

(No Model.)

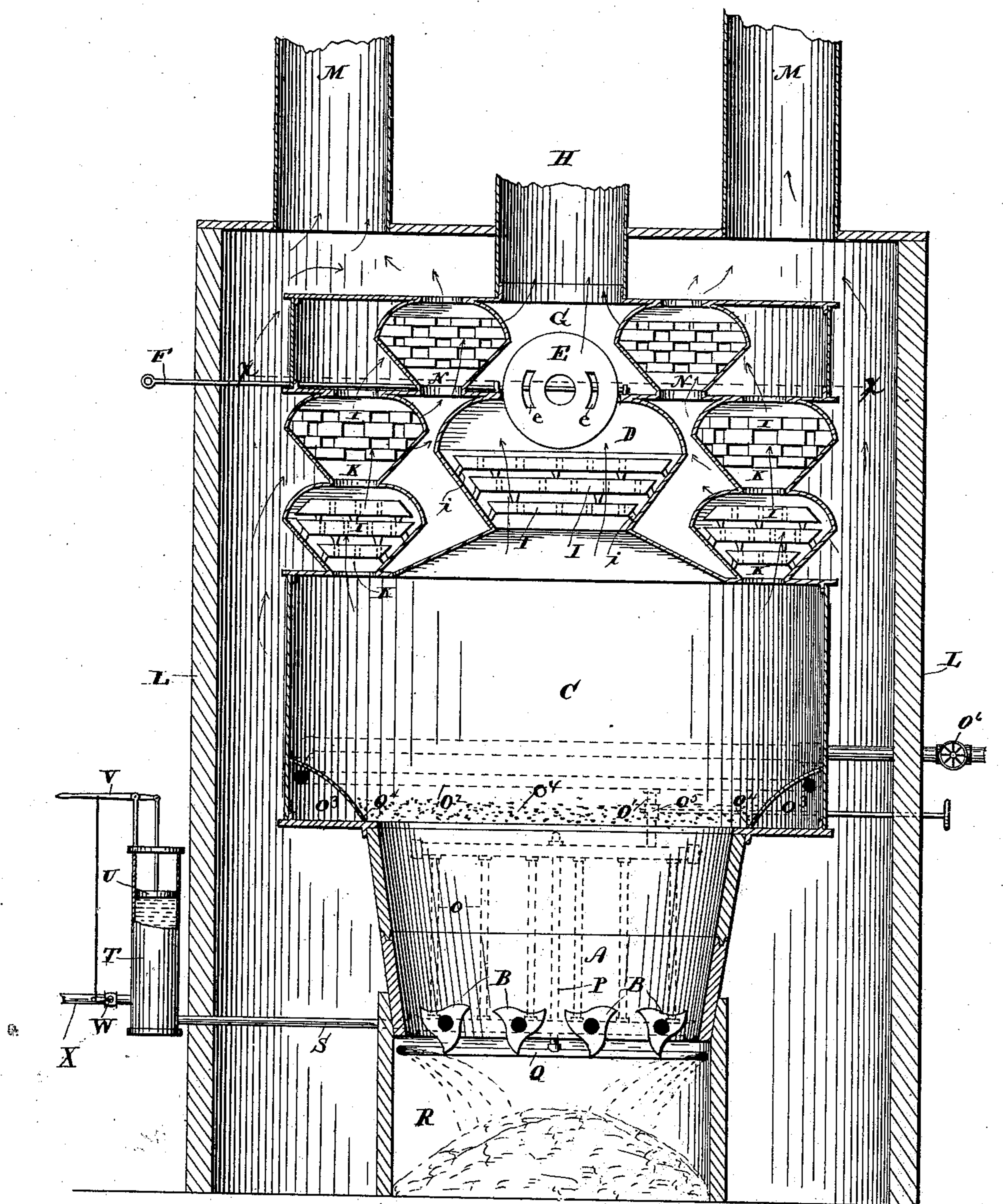
2 Sheets—Sheet 1.

J. A. PRICE.
HEATING FURNACE.

No. 370,889.

Patented Oct. 4, 1887.

Fig. 1.



Witnesses.

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Fig. 2.

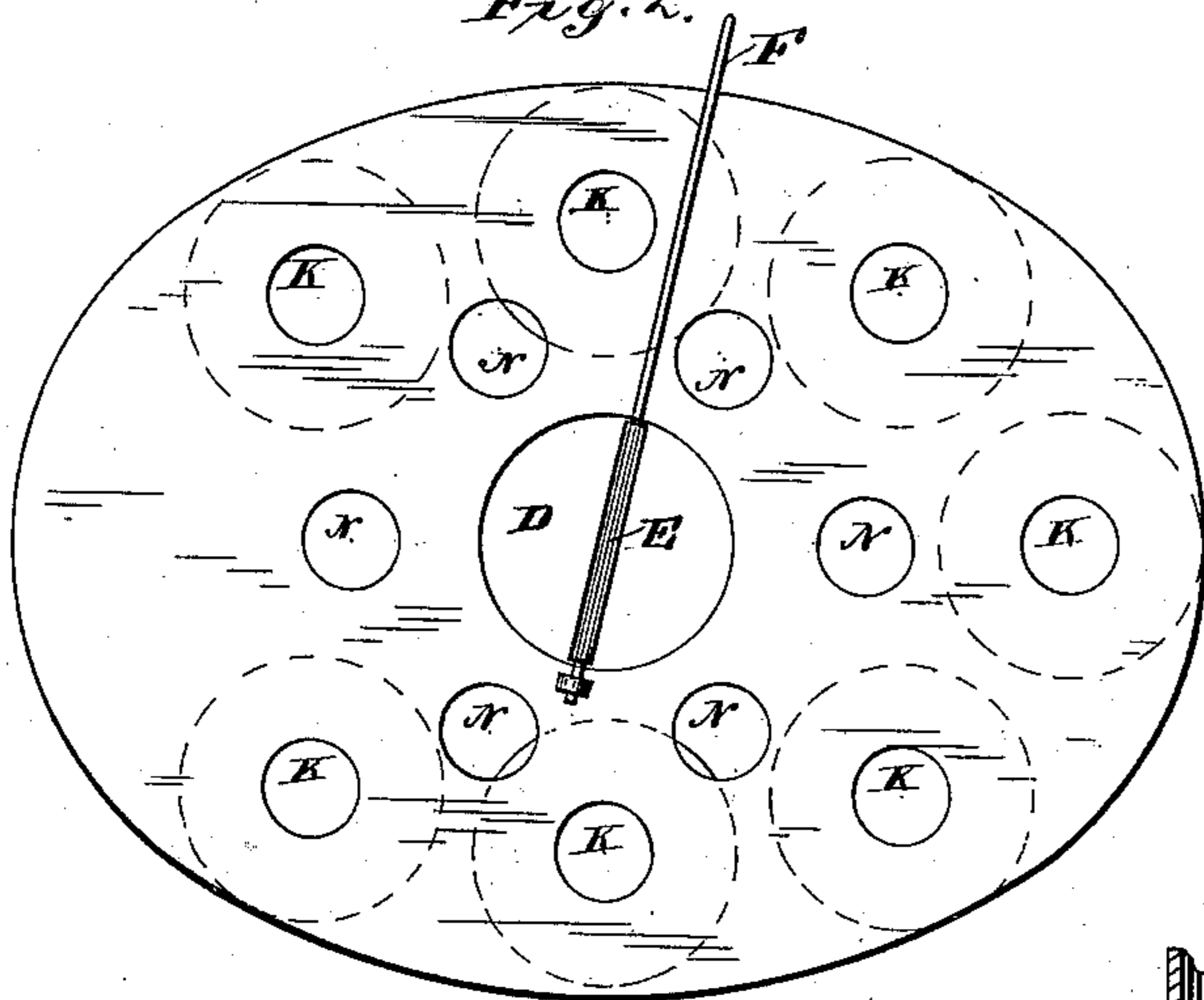


Fig. 3.

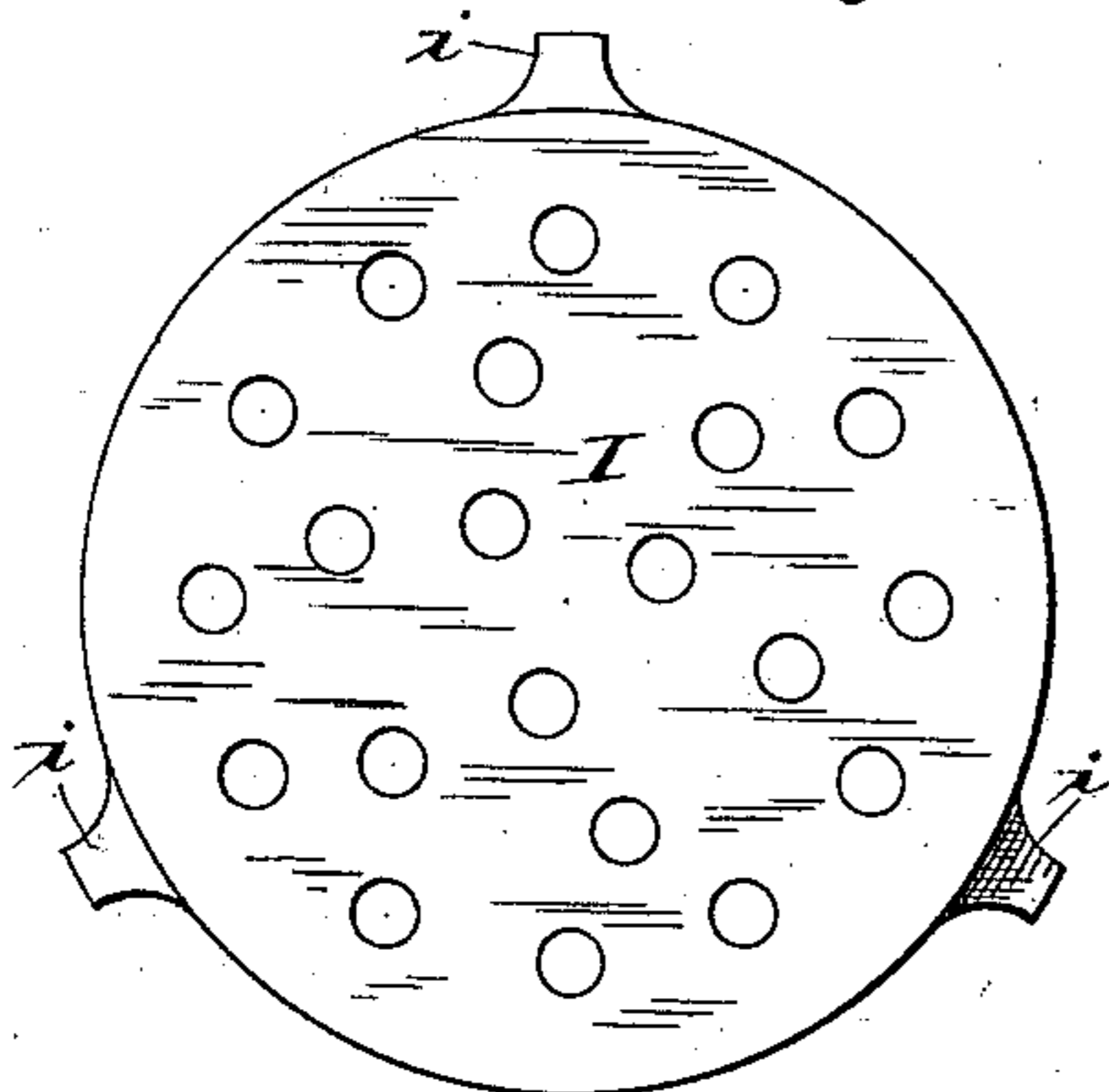
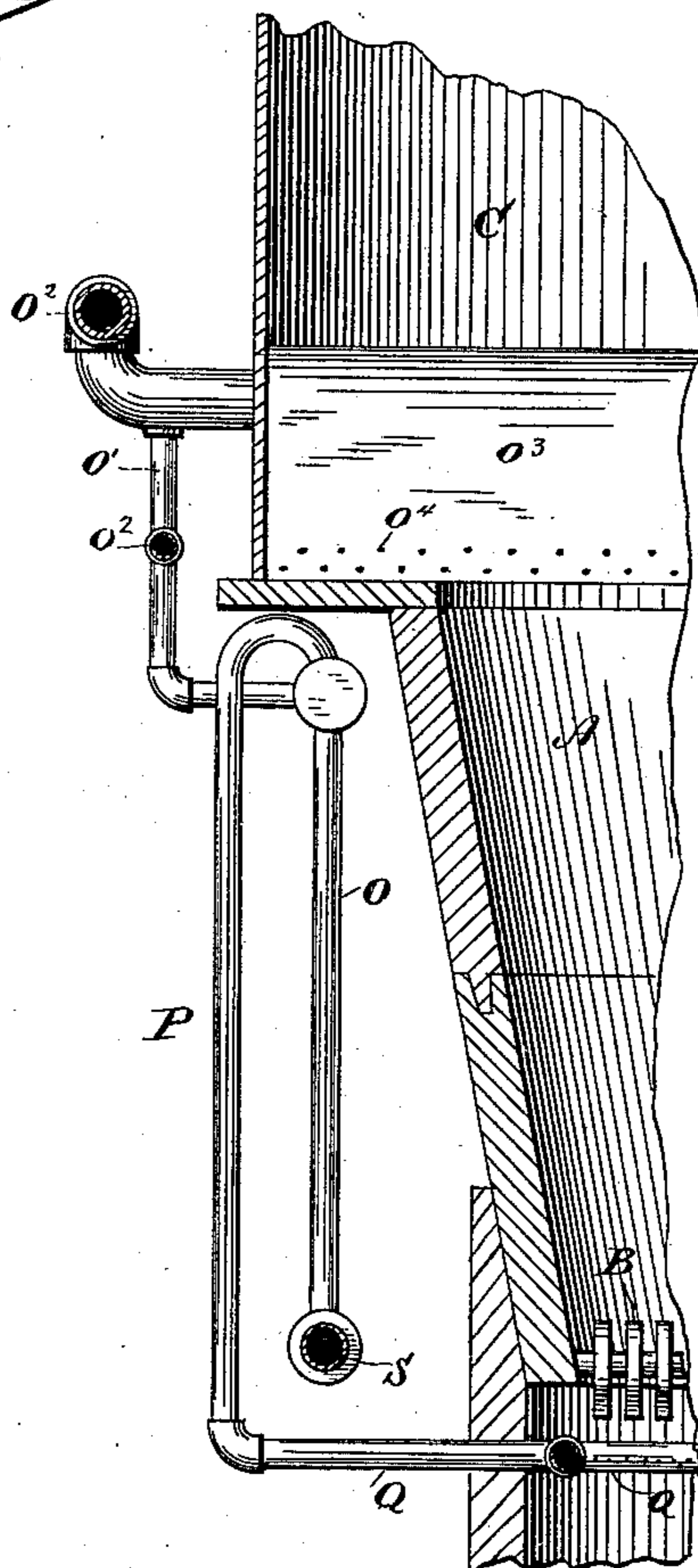


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOHN A. PRICE, OF SCRANTON, PENNSYLVANIA.

HEATING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 370,889, dated October 4, 1887.

Application filed July 6, 1886. Serial No. 207,225. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. PRICE, of Scranton, in the county of Lackawanna and State of Pennsylvania, have invented certain
5 new and useful Improvements in Heating-Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the figures and letters of reference marked thereon.

My invention has for its object the production of a hot-air furnace in which the heated air and products which ordinarily pass from
15 the combustion-chamber freely up the smoke-flue are retarded and utilized so as to reduce the amount of wasted heat to the minimum.

To this end it consists in the novel construction and combination of parts, which will be
20 hereinafter fully described, and pointed out particularly in the claims at the end of this specification.

Referring to the accompanying drawings, Figure 1 represents a longitudinal vertical
25 section of a furnace constructed in accordance with my invention. Fig. 2 is a sectional view of the same, taken on the line *x x*, Fig. 1. Fig. 3 is a plan view of one of the partitions or sections of refractory material employed in the
30 retorts or ducts to retard the heated products arising from the combustion-chamber. Fig. 4 is a detail sectional view showing the fire-pot and the water receptacle or vaporizer arranged in proximity thereto.

35 Similar letters of reference in the several figures indicate the same parts.

The letter A represents the fire-pot of the furnace, constructed as shown, or in any desired manner. B is the grate, consisting, preferably, of revolving sections, and C is the
40 combustion-chamber.

Above the combustion-chamber, and arranged centrally thereof, is what I term the "retort" D, having at its upper end damper
45 E, that is operated by a rod or handle, F. When the damper is open, communication is established between the retort and a chamber, G, from which the smoke-pipe H leads. The body of the retort is preferably of cast-iron
50 and of flared or conical form, as shown in Fig. 1, and it is nearly filled with sections or parti-

tions I, of refractory material, such as fire-brick. Each of these sections or partitions is perforated, as shown in Figs. 1 and 3, and is provided with projecting lugs or feet *i*, which
55 serve to keep its edges away from the walls of the retort sufficiently to leave a space for the passage of the heated products, and the perforations in the several sections or partitions are located so as to cause them to break joints
60 with those of the adjoining sections or partitions, and thus by rendering the paths of the ascending products more devious retard the passage of the products to a greater extent. Also arranged above the combustion-chamber
55 in a circle around the central retort are a series of other retorts, K, smaller than the central retort, but, like the latter, filled with the sections or partitions of refractory material and constituting other ducts or passages for
70 the heated products between the combustion-chamber and the chamber G.

A casing, L, incloses the fire-pot, combustion-chamber, retorts, and chamber G, as shown in Fig. 1, and pipes or flues M lead
75 from this casing to the apartments to be heated.

The form of the retorts also assists in the retardation of the heated products, as it will be noted that after they have passed the contracted orifice at the entrance they will spread
80 laterally, and by coming in contact with the rounded top will be directed down again at the center, as will be readily understood. This radiated heat is utilized in the following manner: As the air in the inclosing-casing L
85 is heated by radiation from the walls of the fire-pot and the walls of the combustion-chamber, it rises, as indicated by the arrow, Fig. 1, passes around and between the retorts of the outer series and the central re-
90 tort, and, being highly heated by radiation from such surfaces, ascends next through retort-shaped passages N, arranged in the chamber G, and highly heated by the products passing therethrough, and finally is conducted off
95 through the flues M to the place of use.

From the described construction it is obvious that a large portion of heat which is ordinarily allowed to pass off as waste through the smoke-exit is utilized, thus greatly in-
100 creasing the heating capacity of the furnace without consuming more fuel.

It is obvious that the refractory retarding sections or partitions employed in the retorts may be varied in construction, the only essential point to be observed being that they shall be perforated, so as to retard without entirely obstructing the passage of the products from the combustion-chamber. The conical form of the retorts also assists in the retardation of the heated products.

As a means for stimulating the fire in this furnace I arrange a water receptacle or vaporizer, O, in such proximity to the fire-pot as to be heated by radiation therefrom, and I connect with the upper part of this water-receptacle a suitable pipe, P, which connects with a pipe or pipes, Q, arranged in the ash-pit R of the furnace. The pipe Q is perforated, as shown in Figs. 1 and 4, and when the water in the receptacle is heated the vapor or steam passes off through pipe P into pipe Q, and is discharged from the latter into the ash-pit, and, passing up through the fire, materially assists in the process of combustion. The form of water-receptacle which I prefer to employ consists of a number of pipes connected together, as shown in Fig. 1, and kept automatically supplied with water through a pipe, S, by means of a cylinder, T, containing a float, U, which operates through a lever, V, and suitable connections to open and close a valve, W, and a pipe, X, connected with some source of water-supply. Whenever the water in the water receptacle or vaporizer falls below its normal level, the water in the cylinder T falls correspondingly, thus causing the float U to descend, and through the described instrumentalities open the valve W and admit water into the cylinder until the float is again raised to normal point, when the supply will be again cut off. This contrivance may also be used for the purpose of sprinkling the ashes in the ash-pit, so as to prevent the raising of dust when said ashes are withdrawn from the ash-pit, it being only necessary to the accomplishment of the result to raise the lever V so as to open the water-supply valve and keep it raised until a sufficient quantity of water has issued from the pipe Q in the form of jets upon the ashes.

When the contrivance is used as a vaporizer to stimulate the fire its usefulness may be extended by connecting with the water receptacle or vaporizer a pipe, O', connected with other pipes, O'', that in turn open into a chamber, O''', having perforations O'' arranged at or about the level of the fire. The admission of vapor or steam through these perforations has also a stimulating effect upon the fire. Instead, however, of admitting vapor or steam through these perforations, a valve, O'', may be closed, so as to cut off communication with the water receptacle or vaporizer, and a valve, O'', opened, so as to admit a supply of air, as will be readily understood.

What I claim as new is—

1. The combination, with the combustion-chamber, of the series of retorts, constituting

passages through which the heated products pass off from the combustion-chamber, each of said retorts being made flared or conical and larger at the top and provided with perforated sections or partitions of refractory material, substantially as described.

2. The combination, with the combustion-chamber, of the series of retorts, constituting passages through which the heated products pass off from the combustion-chamber, each of said retorts being provided with a series of perforated sections or partitions of refractory material, and the perforations of the several sections or partitions being arranged to break joints, substantially as described.

3. The combination, with the combustion-chamber, of a series of retorts, constituting ducts for the passage of the products of combustion arising from the fire, the chamber into which said retorts or ducts discharge, and the other series of retorts arranged within said last-mentioned chamber and serving as ducts for the passage and reheating of the rising currents of air previously heated by radiation from the first-mentioned series of retorts, substantially as described.

4. The combination, with a combustion-chamber, of the flaring central retort arranged above it, provided with perforated refractory sections or partitions and having a damper for controlling communication with the smoke-discharging flue, substantially as described.

5. The combination, with a combustion-chamber, of the central retort and the outer series of retorts provided with the perforated sections or partitions of refractory material and constituting ducts or flues which retard the escape of the products of combustion from the fire, and the damper in the central retort, by which direct communication with the smoke-exit flue may be established, substantially as described.

6. The combination, with the fire-pot and combustion-chamber, of the central flared or conical retort, the outer series of retorts containing the perforated refractory sections or partitions, the chamber into which the uppermost retorts of each series discharge, the additional flared or conical retorts arranged in said last-mentioned chamber, through which air heated by radiation from the outer series of retorts rises, and an inclosing-case for the furnace, substantially as described.

7. The combination, with the flared or conical retorts through which the products of combustion pass from the fire, of the perforated retarding-plates of refractory material arranged within said retorts, and provided with projecting feet, which serve to keep the edges of the sections or partitions away from contact with the walls of the retorts, substantially as described.

8. The combination, with the fire-pot of a furnace or stove, of a water receptacle or vaporizer located outside the fire-pot, but in such proximity thereto as to be heated by radiation therefrom, and suitable pipes or conductors

for conveying the vapor from said water receptacle or vaporizer to the ash-pit and thereby stimulate the fire, substantially as described.

5 9. The combination, with the fire-pot of a furnace or stove, of a water-receptacle located outside the fire-pot, but in proximity thereto, so as to be heated by radiation therefrom, pipes leading from the said receptacle to the ash-pit and perforated, so as to discharge on
10 the ashes in the latter, a valve in the water-supply to the receptacle, and a float operated by the water in the receptacle and connected to the valve, substantially as described.

15 10. The combination, with the fire-pot of a furnace or stove, of a water-receptacle located outside the fire-pot, but in such proximity thereto as to be heated by radiation therefrom, an auxiliary cylinder or receptacle connected with the first-named receptacle through a cock
20 with a suitable water-supply, and a valve or float operating by its position to admit or shut off water into or from the said auxiliary receptacle, substantially as described.

11. The combination, with the fire-pot of the water-receptacle located outside the fire- 25 pot, but in proximity thereto, and having pipes leading to the ash-pit, as described, of the auxiliary water receptacle or feeder, the float-valve, the water-supply pipe and its valve, and the lever and connections between the 30 float-valve and water-supply valve, substantially as and for the purpose specified.

12. The combination, with the fire-pot of a furnace or stove, of a water-receptacle arranged outside the fire-pot, in proximity thereto and 35 heated by radiation therefrom, pipes or conductors arranged to discharge into the combustion-chamber and having connection both with the air and with the said water-receptacle, and valves for controlling such connection, 40 substantially as described.

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