

J. L. HEALD.

FURNACES FOR STEAM BOILERS.

No. 179,191.

Patented June 27, 1876.

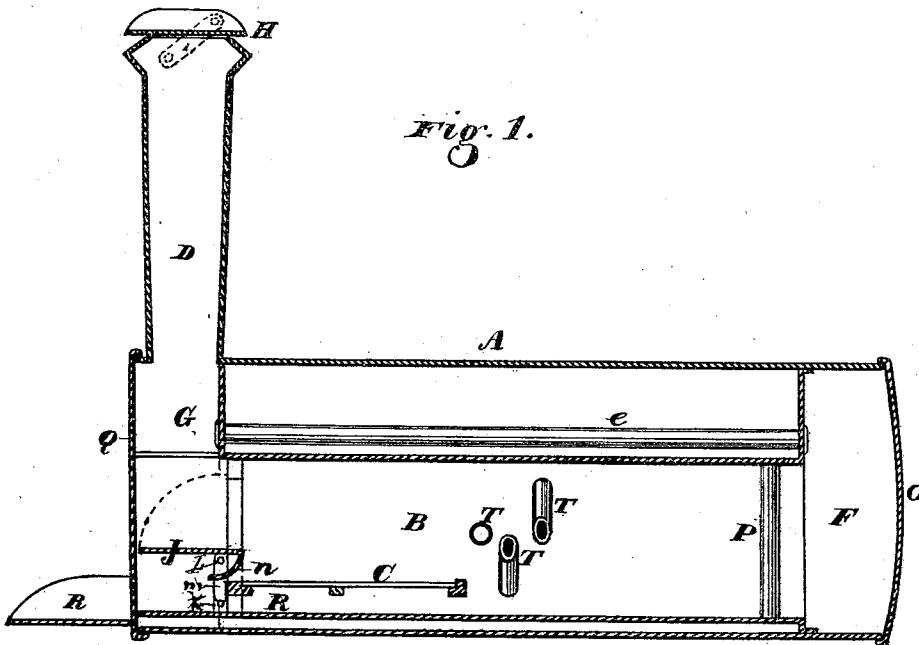


Fig. 1.

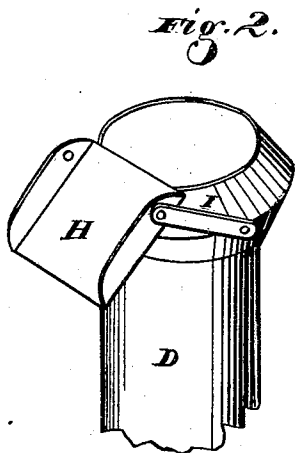


Fig. 2.

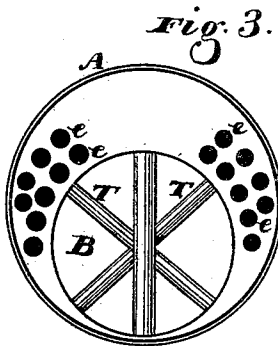


Fig. 3.

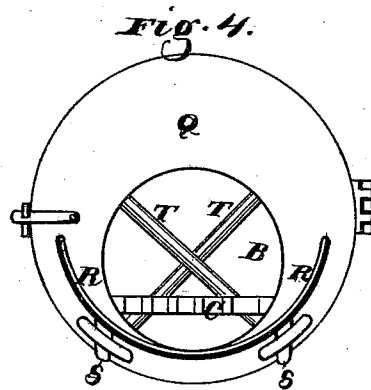


Fig. 4.

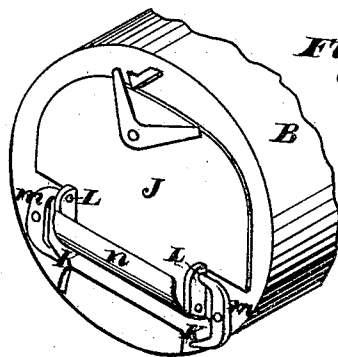


Fig. 5.

Witnesses

Geo. H. Strong.
C. H. Richardson.

Inventor

John L. Heald

UNITED STATES PATENT OFFICE.

JOHN L. HEALD, OF VALLEJO, CALIFORNIA.

IMPROVEMENT IN FURNACES FOR STEAM-BOILERS.

Specification forming part of Letters Patent No. **179,191**, dated June 27, 1876; application filed April 11, 1876.

To all whom it may concern:

Be it known that I, JOHN L. HEALD, of Vallejo, Solano county, State of California, have invented Improvements in Boilers; and I do hereby declare the following description and accompanying drawings are sufficient to enable any person skilled in the art or science to which it most nearly appertains to make and use my said invention or improvement without further invention or experiment.

My invention relates to certain improvements in boilers which are employed to supply steam to drive engines, and it is more especially applicable to that class known as "field" or "portable" engines, in which it is desirable to use wood, straw, brush, or other light fuel.

It consists of a novel attachment for the chimney or stack of the boiler, whereby I am enabled to greatly increase the draft and regulate it, so as to make steam more quickly and retain it more effectually, whatever may be the condition of the wind or atmosphere.

My invention further consists in a novel construction of a furnace-door turning upon a horizontal axis, which is made adjustable, so as to regulate the size of the door-opening to receive different classes of fuel, while at the same time no undesirable draft through the fire will be permitted by this change of door-opening.

Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 is a longitudinal section. Fig. 2 is a perspective view of top of chimney and deflector. Figs. 3, 4 are transverse sections, showing rear and front views, respectively. Fig. 4 is a view of the door with its double hinges.

A is my boiler, which may be made in any suitable form; but to explain certain parts of my invention I have shown it as made in the form well known as a "Cornish" boiler, having one large flue, B, passing through the lower part, with a grate, C, near one end to receive the fuel, and small return flues or tubes *e*, that bring the heat back to the chimney D, which is situated at the furnace end of the boiler. The combustion-chamber F at the rear end, and the smoke-box G at the front, are in no way different from the con-

struction shown in the old English forms of this boiler, in which the large tube B passes through the flue-sheet to the front end of the smoke-box, while the small tubes are secured at each end on the flue-sheets.

Whenever the wind is blowing it is difficult in any field-engine to get a good draft in first starting a fire, because the air blowing across the top of the chimney will cause eddies and downward currents, which prevent a rapid and regular combustion, as is well known. In order to remedy this trouble I fix to the upper part of this chimney D a plate, H, which is so mounted that it may be adjusted to stand in such a position as to deflect the current of air and cause an upward draft through the chimney. This is done in the present case by means of connecting-links I I, which are pivoted to each side of the plate, and also to the top of the chimney, so that by means of proper attachments the angle of the plate and its relative position to the chimney-opening may be changed at will.

The edges of the plate are turned up, so as to make a sort of trough, and it may be found advisable in some cases to form a complete tube, bent or placed at an angle to cause the desired upward draft, the effect of which is somewhat the same as that of an injector, as this deflected current of air causes a sort of vacuum in the chimney, which will thus create the necessary draft.

This device is shown as pinned in one position to the chimney, and it needs no other adjustment for use in the fields of California, where the winds are trades, and constant from one direction; but in case of variable winds, a loose band or ring may be fitted to turn upon the top of the chimney, and the connecting-rods pinned to this ring, so that the deflector can be easily adjusted to any position. After work is finished this deflector may be drawn across the top of the chimney to serve as a damper, and cut off all draft.

In order to fit my boiler for the use of different kinds of fuel, I have constructed a furnace-door in such a manner that the size of the opening can be easily and instantly adjusted, so that when I wish to use wood I can make the opening large enough for that purpose; but if straw or brush is to be used it

is desirable to contract the door-opening, and this may be done in various ways.

I have made use of a door, J, so mounted as to drop into a horizontal position when open, and this door has two sets of pintles or hinges to turn on. K K are a pair of hinges, placed at the lowest part of the door, so that when these are used the door will open to expose the full size of the furnace-opening. L L are another pair of pintles or hinges, which support the door at points nearer the center, and when it turns upon these a small opening is left. These two pairs of hinges are mounted upon the ends of a plate or lever, *m*, which is pivoted to turn in the center, and is secured to the side, as shown.

It will be seen that when this plate is turned so that one pair of pintles enter the sockets made for them the other will be withdrawn, and thus the change from a large to a small opening, or vice versa, will be easily accomplished without removing the door from its hinges. When the door is turned upon the hinges nearest the center, the portion back of the hinges would be turned, so as to leave an opening for the entrance of air, if the door were straight, which would be undesirable, as the small opening is always used with light fuel, where it is necessary to keep the air from entering except through the grate-bars and door-opening itself. I therefore curve this back part of the door into a semicircle, as at *n*, so that when it turns upon the pintles L L this semicircle will just fill the opening below the pintles, and prevent the entrance of air at that point.

In the use of straw for a fuel, a fierce draft is caused through the large flue, and the heat strikes the rear cap or door O so strongly as to make it red hot and burn it out. I remedy this by placing one or more tubes, P, transversely across the large flue near the rear end, as shown, and these serve to divide or deflect the flame, and by this deflection partially turn it and prepare it to enter the return-flues. The effect is to protect, in a great measure, the rear cap and the tubes, and it also assists in circulating the water more freely in the boiler.

To prevent the straw or other light fuel from rolling up and off the grate-bars into the combustion-chamber, I insert short tubes T T across the large flue at or near the end of the grate-bars. I find that all grate-bars placed across the large flue to prevent the straw from

passing to the combustion-chamber soon burn out. I also find that tubes placed across the large flue at the end of the grate-bars increases the heating capacity of the boiler very much, and aids the circulation of the water in the boiler.

The front head or cap Q of the smoke-chamber is always hinged, so as to be readily opened for the purpose of cleaning out this chamber, and the ash-pan R, which I desire to use, would be in the way and strike the wheels of the engine when this door is opened, if made stationary. I therefore make two sockets upon the lower side of this door, and two arms, S, secured to the ash-pan, are so bent as to enter these sockets, thus making the ash-pan removable at will.

The door J, when in its horizontal position, just fills the flue, and may rest upon short flanges, thus preventing straw from falling into the ashes in the lower part.

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

1. In a straw-burning furnace, the grate O, large flue B, return-flues *e e*, and chimney D, in combination with the deflector H, adjustably hinged or attached, so as to cause an upward draft of air in the chimney by changing the current of air as it passes across, substantially as and for the purpose described.

2. The door J, turning upon the hinges K or L, said hinges being arranged in pairs, so that, changing from one pair of hinges to the other, the opening of the door will disclose a larger or smaller space for firing, substantially as herein described.

3. The lever-arms *m*, centrally pivoted, and carrying the pintles or hinges K and L at either end, so that, by turning on their points of support, one pair of pintles will be thrown into their sockets to support the door, and the other pair released, substantially as herein described.

4. The door J, with its two sets of hinges K and L, and having its lower edge formed into a semicircle, with the center L as a radius, so that when the smallest fuel-opening is disclosed, the semicircle will prevent the entrance of air to the furnace below the axis of motion of the door, substantially as described.

JOHN L. HEALD.

Witnesses:

GEO. H. STRONG,
C. M. RICHARDS.