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M. E. HERBERT.
WATER HEATER WITH GARBAGE BURNER.

APPLICATION FILED JULY 12, 1904.

3 SHEETS—SHEET 1.

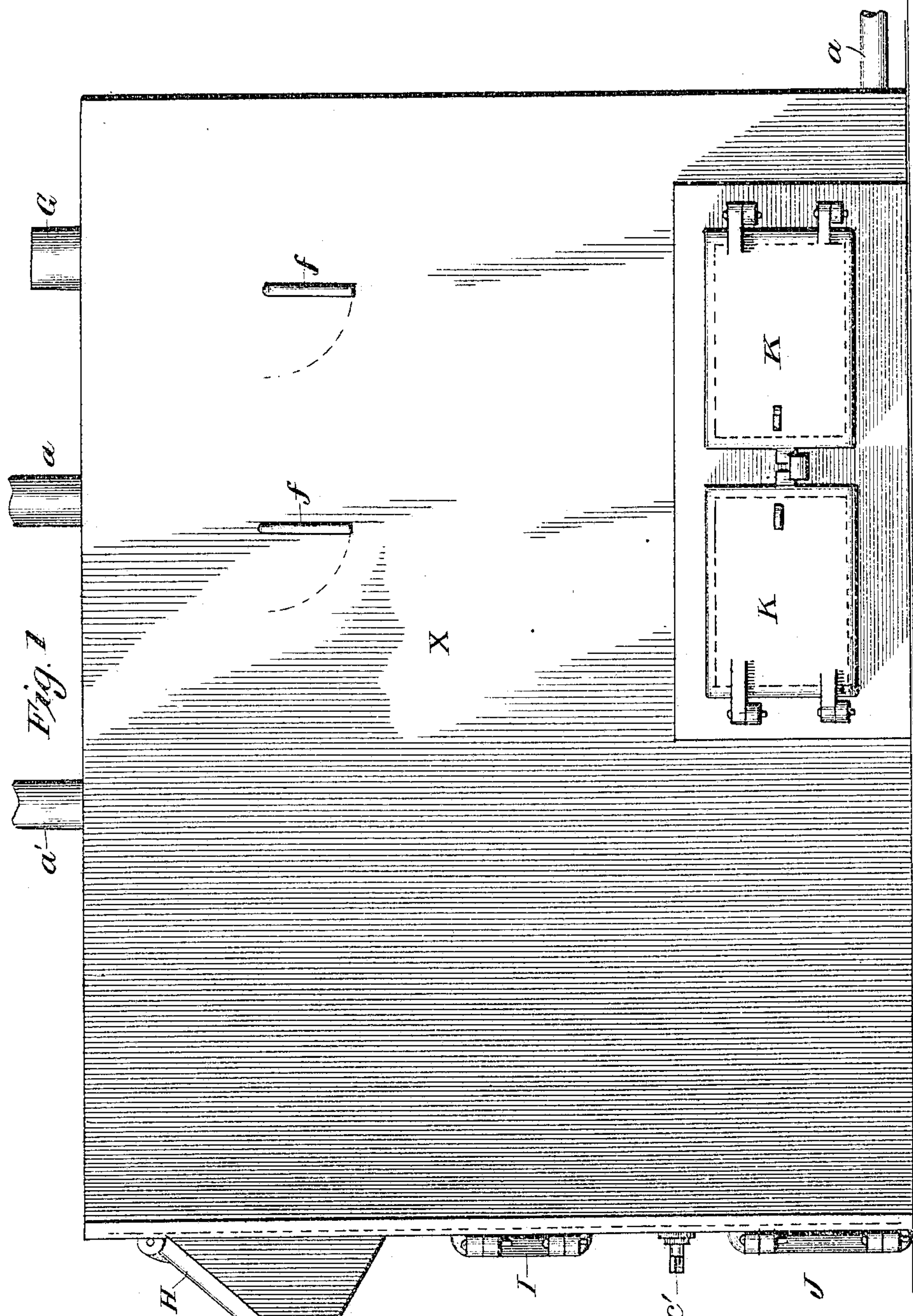


Fig. 1

WITNESSES:

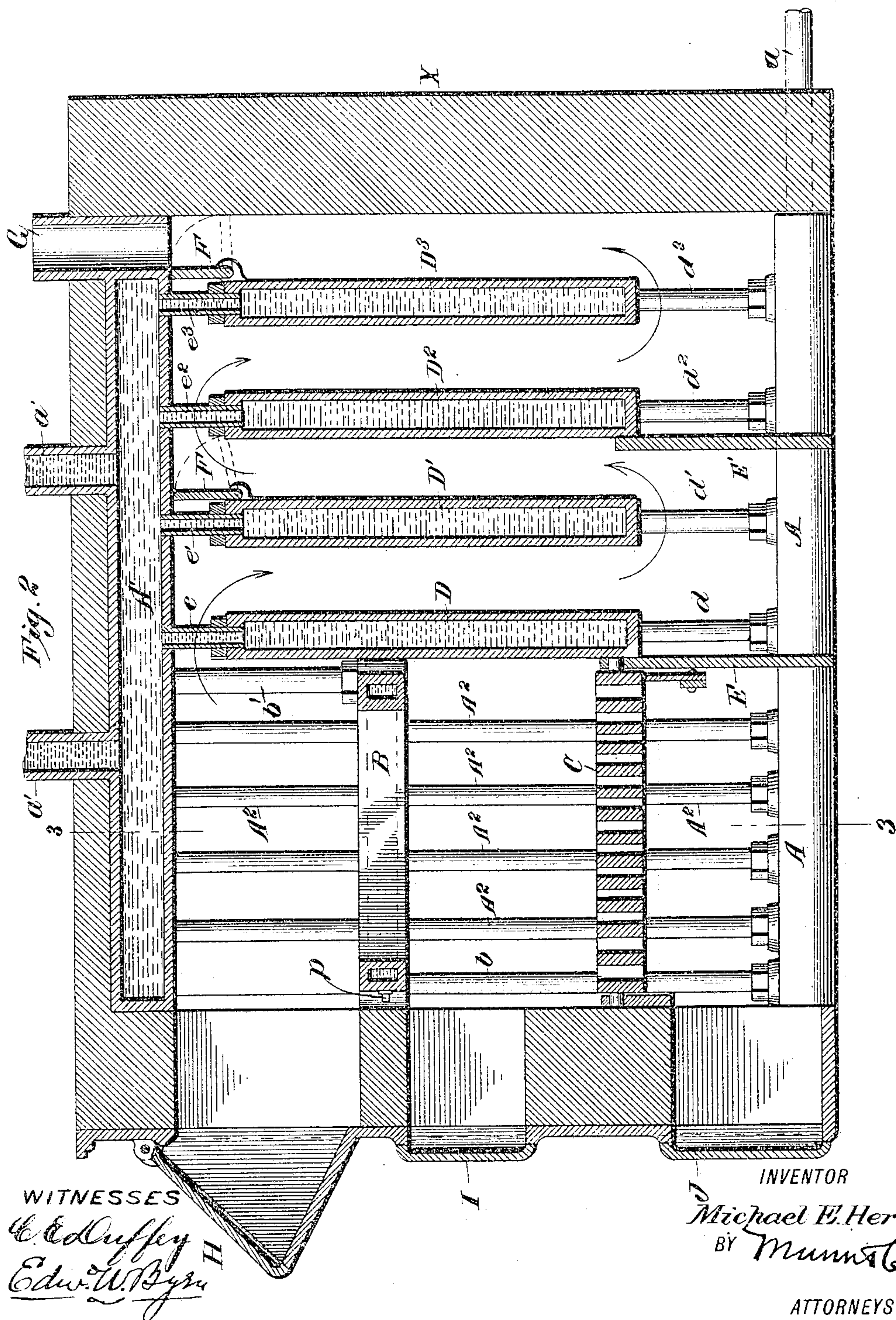
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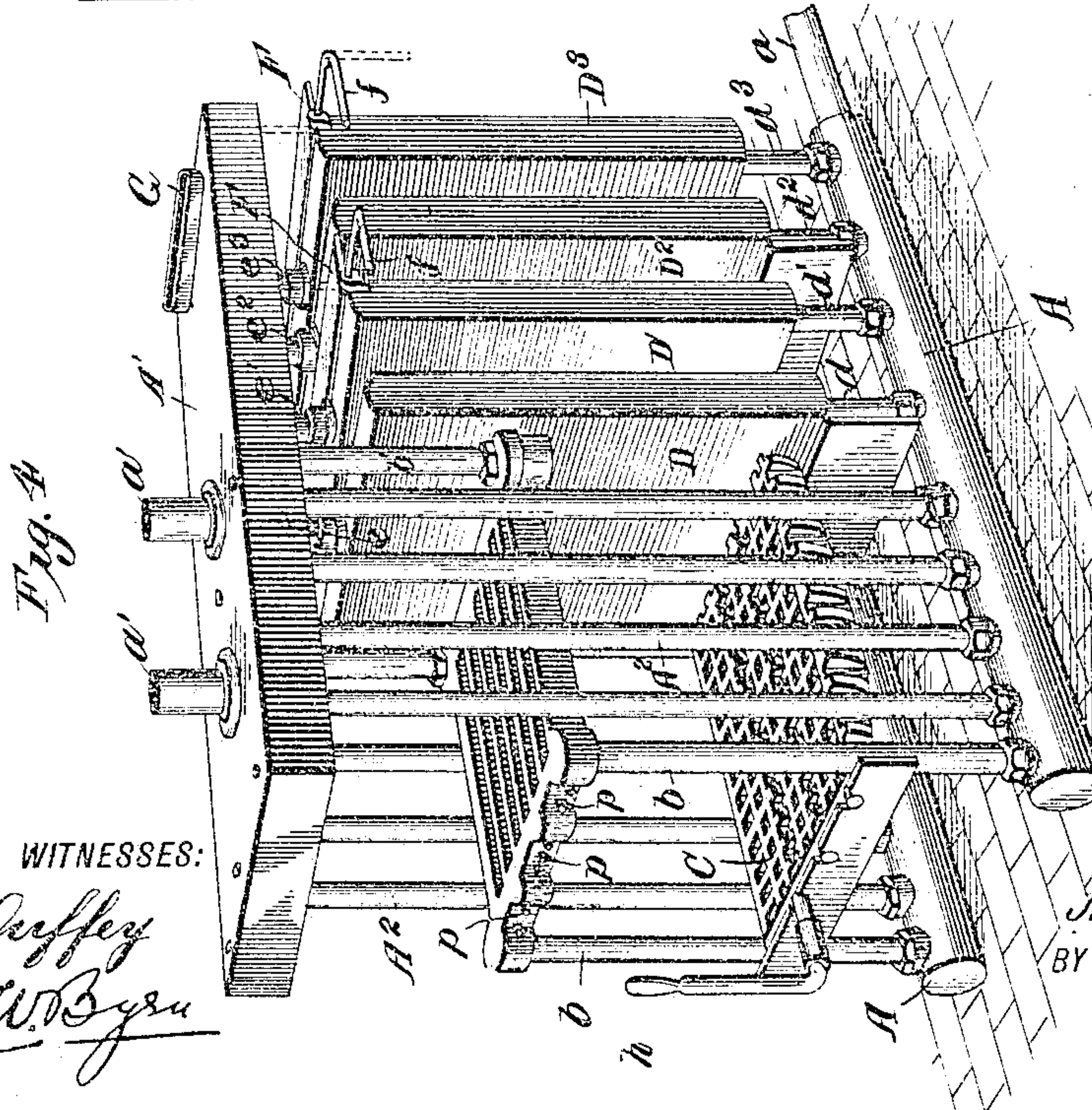
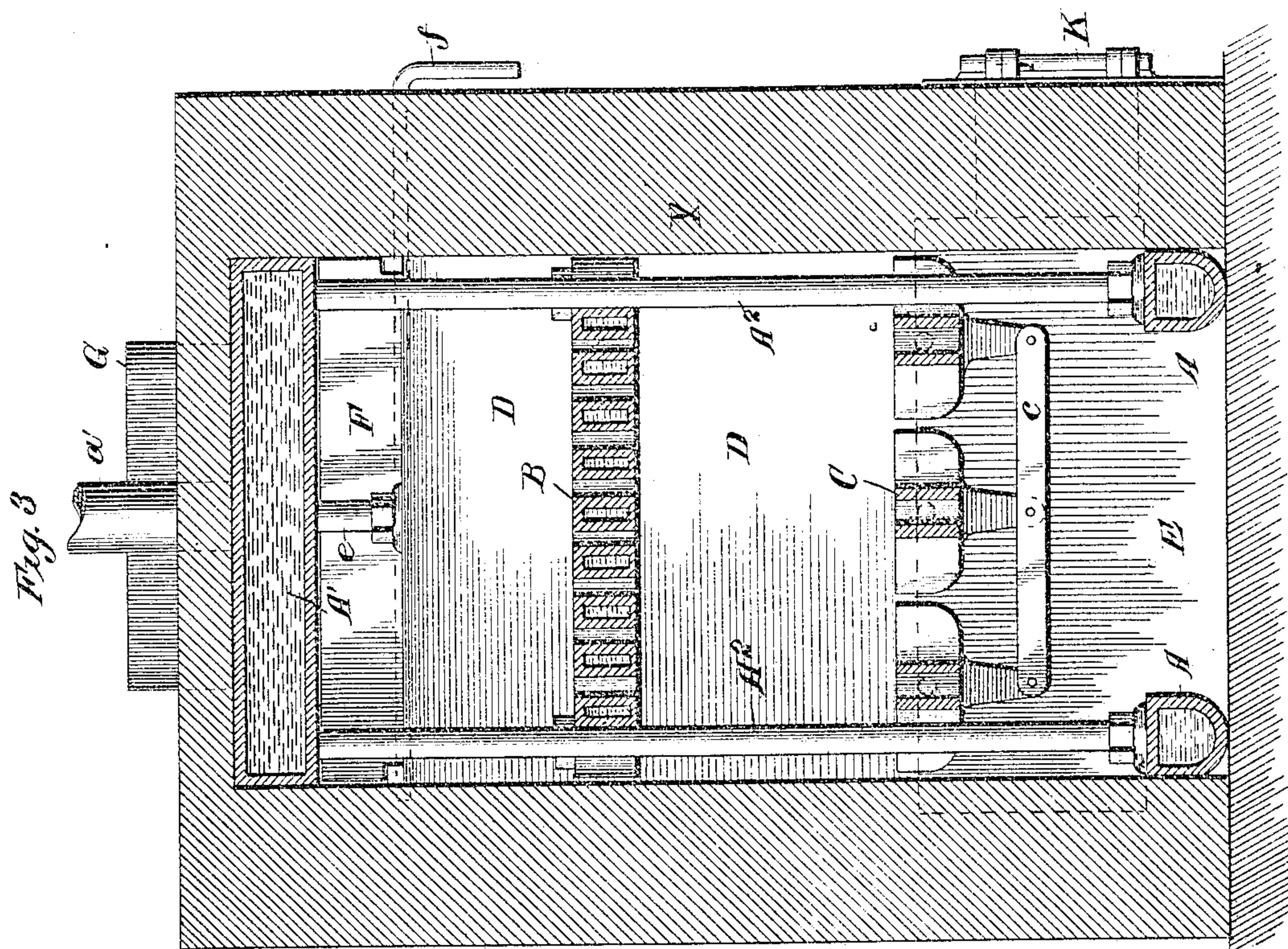
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

MICHAEL E. HERBERT, OF CHICAGO, ILLINOIS.

WATER-HEATER WITH GARBAGE-BURNER.

SPECIFICATION forming part of Letters Patent No. 787,176, dated April 11, 1905.

Application filed July 12, 1904. Serial No. 216,205.

To all whom it may concern:

Be it known that I, MICHAEL E. HERBERT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Water-Heaters with Garbage-Burners, of which the following is a specification.

My invention is in the nature of a novel form of furnace designed more particularly for a water-heater and so constructed as to permit of the economical disposition and utilization of garbage in connection with other fuel.

It relates to that form of furnace in which a second supplementary grate is employed above the usual fire-chamber; and it consists in the novel combination and arrangement of parts whereby either garbage or soft coal may be burned on this supplementary grate with a complete combustion and without the production of bad odors and securing at the same time an economical and efficient water-heater, as will be hereinafter fully described with reference to the drawings, in which—

Figure 1 is a side elevation of the furnace. Fig. 2 is a vertical longitudinal section through the same. Fig. 3 is a vertical cross-section taken on the line 3 3 of Fig. 2, and Fig. 4 is a perspective view of the principal parts of the furnace with the outer casing removed.

In the drawings, Figs. 1 and 2, X represents the furnace-walls or outer casing. H is the garbage or soft-coal door; I, the hard-coal door; J, the ash-pit door, and K clean-out doors at the side.

The principal parts of the furnace are seen in Fig. 4, and they comprise a flat horizontal water-chamber A' at the top forming a complete roof to the fire-space and two horizontal water-pipes A A at the bottom. These pipes at their front portion are connected directly to the top water-chamber by vertical circulation-pipes A², which lie along the sides of the upper and lower fire-chambers. The rear portion of the pipes A A and chamber A' are connected through flat and hollow water-boxes D D' D² D³, which are arranged vertically in parallel position to each other. These water-boxes form hollow vertical partitions extending transversely across the furnace, but

have a free space above and below them.

Through the upper free space short vertical pipes *e e' e² e³* connect the water-boxes to the upper water-chamber A', and through the lower free space corresponding pipes *d d' d² d³* connect the water-boxes to the two subjacent water-pipes A A, so as to permit an upward circulation of water from the pipes A A through the hollow partitions to the water-chamber A' above.

C is the main or hard-coal grate, made, as usual, of rocking bars, as seen in Fig. 3, and connected in the ash-pit by a coupling-bar *c*, by which they may be all rocked together by a suitable handle *h*, applied to the squared end *c'*, Fig. 1, of one of the grate-bars.

E and E' are baffle-plates arranged in the bottom of the rear part of the furnace. The plate E directs the air from the ash-pit up through the grate C and shuts off the space in rear of this plate. Said plate E also forms a bearing-support for the rear ends of the rocking grate-bars. The other baffle-plate, E', extends from the bottom of the furnace to the bottom of the hollow partition D². At the upper ends of the hollow partitions D' and D³ are arranged dampers F F, whose shafts are extended through the side walls of the furnace and provided with crank-handles *f*, by which the positions of these dampers may be adjusted. When the dampers are turned vertically, as shown in Fig. 2, a tortuous passage-way is provided for the products of combustion around and between the hollow partitions, as shown by the arrows; but when, in first building the fire, the dampers are turned down, as shown in dotted lines in Fig. 1 and full lines in Fig. 4, the products of combustion pass directly from the top of the partition D to the smoke-pipe G.

About midway the space between the grate C and the top water-chamber A' is located the supplementary garbage-grate B. This is cast in one piece, with hollow bars and end chambers, the end chambers being provided with detachable screw-plugs *p* in line with the hollow bars, so as to permit sediment to be cleaned out from the same. The front end of this hollow grate (see Figs. 2 and 4) is connected to the two subjacent water-pipes A A by means

of standing vertical circulation-pipes b along the sides of the fire-chamber and in the plane of the circulation-pipes A^2 . The rear end of this hollow grate is connected by suspended pipes b' with the hollow water-chamber A' at the top, and these pipes are likewise arranged at the sides of the upper fire-chamber and in the plane of the other circulation-pipes, A^2 . The two sets of pipes b and b' serve to hold the hollow grate B in horizontal position above the main grate and also form circulation-pipes for this water-grate, the colder water rising through the pipes b to the water-grate and after traversing the same and becoming heated passes, from convection, upwardly through the pipes b' to the top water-chamber A' .

The position of the hollow grate B holds the garbage above the fire, so that the flames, the air, and products of combustion circulate through and around it, simultaneously cremating it without objectionable odors and also utilizing its combustible elements to increase the fuel-supply and economically heat the water.

The colder return water of the water-heating system enters the bottom pipes A through the smaller pipe a , and the heated water passes out from the top water-chamber A' through the issue-pipes a' to the various pipes leading to the radiators of the system.

Instead of using garbage on the elevated water-grate B wood, sawdust, soft coal, or any other similar fuel which requires a large access of air for its combustion without smoke may be successfully burned.

I do not claim, broadly, an elevated supplementary grate, as I am aware that this is not broadly new.

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

1. A water-heating furnace, comprising upper and lower water-chambers, a main grate

arranged between the same, a supplemental water-grate arranged in elevated position above the main grate and between it and the upper water-chamber, circulation-pipes connecting one end of the water-grate to the lower water-chamber and the other end of the water-grate to the upper water-chamber, and vertical circulation-pipes arranged at the side of the two grates and connecting the upper and lower water-chambers substantially as described.

2. A water-heater having two grates, the upper one being a water-grate connected, for circulation, with the water-spaces and having in rear of the same hollow upright partitions also connected, for circulation, with the water-spaces and having dampers above and baffle-plates below substantially as and for the purpose described.

3. A water-heating furnace comprising upper and lower water-chambers, a main fuel-grate and a water-grate located above the main grate and formed in one piece and provided with clean-out plugs in its end and combined with and exclusively supported by standing circulating-pipes at its front end connecting with the lower water-chamber and by suspended circulation-pipes at its rear end connecting with the upper water-chamber substantially as and for the purpose described.

4. A water-heater having two grates, the upper one being a water-grate connected for circulation with the water-spaces and having in rear of the same hollow upright partitions also connected for circulation with the water-spaces and means for causing the fire-currents to circulate between the hollow upright partitions substantially as described.

MICHAEL E. HERBERT.

Witnesses:

WILLIAM H. HERBERT,
CHARLES A. HERBERT.