and figures of reference marked thereon, which form a part of this specification.

This invention relates to improvements in furnaces for generating and consuming the gases from coal, wood, peat, sawdust, shavings, or other combustible material, and is applicable to any use, though particularly herein shown as applied to boiler-furnaces.

The object of the invention is to so construct a furnace that the gases from the fresh fuel shall be liberated under instead of over the glowing coals already in the furnace, and to provide for the necessary amount of air to carry on combustion at a point near the bottom of the furnace, resulting in a deep fire of glowing coals, through which all the gas liberated from the fresh fuel must pass, thereby consuming gases which would otherwise pass off unconsumed.

My invention consists of concave or inclined grate-bars, forming part of the bottom of the furnace, for the purpose of supporting the fuel when at rest, and for elevating the same when pressure is brought to bear from the outside and bottom of the incline, and for the purpose of admitting the necessary amount of air at a point near the bottom of the furnace.

My invention consists, further, in the arrangement of horizontal and vertical grate-bars for the purpose of admitting the necessary amount of air at a point near the bottom of the furnace, and to provide means for the removal of clinkers and ashes when necessary.

My invention also embodies features which will be hereinafter fully described in the specification and definitely indicated in the accompanying claims.

In the accompanying drawings, which illustrate my invention, Figure 1 is a central ver-

tical section of a wood-burning furnace. Fig. 2 is a plan of part of the wood-burning furnace. Fig. 3 is a vertical section of a furnace for burning coal or other similar material, the boiler being shown in elevation. Fig. 4 is a transverse vertical section of Fig. 3 on the line $x y$. Fig. 5 is a horizontal section on the line $x y$ of Fig. 4. Fig. 6 is a horizontal section on the line $x' y'$ of Fig. 4.

I will first describe the wood-burning furnace, and will then describe the modifications adopted to render it efficient for burning coal or other fuel of a fine or granular character. The bottom of the fuel-chamber, as shown in Fig. 1, is arc-shaped, inclining upwardly and to the rear of the chamber from the point at which the fuel is fed thereto. A series of inclined grate-bars 1 is mounted over the ash-pit 2. A dead-plate 3, lined with fire-brick, forms a continuation of the curve of the grate-bars. An opening is provided at the front end of the furnace, through which a ram 4 may be forced to push wood into the furnace. This ram is actuated by the piston of a steam-cylinder 6. The slide-valve controlling the admission of steam to the cylinder is connected to a hand-lever 7, pivoted at 8, so that the valve may be shifted to admit steam to either side of the piston and withdraw the ram from the rear end of the fuel-box 9, or force it into the opening in the front of the furnace, as desired.

Secured to the ram 4 is a rod 10, on which are tappets 11 12 to strike the lever and shut off steam when the ram reaches the end of its stroke. The lever is shown in a position which will admit steam in front of the piston and withdraw the ram. The tappets are so placed that they will shift the slide-valve to the exhaust-port of the cylinder.

The fuel-box 9 is made of such a size as will accommodate sticks or blocks of wood of a convenient length.

The ram is lined in front with fire-brick 13, so that the high temperatures of the furnace will not deleteriously affect it.

In the top of the feed-box is an opening 14, through which the fuel is introduced when the ram is drawn back.

The boiler is arranged transversely across the upper part of the fire-box, so that the products of combustion and hot air can circulate through the heating-pipes. By the

construction thus described the green fuel is forced up into the body of the fire. The gases which are driven off must pass through a bed of live coals and are completely consumed.

- 5 The location of the grate-bars below the fresh fuel admits the supply of air to support combustion at a point which will carry the gases driven off from the fresh fuel through the hottest part of the fire.
- 10 The inclined bottom of the furnace acts as a support for the fuel and permits the ready insertion of fresh fuel into the furnace. It also prevents the fire from falling in a body when the ram is withdrawn to fill the feed-
- 15 box, as the body of partially consumed material will wedge itself by gravity in the downwardly-contracting throat and support the fire.

In Figs. 3, 4, 5, and 6 I have shown a modified construction adapted to more perfect action when coal or other small fuel is burned. In this form the ash-pits 2' 2' are arranged on the sides of the furnace. A fuel-chamber is provided with an upwardly-curving bottom, and has at its mouth a feeding-ram, as in the furnace already described. In front of the fuel-box is a hopper 17, from which the box may be filled when it becomes necessary to add fresh fuel to the furnace. Vertical grate-bars are placed on the sides of the fuel-chamber. These grate-bars 18 have their faces set at an angle, as shown in Fig. 5, so as to admit of easy raking with a poker 19. An upper grate is also provided, the structure of which will be understood from Figs. 4 and 6. There is one on each side of the fuel-chamber. These auxiliary grates are preferably sectional, and are mounted on bars 22 22 22, provided with intermeshing gears 20 20 20 on the outside of the furnace, one of the bars having a squared end for the application of a crank. When the grate is rocked, the ashes are shaken down and the clinkers crushed.

The boiler may be supported over the furnace in any suitable manner.

A fire-door 21 is provided at the upper part of the furnace, through which the fire may be started.

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

1. A furnace provided with a lateral fuel-supply opening beneath the fire, a supporting bottom for the fire sloping upward and backward from the supply-opening, grate-bars forming a portion of said bottom, a dead-plate forming the remaining portion of said bottom, and a ram on the side of the furnace for forcing fuel into the opening, whereby fuel may be readily pushed up into the fire and will be firmly supported independently of the position of the feeding mechanism.

2. A furnace comprising a downwardly-contracting fuel-chamber having grate-bars in the lower portion thereof and forming at all times a firm support for the fuel, a lateral supply-opening in the lower part of the fuel-

chamber, and a ram for forcing fuel through the opening, said fuel being forced up into the fire by the sloping wall of the fuel-chamber.

3. A furnace provided with a fuel-chamber having an inclined bottom and a fuel-opening opposite the lower edge of the bottom, a ram for forcing fuel through the opening against the inclined bottom, whereby it will be forced up into the fire, and grates in the fuel-chamber, the upper portion of the fuel-chamber spreading laterally and being provided with auxiliary grates, as and for the purpose set forth.

4. A furnace provided with a fuel-chamber having an upwardly-inclining side and a fuel-supply opening below the line of fire, means for forcing fuel up into the chamber, and air-supplying grates in the side or sides of the chamber.

5. A furnace having a fuel-chamber provided with an upwardly-expanding cross-section, vertical grate-bars in the side of the chamber and between it and the furnace-walls, said grate-bars having their faces inclining toward the front of the furnace to facilitate raking.

6. In a furnace, the combination of a fuel-chamber having an upwardly - expanding cross-section, vertical grate-bars in the lower side walls of said chamber, horizontal grate-bars 22 in the upper part of said chamber, and a fuel-supply opening in the lower part of the chamber below the line of fire.

7. In a furnace, the combination of a fuel-chamber having an upwardly - expanding cross-section, vertical grate-bars in the lower side walls of said chamber, horizontal grate-bars in the upper part of said chamber, a fuel-supply opening in the lower part of the chamber below the line of fire, and a fire-door in the upper part of the chamber for building the fire.

8. In a furnace, the combination of the fuel-chamber having an upwardly-inclining bottom, a fuel-supply opening opposite said bottom below the line of fire, a fuel-box in front of the opening, a ram for forcing the fuel from the box up into the chamber, a piston connected to the ram, a valve-shifting lever for controlling the direction of movement of the piston, and a cut-off operated by the ram on the completion of its stroke.

9. In a furnace, the combination of a fuel-chamber having an upwardly-inclining bottom and a fuel-supply opening opposite said bottom below the line of fire, and a ram for forcing fuel into the opening, said ram having a fire-brick lining on the side entering the opening.

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

EVAN W. JONES.

Witnesses:

W. J. IDLEMAN,
J. C. RUETENIK.