

(No Model.)

J. HAM.
BOILER FURNACE.

No. 358,351.

Patented Feb. 22, 1887.

Fig. 2.

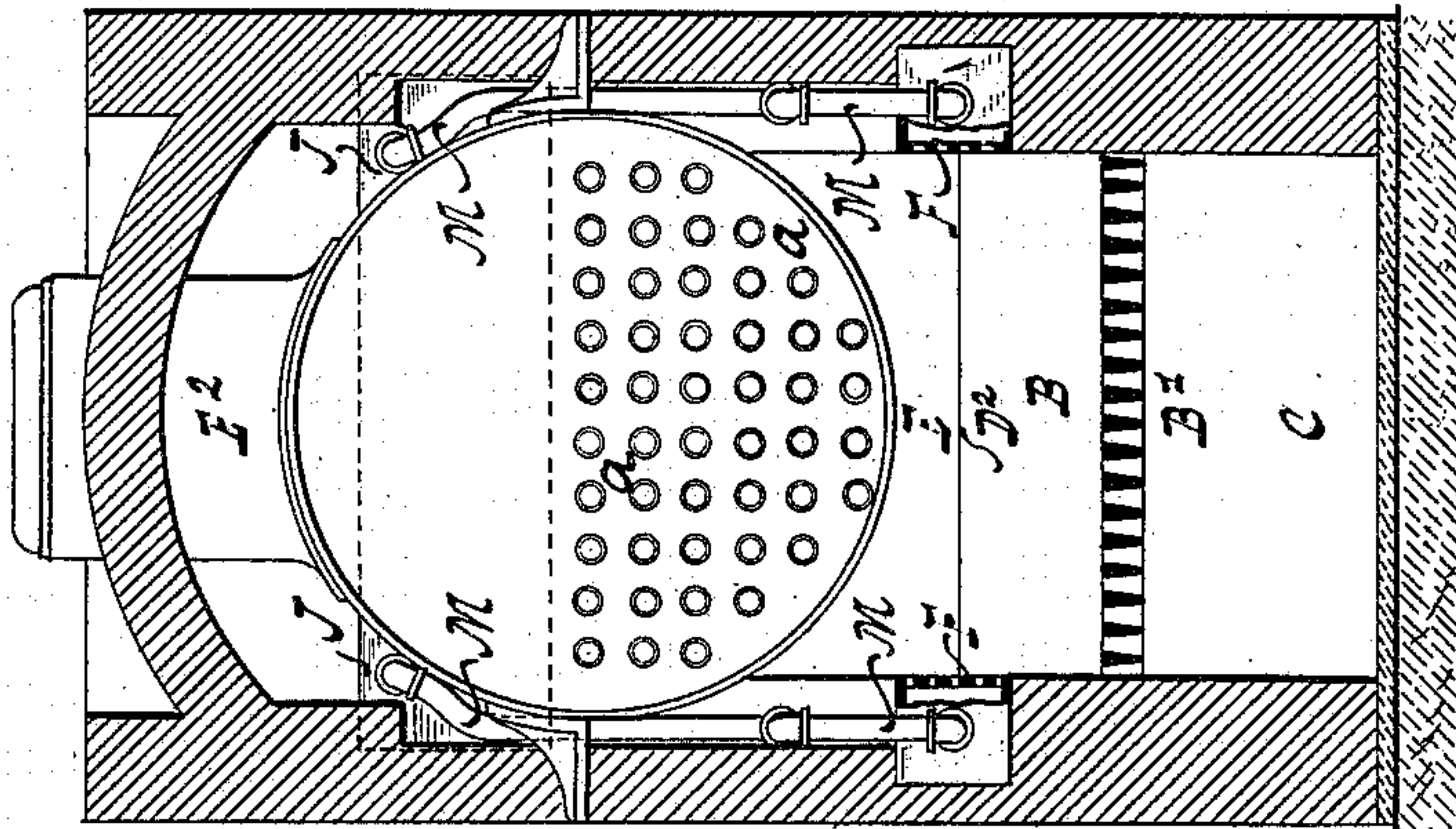
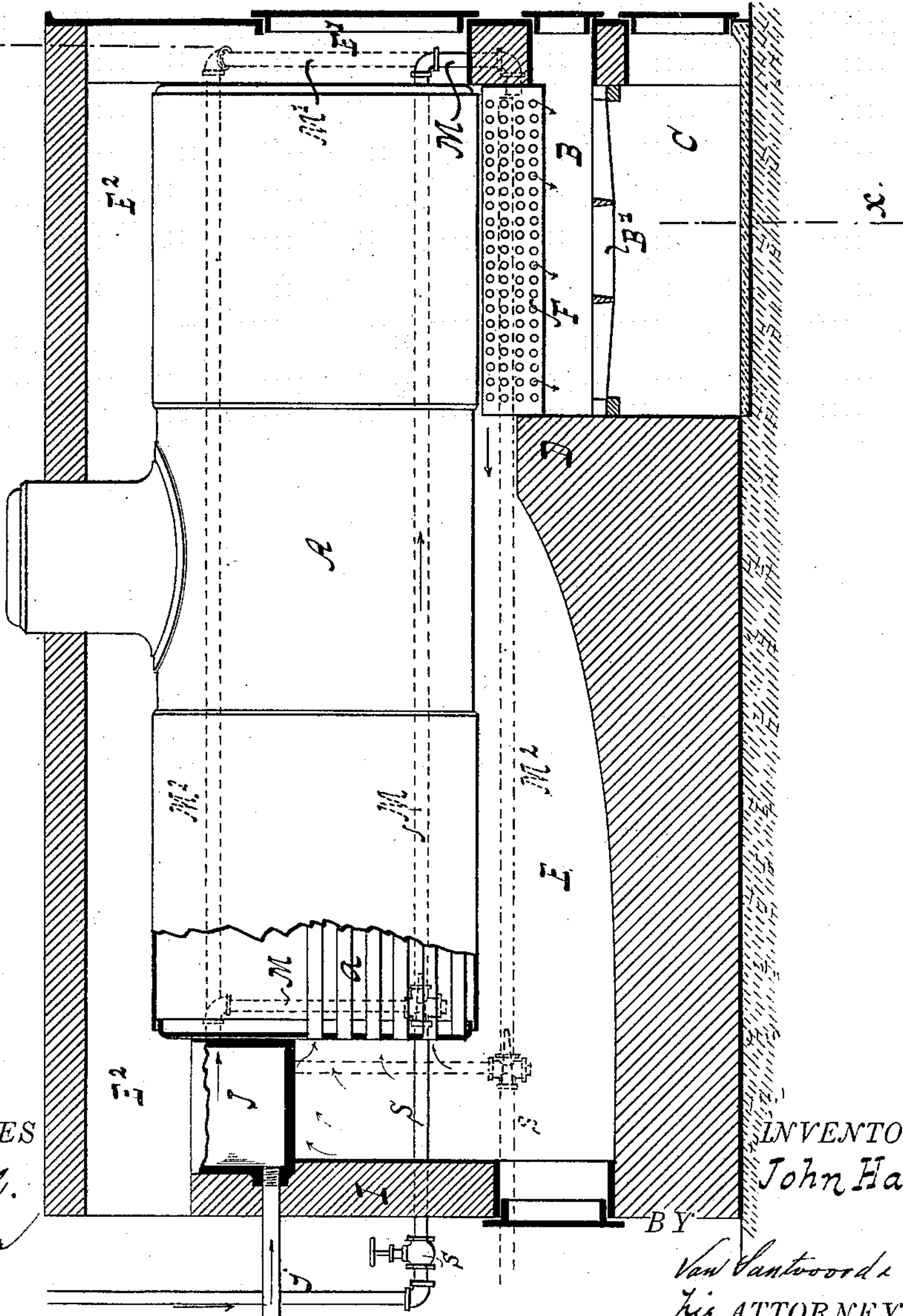


Fig. 1.



WITNESSES

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JOHN HAM, OF BROOKLYN, NEW YORK.

BOILER-FURNACE.

SPECIFICATION forming part of Letters Patent No. 358,351, dated February 22, 1887.

Application filed June 10, 1886. Serial No. 204,770. (No model.)

To all whom it may concern:

Be it known that I, JOHN HAM, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented new and useful Improvements in Boiler-Furnaces, of which the following is a specification.

This invention has for its object to provide novel means for supplying heated air to the fire-chamber of a steam-boiler furnace; and to such end it consists in the combination and arrangement of devices hereinafter described and claimed, reference being made to the accompanying drawings, in which—

Figure 1 represents a longitudinal central section of a steam-boiler and its furnace embodying my improvements. Fig. 2 is a transverse section thereof in the plane $x x$, Fig. 1.

Similar letters indicate corresponding parts.

In the drawings, the letter A designates a steam-boiler provided with tubes a . B is the furnace. B' is its fire-grate; C, the ash-pit. D is the bridge-wall. E is the combustion-chamber. E' is the uptake at the front of the boiler, and E² is the smoke-chamber, which communicates with the chimney, all said parts constituting the setting of a return tubular boiler of well-known construction.

At both sides of the grate B, and above the level of the same, are located the air-distributors F, that are formed by boxes of metal or refractory material, which air-distributors are provided with a large number of perforations on the sides facing the fire. By placing the air-distributors within the walls surrounding the boiler they are not liable to be destroyed by the heat of the furnace, and they do not interfere with the draft nor with the introduction of fuel to the furnace B.

In constructing the settings of return tubular or flue boilers it is necessary to separate the combustion-chamber E from the smoke-chamber E², in order to cause the flame to make its way through the tubes or flues a of the boiler. This separation has been heretofore accomplished by constructing a horizontal partition-wall between the boiler and the rear wall, I, of the setting, said partition extending transversely between the side walls at a level above the topmost row of the fire tubes

or flues. Instead of this wall I make use of an air-box, J, which occupies the position of the old deflecting or partition wall, and consequently is heated by the flames coming into contact with its bottom. This air-box is built in the masonry of the boiler, so as to be securely supported, and its side or inner wall is in close contact with the boiler. In the other side of the box is an inlet-opening, from which a pipe, j , Fig. 1, is led through the rear wall, I, and into the open air, so that the box is constantly filled with air. The air-distributors F F are connected with this air-box by pipes M, which, in the example shown by full lines in the drawings, lead from the side of the air-box down one side of the boiler, then longitudinally through the combustion-chamber, then downward, and finally to the front ends of the air-distributors.

The draft of the chimney causes the air to be drawn into the air-box and through the pipes M to the air-distributors, from whence it is discharged in fine streams into the furnace, and mingles with the flame to produce a perfect combustion. In cases where the draft is not sufficient any air-forcing device may be coupled to the inlet-pipe j of the fire-box.

The air drawn into the air-box is heated while therein, and during its passage through the pipes M is additionally heated, so that it is discharged from the distributors at a high temperature, and consequently does not cool the furnace gases.

The course of the pipes connecting the air-distributors F F with the air-box J may be varied. For example, as shown by the dotted lines designated M' in Fig. 1, the pipes extend directly in a horizontal line through the smoke-chamber E², thence downward between the front head of the boiler and the front wall of its setting, and thence to the front end of the air-distributors; or, as shown by the dotted lines designated M², they may lead vertically from the bottom of the air-box and then horizontally through the combustion-chamber and extend into the rear ends of the air-distributors. In this case the pipes project into the air-distributors to near the front ends thereof, so that the heated air must necessarily fill the distributors.

Instead of leading the pipes M through the furnace, they can be led through the boiler itself; or the air-box may be connected by short pipes with two or more of the fire-tubes *a*, the other ends of which tubes are connected with the air-distributors. By providing the furnace with the air-box J, I obtain heated air without detracting from the efficiency of the furnace, and by leading it to the air-distributors I effect a great saving of fuel.

The air-box, in connection with the distributors, can be placed in any boiler-furnace with any type of boiler, and therefore I do not wish to restrict my invention to the particular type of boiler shown; neither do I restrict myself to any of the methods indicated for connecting the air-distributors with the air-box.

When the furnace is to be used for the consumption of fuel, I provide a steam-jet for forcing steam combined with the air into the distributors. In the example shown in the drawings steam-pipes S are led from the boiler, and the nozzles of said pipes enter the hot-air pipes M, so that mixed steam and air are distributed among the furnace gases and an increased supply of oxygen is introduced. A valve for regulating the volume of steam is located in the pipes, and a similar valve can be located in the inlet-pipe *j* of the hot-air box.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a boiler, its setting, and air-distributors F, located in front of the bridge-wall, of the air-box J, having the inlet *j*, and located in the space between the rear tube-sheet of the boiler and the rear wall, I, of the furnace, and pipe-connections between the air-box and the air-distributors, substantially as described.

2. The combination, with a return-flue or tubular boiler and its setting, of the air-box J, located in the combustion-chamber above the line of flues or tubes and closing the combustion-chamber, the air-distributors F F, situated at the sides of the furnace above the fire-grate, and a pipe-connection between the air-box and the air-distributors, substantially as shown and described.

3. The combination, with a return-flue or tubular boiler and its setting, of an air-box, J, located in the combustion-chamber above the line of the flues or tubes, and between the boiler and the rear wall of the setting, a supply-pipe, *j*, leading to the air-box, the air-distributors F F, located in front of the bridge-wall and above the fire-grate, and the pipes connecting the air-distributors with the air-box, said pipes extending through the combustion-chamber, substantially as shown and described.

4. The combination, with a boiler, its settings, and air-distributors F, located above the fire-grate in front of the bridge-wall, of an air-box, J, located in the combustion-chamber above the line of the boiler tubes or flues, between the rear furnace-wall and the rear tube-sheet of the boiler, and closing the combustion-chamber, a pipe-connection between the air-box and the air-distributors, and a steam-pipe, S, in communication with the said pipe-connection, substantially as described.

In testimony whereof I have hereunto set my hand and seal in the presence of two subscribing witnesses.

JOHN HAM. [L. S.]

Witnesses:

W. HAUFF,

E. F. KASTENHUBER.