A. LAWRENCE.

BLAST-NOZZLES FOR STEAM BOILER-FURNACE.

No. 182,204. Patented Sept. 12, 1876.

Fig. 4.

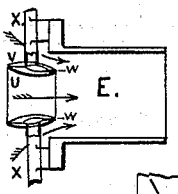
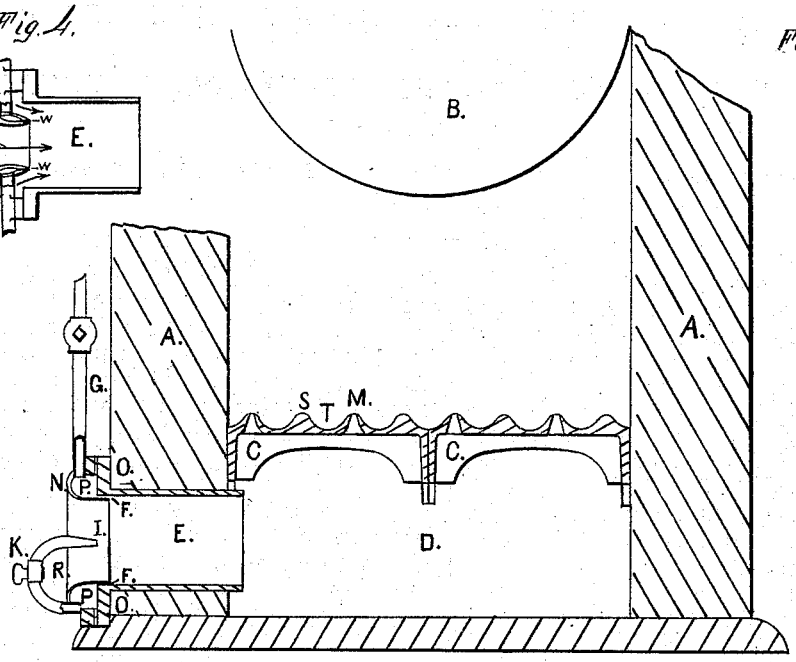


Fig. 1.



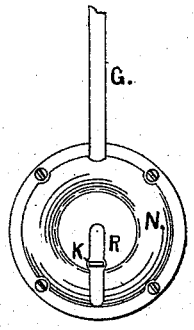


Fig. 3

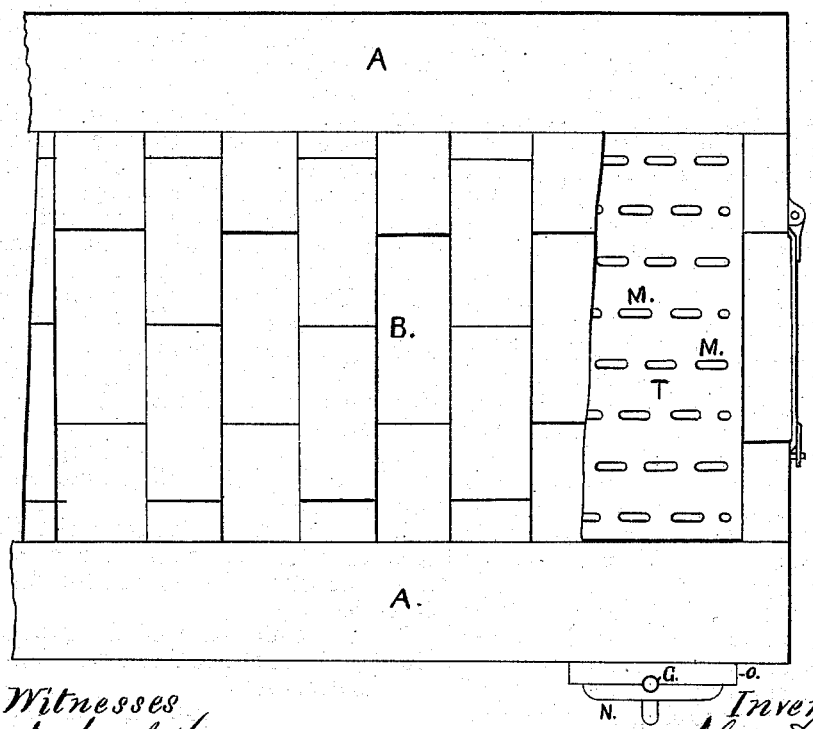


Fig. 2.

Witnesses
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UNITED STATES PATENT OFFICE.

ALVIN LAWRENCE, OF LOWELL, MASSACHUSETTS, ASSIGNOR OF ONE-HALF OF HIS RIGHT TO JOHN KNOX FOSTER, OF PHILADELPHIA, PA.

IMPROVEMENT IN BLAST-NOZZLES FOR STEAM-BOILER FURNACES.

Specification forming part of Letters Patent No. **182,204**, dated September 12, 1876; application filed May 29, 1876.

To all whom it may concern:

Be it known that I, ALVIN LAWRENCE, of Lowell, State of Massachusetts, have invented a new and Improved Furnace for Boilers, of which the following is a specification:

The object of my invention is to produce an improved furnace for burning fine coal, such as is known as pea or dust coal; and consists of an improved air-nozzle or air-passage, having an annular jet of steam projected therein, through which the air is drawn forward to supply air for combustion.

As shown in the accompanying drawings, Figure 1 shows a cross-section through the furnace, showing the grate-bars and nozzle in cross-section. Fig. 2 is a top view, with portion of the boiler removed, showing longitudinal slots in the grate-bars and the position of air-nozzle. Fig. 3 shows front view of nozzle detached; all the drawings showing portions of the devices embodying my invention. Fig. 4 shows section through air-nozzle, in which the annular slot for the projection of the steam-jet is so arranged that the air may pass both within and without the steam-jet through the air-nozzle; also embodying a modification of my invention.

A, Figs. 1 and 2, are the outer walls of the furnace; B, the boiler; C C, the grates; D, the air-chamber under the grates; E, the nozzle; N, a shell attached to the flange O of the nozzle, and extending a short distance into the nozzle, leaving a narrow slit, F, through which the steam passes into the nozzle. Near its inner circumference the shell N is so shaped as to leave an annular chamber, P, between it and the flange O of the nozzle, and a pipe, G, connects with the chamber P to supply the required steam. A valve in the pipe is used to regulate the supply of steam. A pipe, R, is connected with the chamber P, and is bent so as to direct its delivery-end into the nozzle E, and is provided with a cock, K, so that a jet of steam may be used at a central point in the nozzle to augment the blast produced by the annular jet through the space F, if desired.

In Fig. 4 the annular chamber is formed between two shells, U V, which are closed at the outer edge, and so arranged as to leave an annular slit, W, at their inner edge. The shells are supported by the pipes X, and the whole so arranged that air may be drawn through the ring formed by the two shells, and also between the ring and the inner surface of the nozzle by the jet of steam projected through the slit W.

In practice I make the internal diameter of the nozzle about four inches for sixteen feet of grate-surface, and about five inches for twenty-five feet of grate-surface, but these proportions may be varied, as desired.

The width of the annular space F is usually made from one one-hundredth to one two-hundredth of an inch in width, and with these proportions it is found effective in supplying the necessary air for combustion. The central pipe R is effective in increasing the blast of air on occasions when desired.

In practice I make the nozzle and steam-jet circular in cross-section, but it is obvious that they may both be of oval cross-section, or of other form, without departing from my invention, which is embodied in the continuous slit F combined with the air-nozzle.

The arrangement of the shell N and nozzle E may be so far modified so that the shell N may touch the nozzle E at intervals at the delivery F, leaving a nearly continuous sheet of steam, without departing from my invention embodied in the drawing.

I claim—

1. In an air-nozzle for furnaces, the continuous slit F, substantially as and for the purpose described.

2. In a furnace, the grate-bars C C, in combination with the nozzle E, and continuous slit F, substantially as and for the purpose described.

3. The combination of the nozzle E, provided with the flange O and the shell N, forming the chamber P.

ALVIN LAWRENCE.

Witnesses:

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