

(No Model.)

2 Sheets—Sheet 1.

O. D. ORVIS.

STEAM BOILER AND OTHER FURNACES.

No. 273,299.

Patented Mar. 6, 1883.

Fig. 1.

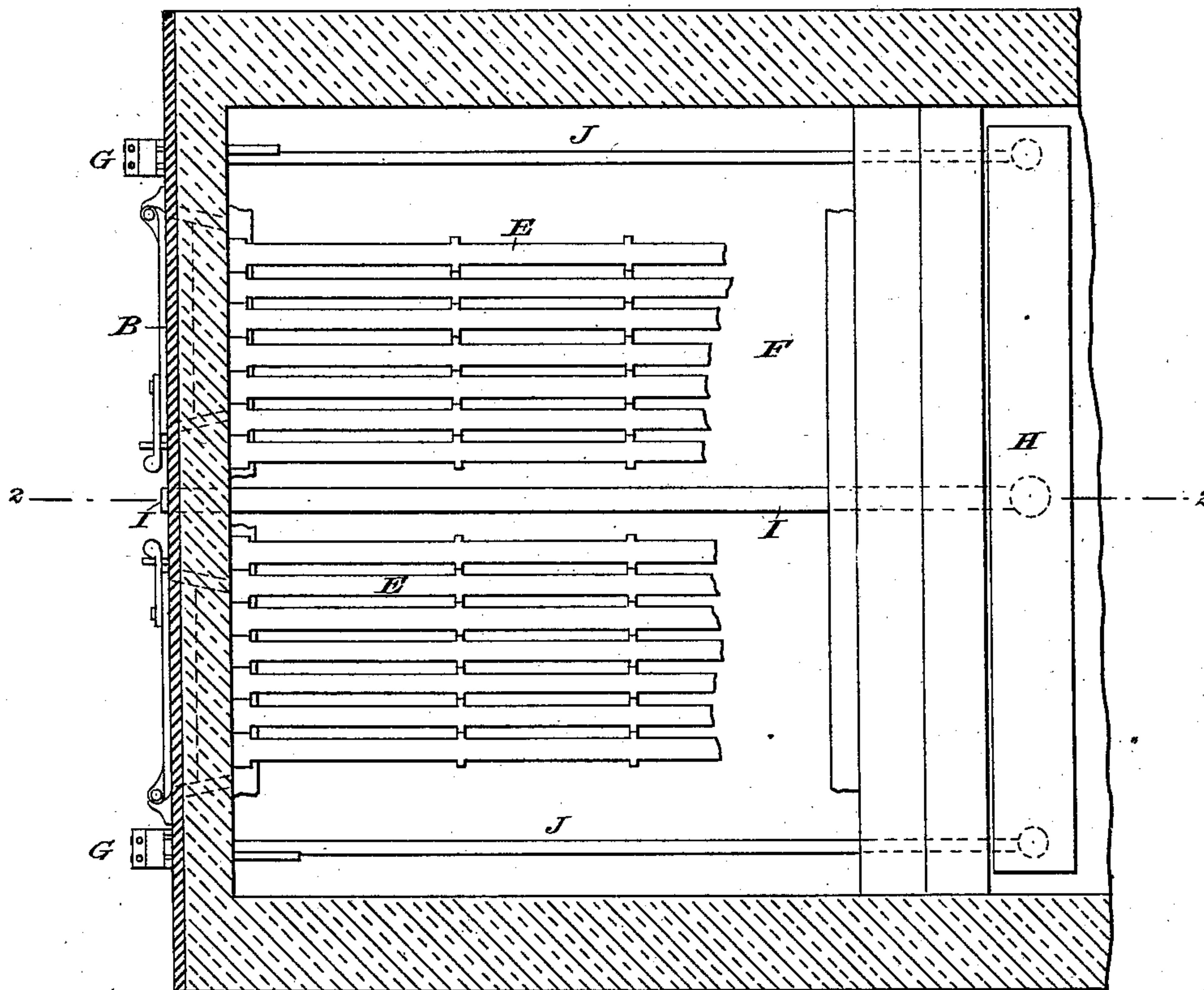
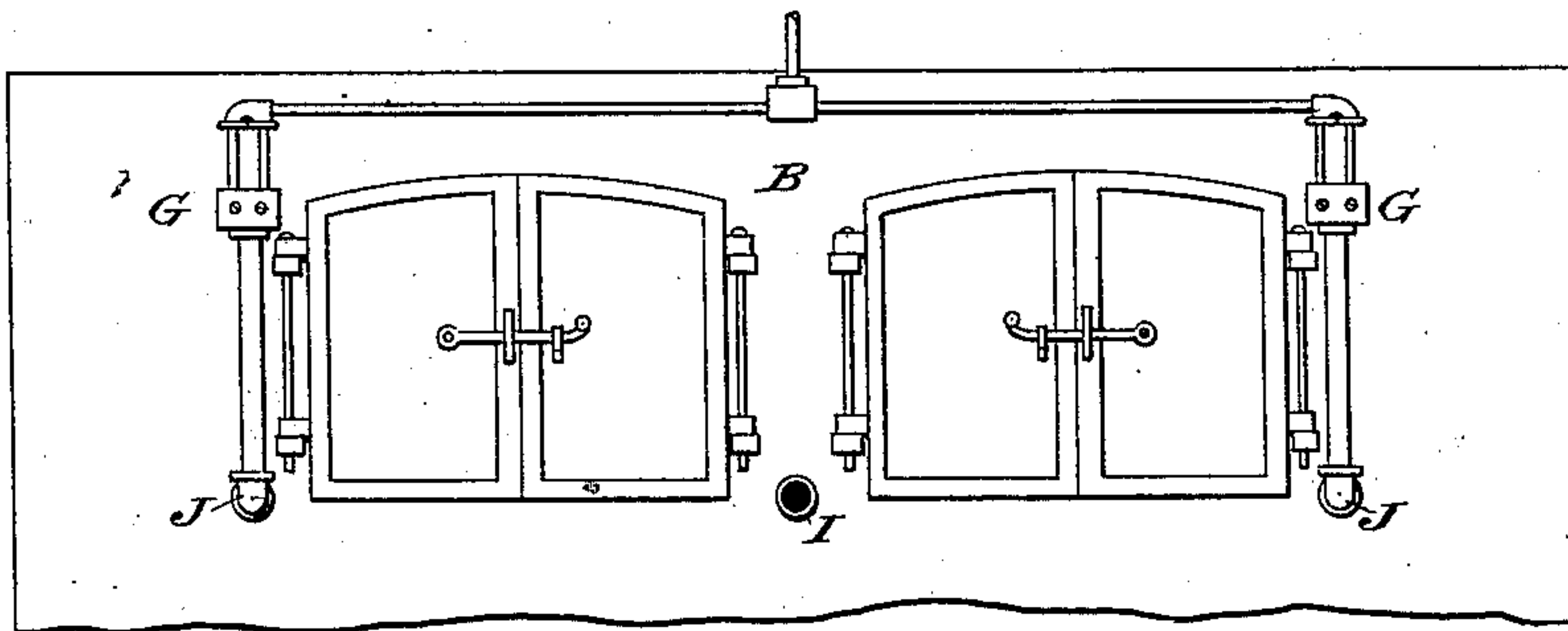


Fig. 3.



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Fig. 2. Patented Mar. 6, 1883.

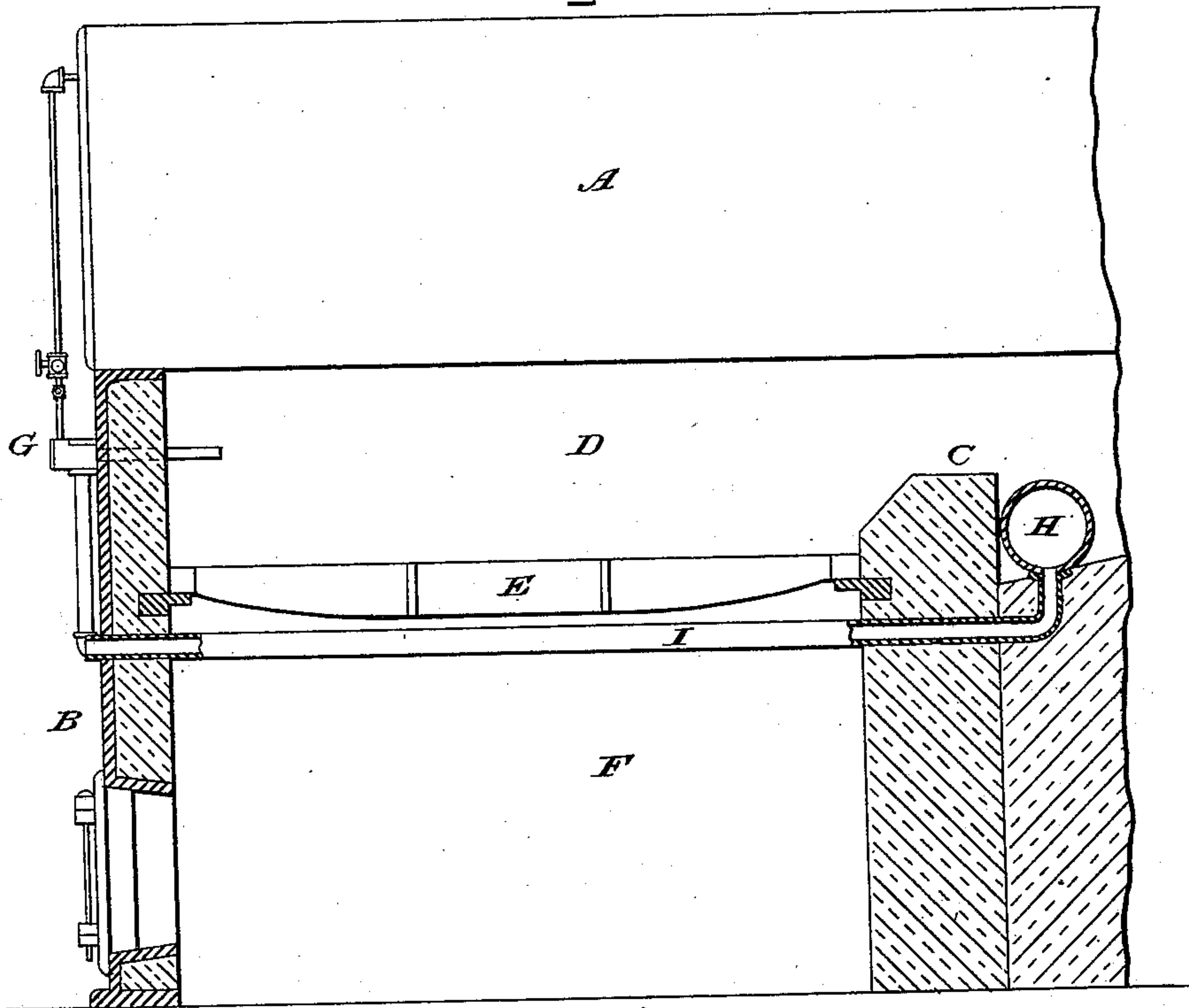
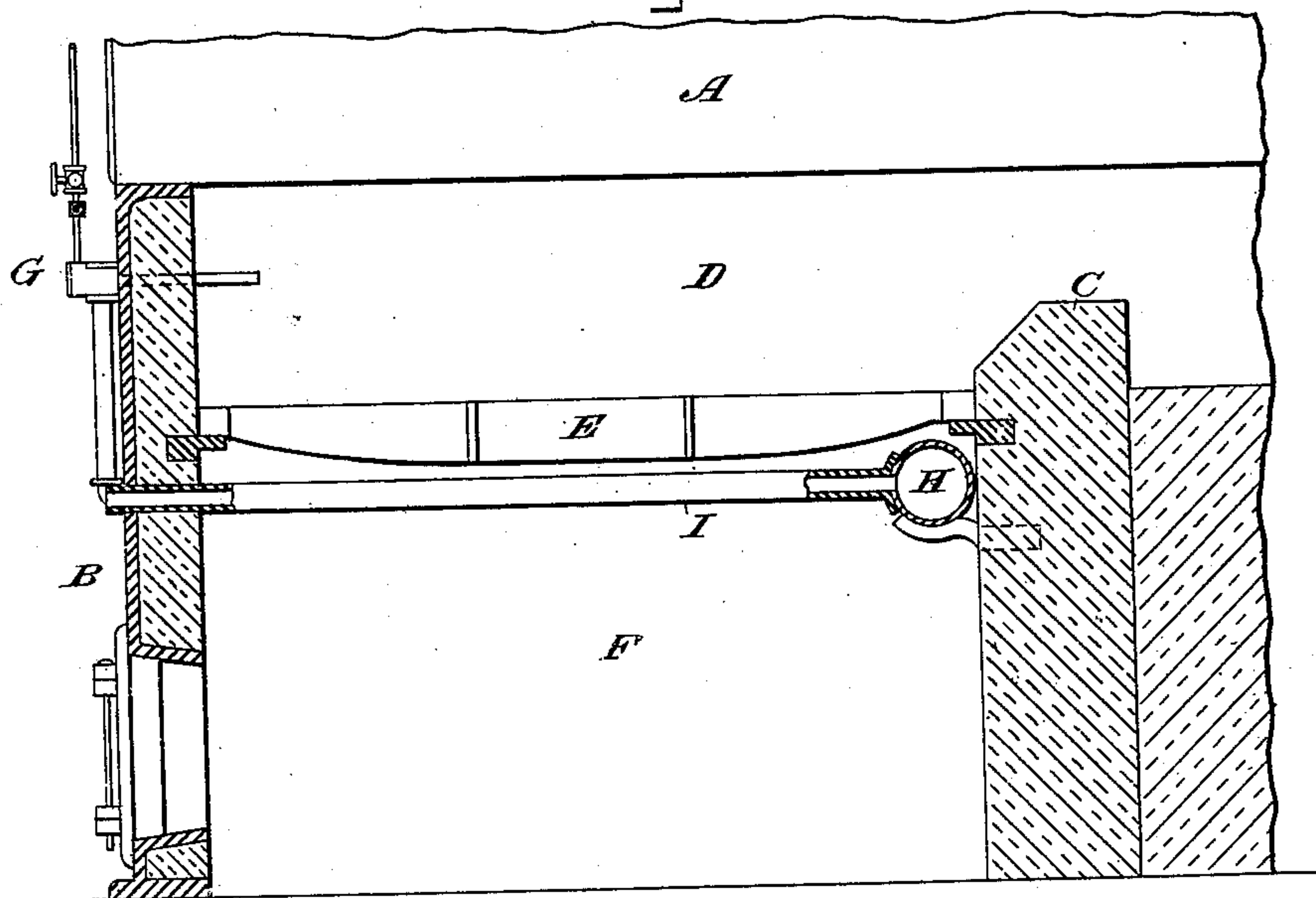


Fig. 4.



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UNITED STATES PATENT OFFICE.

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STEAM-BOILER AND OTHER FURNACES.

SPECIFICATION forming part of Letters Patent No. 273,299, dated March 6, 1883.

Application filed January 13, 1883. (No model.)

To all whom it may concern:

Be it known that I, OREL D. ORVIS, a citizen of the United States, and a resident of the city, county, and State of New York, have invented certain Improvements in Steam-Generator and other Furnaces, of which the following is a specification.

My invention relates to furnaces in which are arranged pipes which open into the fire-chamber above the burning fuel, through which pipes are introduced with considerable force jets of combined steam and air, designed to commingle with the heated gases arising from the fire-bed and supply the requisite oxygen and hydrogen for combining with said gases to produce perfect or nearly perfect combustion.

In efforts to produce or promote perfect combustion in the burning of fuel in furnaces practical experience shows that while jets of combined steam and air projected over the burning fuel in the furnace, and in close proximity thereto, as illustrated in my Letters Patent No. 268,720, of December 5, 1882, produces the best results, yet if the air be cold or at the normal temperature the temperature of the steam commingled therewith will be lowered. Hence the combined jet, when it enters the furnace, is not at as high a temperature as it should be to commingle with and properly ignite the gases. The reduction in temperature of the jet correspondingly reduces the temperature of the rising products of combustion, and instead of the gases from the jet igniting those from the furnace they all pass off together uncombined. The temperature must be maintained at a high point, as the gaseous products from the furnace will ignite only at a high temperature. In my patent above referred to I showed a means of heating the air before it commingled with the steam at the jet apparatus. This consisted of a large tube or pipe, arranged in the ash-pit, the inner end of which was closed and the outer end, which projected out through the furnace-front, open. The air-supply pipe for the jet apparatus extended from said apparatus into the larger fixed pipe and nearly to its inner or closed end. By means of this device the air was caused to enter the larger pipe, pass to its inner end at the back of the ash-pit, and return through the air-supply pipe. This device will heat the air

to a certain extent; but when a large amount of air is required to be delivered into the furnace, commingled with the steam from the jet, the passage of the air through the pipes is so rapid that it has not time to absorb heat enough to raise its temperature to the point desired before it commingles with the steam.

The object of my present invention is to provide a means whereby a reservoir of heated air, so to speak, may be provided, on which the pipes leading to the jet apparatus will draw for their supply of air, while the reservoir will be filled at another point by a supply-pipe. In order that the temperature of the air may be as high as possible, I arrange the reservoir in the furnace at a point where it will be protected in a measure from the oxidizing effects of the heat, and yet be exposed at all times to heat sufficient to raise the temperature of its contents to the required degree. I also, to economize the heat of the air while it is being conveyed, and to prevent radiation, arrange the pipes leading to and from the reservoir to pass across the ash-pit and close under the grates of the fire-bed. By thus introducing a reservoir of large capacity, comparatively, between the air inlet or supply pipe and the pipes leading to the jet apparatus I avoid the formation of a direct circulatory current in a considerable degree, and also modify the disagreeable noise attendant upon the rushing of the air to the vacuum-boxes of the jet apparatus.

In order that my invention may be the better understood, reference may be had to the accompanying drawings, wherein it is illustrated as applied to the furnace of an ordinary stationary boiler.

Figure 1 represents the furnace in horizontal section on line 1 1 in Fig. 2, part of the fire-grate being broken away to show the pipes beneath it. Fig. 2 is a vertical mid-section taken on line 2 2 in Fig. 1. Fig. 3 is a fragmentary front elevation. Fig. 4 is a sectional view corresponding to Fig. 2, designed to illustrate a modification.

Let A represent a boiler; B, the furnace-front; C, the bridge-wall; D, the fire-chamber; E, the grate, and F the ash-pit. These are or may be of the usual kind.

G G represent jet apparatuses, which may

be constructed and arranged according to the description contained in my patent of December 5, 1882, before mentioned.

H is a hot-air reservoir, which I prefer to arrange behind the bridge-wall and in the combustion-chamber, but in such a position that it will be protected in some measure from the oxidizing effect of the fierce heat of the furnace. I is the inlet-pipe which supplies air to said chamber H. This pipe extends from the front of the furnace through the ash-pit and close under the grate, passing through the bridge-wall and connecting with the reservoir H, substantially as shown in Fig. 2.

J J are the pipes which deliver hot air to the jet apparatuses G G from the reservoir H. These also extend across the ash-pit, close under the grate, and are arranged in all respects the same as the pipe I, before described. Where a jet apparatus G is arranged at each side of the furnace, as shown in Fig. 1, I prefer to arrange the pipes J to connect with the reservoir H at or near its ends, and the pipe I to connect with it at or near its center. This is in order that the point of ingress of air to the reservoir shall be as far removed from the point or points of egress therefrom as possible, so as to avoid a circulatory current, as far as may be, by interposing a large body of the heated air between the inlet and outlet. By so doing I seek to prevent the incoming air, which is only moderately heated in its passage through pipe I, from passing immediately to and through pipes J to the jet apparatus. This also serves to modify in a great degree the noise which would otherwise be produced by the rushing of the air in at the pipe I. I also prefer to employ a pipe, I, having an area little greater than the combined areas of the outlet-pipes J, in order that the air may not be forced in its passage to the reservoir.

In Fig. 4 I have shown the reservoir H mounted on a support at the back of the ash-pit F and close up under the grates. At this point in the ash-pit the reservoir would not be subjected to the currents of cold or normally cool air which is entering to supply the fire, and the temperature of the air therein could be maintained at a high degree. This construction is well adapted to furnaces already constructed, and is somewhat less costly than that shown in Figs. 1 and 2, as it is not necessary to penetrate the bridge-wall, and the pipe-connections are more direct.

I may employ two pipes J to connect each jet apparatus G with the reservoir H in place of one, as shown. Indeed, I do not limit myself to any number of pipes, either for admitting air to or discharging it from the reservoir. The number and size of pipes employed would depend upon the peculiar construction of the furnace and the number and arrangement of the jet apparatuses employed.

I have shown my device as applied to an ordinary boiler-furnace; but it may also be employed in other forms of furnaces without departing from my invention.

I have shown the reservoir H as cylindrical; but it may have any desired contour.

By the term "furnace," as herein employed, is meant the front B and exterior walls, the fire-chamber, combustion-chamber back of the bridge-wall, the ash-pit, and the grate and bridge-wall, all combined and arranged for heating, &c., as shown.

I am aware that it has been proposed to construct the bridge-wall of a furnace hollow, and to connect it with the outer air with hollow grate-bars, and that air from this hollow wall has been supplied to the jet-tubes by means of pipes arranged exterior to the furnace. My hot-air chamber is not exposed to the direct fierce heat of the fire-chamber, and it does not form an integral part of the furnace. It is readily removable from the furnace, so that when impaired or worn out it may be replaced, and the pipes leading from it to the jet apparatus are not arranged exteriorly, but pass through the ash-pit under the grate.

I do not herein claim the employment of jets of combined steam and heated air for promoting combustion in furnaces, as this was shown and described in my before-mentioned patent; but

What I do claim is—

1. In a furnace provided with a jet apparatus for supplying jets of combined steam and air to the same, a removable hot-air reservoir, which does not form an integral part of the furnace, arranged within said furnace at a point where the air it contains will be heated to a high degree, and said reservoir provided with a supply-pipe and with pipes for the delivery of air from it to the jet apparatus employed, all of said pipes being arranged to traverse the ash-pit, as and for the purposes substantially as set forth.

2. The combination, with a furnace, of a jet apparatus arranged to supply a jet of combined steam and air to the fire-chamber of the same, a hot-air reservoir arranged within the combustion-chamber of the furnace, a pipe or pipes leading from said reservoir through the ash-pit to the outer air for supplying said reservoir, and a pipe or pipes leading from said reservoir through the ash-pit for supplying said jet apparatus, all arranged to operate substantially as set forth.

3. The combination, with the furnace, of the elongated reservoir H, arranged within the furnace, and extending across the same, the jet apparatuses G G, arranged to introduce jets of combined steam and air into the fire-chamber D, the air-supply pipe I, leading from the front of the furnace to the reservoir through the ash-pit, and the pipes J J, leading from the reservoir, near its ends, through the ash-pit to the jet apparatus, substantially as and for the purposes set forth.

4. The combination, with the furnace and the jet apparatus, of the elongated reservoir H, arranged behind the bridge-wall C, as shown, and to extend across the furnace, the

pipe I, arranged to connect with said reservoir
at or near its middle, and to lie close under the
grates in the ash-pit, and the pipes J J, arranged
to connect with the reservoir at or near its ends,
5 and to lie close under the grates in the ash-pit,
substantially as set forth.

In witness whereof I have hereunto signed

my name in the presence of two subscribing
witnesses.

OREL D. ORVIS.

Witnesses:

J. S. ELKINS,

ARTHUR L. DENMAN.