P. W. LAMB.

STEAM-BOILER FURNACES.

No. 185,829. Patented Jan. 2, 1877.

Fig. 1.

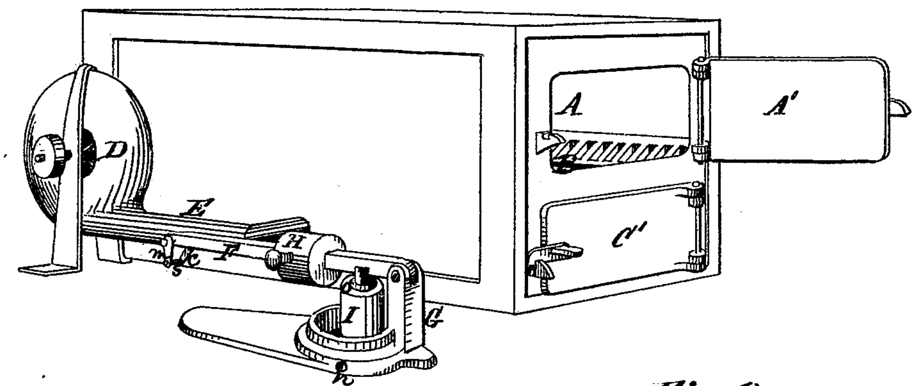


Fig. 3.

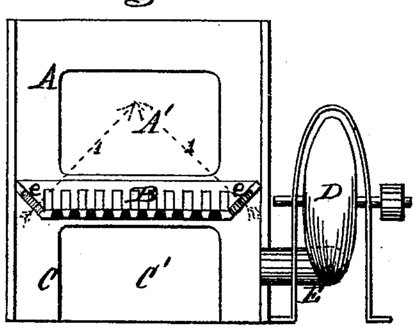


Fig. 2.

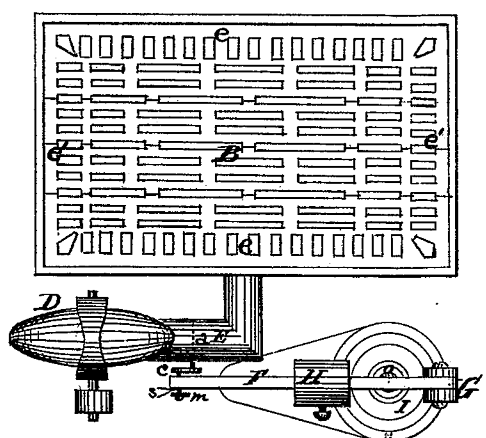
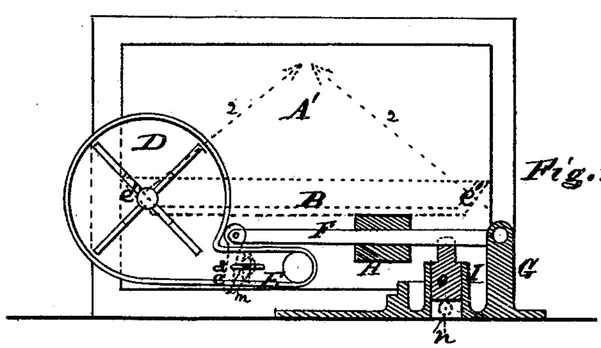


Fig. 4.



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IMPROVEMENT IN STEAM-BOILER FURNACES.

Specification forming part of Letters Patent No. **185,829**, dated January 2, 1877; application filed October 16, 1876.

To all whom it may concern:

Be it known that I, PATRICK W. LAMB, of the city and county of Albany, State of New York, have invented certain Improvements in Furnaces for Steam-Boilers; and I do hereby declare that the following is a description thereof, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 represents a perspective view of a furnace embodying the improvements in this invention. Fig. 2 is a plan view of the same. Fig. 3 is a cross-sectional view of the same. Fig. 4 is a sectional elevation.

My invention relates to furnaces of steam-boilers; and consists in the several combinations of devices or elements hereinafter described.

The object of this invention is to regulate the amount of air admitted to the fuel in combustion, and to direct the flame toward the center of the fire-chamber.

To enable others skilled in the art to make and use my invention, I will proceed to describe it in reference to the drawings and letters of reference marked thereon, the same letters indicating like parts.

In the drawings, A represents the combustion-chamber in which the fuel and gases are burned. B is the grate. C is the ash-pit. A′ is the door of the combustion-chamber. C′ is the door of the ash-pit. D is a blower intended to be driven by power. E is the air-conduit leading from the blower to the ash-pit. The grate B has its sides *e* made with an incline, which extends from the said grate B to the vertical walls of the furnace A, provided with openings, as shown. The inclined sides prevent the lodgment of dead fuel and ashes, and also permit the air to enter into the combustion-chamber from below in an oblique direction, as shown in Fig. 3, so as to concentrate the combustion of the gases about central within the combustion-chamber. The ends *e′* of the said grate are also made inclined, in the same manner as the sides, and provided with perforations, so as to admit a portion of the air forced through the said inclined ends in an oblique direction, and prevent the accumulation of dead coal and refuse. The perforations in the grate, in its horizontal portions and in the inclined side and end portions, are about one-eighth of an inch in diameter at the upper surface, and may be made in the form of oblong slits or round perforations, of about one-eighth of an inch diameter, so as to prevent the coal-dust from passing through. The ash-pit door is made solid, without any draft-door or opening to permit either the escape of air from the said ash-pit or entrance of air to the same from without. Placed in the conduit E is the damper *a*, secured to a shaft having bearings in the sides of the said conduit. Secured to one end of the damper-shaft is the crank *c*, provided with a pin, *s*, to which is pivoted the connecting bar or piece *m*, the upper end of which connecting-bar is pivoted to the lever F, which lever is pivoted at its opposite end to the standard G. The lever F is weighted by the adjustable weight H. I is a steam-cylinder, supplied with steam from the boiler by a pipe, (not shown,) through the port *n*. Nicely fitted in the said cylinder is the piston *o*, the upper end of which bears against the lower side of lever F, so as to be capable of raising the same when the pressure on the piston becomes sufficient to overcome the gravity of the weight carried by the lever F.

The manner in which the improvements in this invention operate is as follows: The coal-dust is thrown in a mass or body on the kindled fire in the furnace-chamber. The blower is rapidly revolved by a belt driving the pulley of the blower. The weight H on the lever F is adjusted to a proper point to load the said lever against a stated or desired pressure of steam to be used. When the steam is below the pressure the boiler is to bear, the damper *a* will be held open, as shown by full lines in Fig. 4; but when the pressure is greater, so as to raise the lever F, the said damper will be closed by the action of the said lever operating the said damper through the medium of the connecting-piece *m* and crank *c*. The ash-pit door, being without a draft-opening and fitting close with the door-opening, prevents all escape of air from the ash-pit when the blower is in operation, while, at the same time, no air is permitted to enter the ash-pit by natural draft when the damper is closed. When the damper is closed the fuel in combustion will be wanting in a supply of oxygen for the

same, and the fire will become deadened, or the combustion will be reduced to a degree, until the generation of steam in the boiler has been lessened, when the lever F will fall and open the damper, and permit the air to pass to the ash-pit and the fuel in combustion above. When the air is driven into the ash-pit one portion will be forced up vertically through the openings in the horizontal section of the grate. Another portion will be forced into the furnace-chamber through the openings in the side inclines of the grate, in an oblique direction, as indicated by dotted lines 1 in Fig. 3, and another portion of the air will be forced into the said chamber in an oblique direction through the openings of the inclined ends, as indicated by dotted lines 2 in Fig. 3, while, at the same time, the combustion of the hot gases will be, in a measure, concentrated nearly centrally within the said chamber.

It will be readily seen that by these improvements the combustion of the fuel will be proportionate to the steam generated, and the generation or pressure of the steam may effectually regulate the damper and the quantity of air to the fuel to supply combustion. It may also be readily seen that no dead coal or refuse material can be permitted to lodge in the side and end corners of the furnace-chamber at the grate, and that, by the oblique direction of the blast of air through the inclined end and side openings of the grate, the hot gases will be burned more centrally within the furnace-chamber, to be drawn with a better effect through the tubes or flues of the boiler than with the air passing up vertically through all portions of the grate.

These improvements may be applied to either upright or horizontal boilers with the same results.

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

The combination, with the furnace A, provided with grate B and blower D, provided with a conduit leading to the ash-pit beneath the said grate, of the damper *a*, weighted lever F, steam-cylinder I, and piston *o*, operating substantially as and for the purpose set forth.

PATRICK W. LAMB.

Witnesses:
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