

(No Model.)

C. O. AREY.
BOILER AND FURNACE SETTING.

No. 482,147.

Patented Sept. 6, 1892.

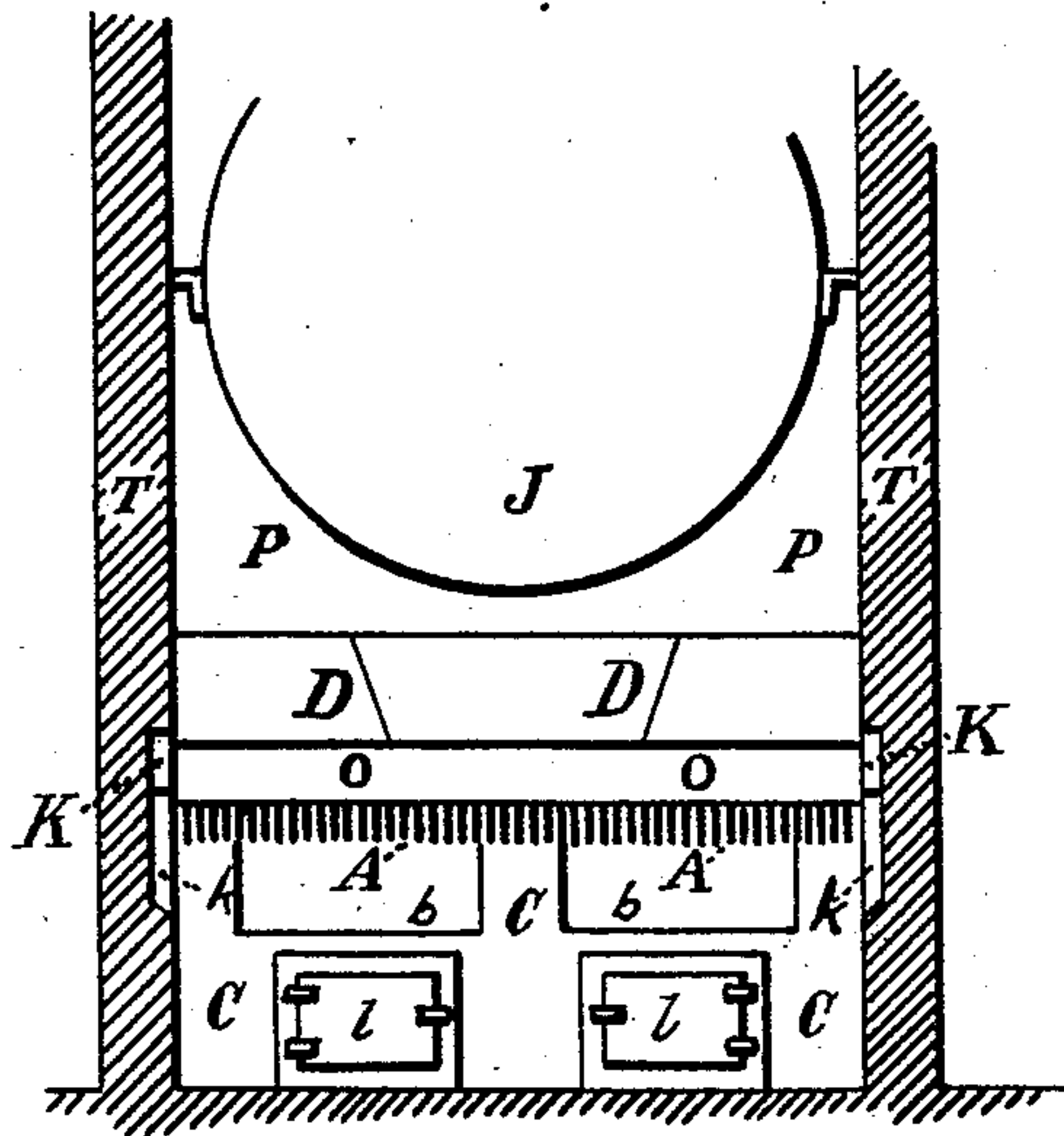


Fig. 1.

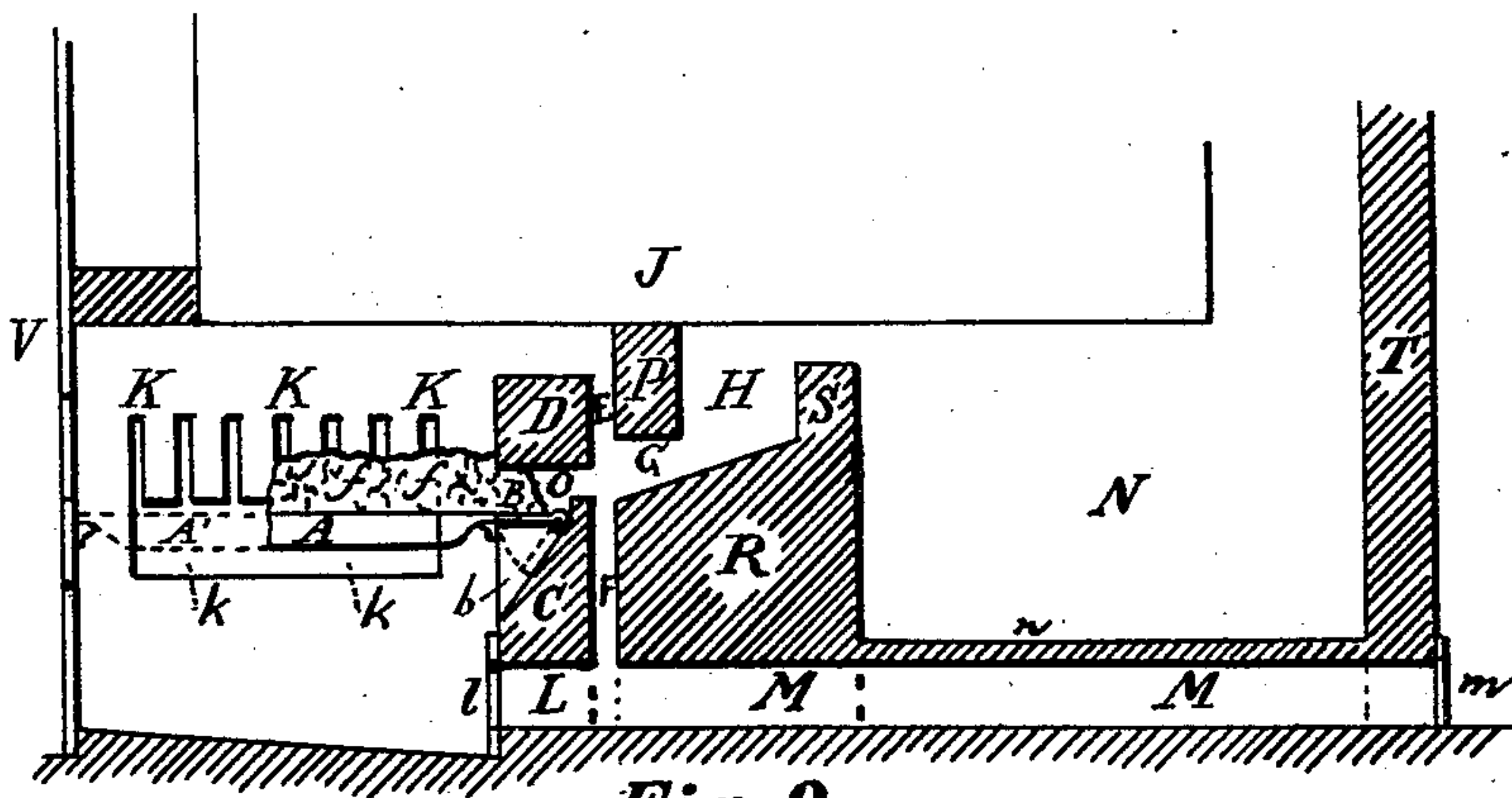


Fig. 2.

WITNESSES:
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BOILER AND FURNACE SETTING.

SPECIFICATION forming part of Letters Patent No. 482,147, dated September 6, 1892.

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To all whom it may concern:

Be it known that I, CLARENCE O. AREY, of the city of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Boiler and Furnace Settings; and I do hereby declare the following to be a clear and exact description of the invention, such as will enable others skilled in the art to which it pertains to thoroughly understand the same.

My invention relates to improvements in boiler and furnace settings, designed to prevent and consume smoke, and also, on account of making better combustion, to make a saving in the amount of fuel used. It consists of certain features of construction, and in combination of parts hereinafter set forth.

Heretofore it has been considered impossible to dispense with the black smoke where soft or bituminous coal is used for fuel, and in view of these facts I have devised the boiler and furnace settings illustrated in the accompanying drawings, in which—

Figure 1 is a transverse section through the fire-box, and Fig. 2 is a longitudinal section through the same.

A A A' is the grate, A' being dotted to indicate the position of grate, the grate being removed at this end to show the pockets K k.

B is a solid metal dumping-plate to drop the ashes into the pocket b.

b b is a sloping pocket to allow ashes to drop into the ash-pit.

C C C is the bridge-wall.

D D D is a flat arch above the bridge-wall.

E is a duct back of the bridge-wall D for the escape of smoke.

F is a duct for the introduction of heated air.

G is a duct for the gases from the ducts E, F, and O to pass into the mixing-chamber H.

H is the mixing-chamber.

J is a boiler or roof of furnace.

K K K are narrow pockets of about the width between grate-bars opening into the large pocket k.

k k is a large pocket in the side walls, whose bottom surface is somewhat below the bottom of the grate-bars and whose top surface is the width of the ordinary space between grate-bars above the top of the grate-bars.

L is a clean-out hole connecting with the bottom of the duct F.

ll are doors to the clean-out holes.

M M is a chamber for the heating of the air supplied to the duct F.

m is a door to regulate the quantity of air passing into the chamber M.

N is the ordinary combustion and soot-collecting chamber at the back of boilers and furnaces.

O is a duct for the escape of flame from the fire ff.

ff is the fire lying on the grate.

P is an arch over the duct G, which is built up tight to the boiler or roof of furnace, so that all smoke will necessarily pass into the duct G.

R is composed of walls and filling to make a floor at the proper level for the chamber H.

S is a wall at the back of the chamber H to cause an eddy and consequently a more thorough mixing of the gases.

T T T are the inclosing walls of the boiler or other furnace.

V is the front of the boiler or other furnace.

The fire having been started and a bed of incandescent fuel having accumulated on the grate A, reaching above the bottom of the arch D, fresh fuel is thrown into the furnace, when combustion takes place, in the following manner: Air enters the large pockets k and passing up through the branch pockets K of the pockets k is heated to a very high temperature by passing against the sides of the fire, and then it enters the fire-box over the surface of the fire and mingling with the gases improves combustion. From the body of the incandescent fuel ff a sheet of pure flame passes out through the duct O and into the duct G. The smoke from the fresh fuel on the surface of the fire rises and passes over the top of the arch D, then down the duct E to where it mingles with the jet of flame from O and the jet of heated air from the duct F. The door m being open allows air to pass into the chamber or duct M, where it receives heat through the roof n from the heated gases in the chamber N. This heated air passes onward and up through the duct F till it reaches the intersection of the ducts O, E, F, and G. Here the jet of flame from O, the smoke from E, and the heated air from F meet and pass into the duct G, and

then into the mixing-chamber H, where they strike the wall S, thus being completely mixed, and the carbon of the smoke that comes down the duct E being thoroughly mixed with the heated air from F at a very high temperature caused by the flame from O unites with the oxygen of the air and forms carbonic dioxide, only a small part of the carbon escaping in a free state. The doors *ll* are always kept shut, except when cleaning, as they would allow cold air to enter the duct F. The dumping-plate B is made preferably solid, as too much unheated air reduces the temperature of the flame that passes through O.

I have reduced my invention to practice in all its more essential parts, and find that it burns soft coal with greater economy and less smoke than any apparatus which I have seen.

The essential features of my invention are the pockets in the side walls and the ducts, walls, and chambers arranged as heretofore described. The cleaning-doors *ll* and the dumping-plate B add to the convenience of handling, but are not essential.

What I claim is—

1. The combination, in the fire-box of a boiler or other furnace, of narrow ascending side pockets with a large lower connecting-pocket whose axis is nearly parallel with the surface of the grate, with a duct at the back edge of the grate and near its level, with an arch or lintel directly over this duct that does not extend up to the boiler or roof of furnace, with a descending duct immediately behind this arch or lintel, with an ascending duct immediately below the descending duct, which is connected into a chamber at the rear underneath the rear combustion-chamber, this under chamber connecting with the air out-

side by means of a regulating-door, with a nearly horizontal duct just in the rear of the duct from the back edge of the grate, with a chamber at the back of this duct which opens only into this duct and at its upper back surface, with a wall between the descending duct and the last-named chamber, resting upon an arch or lintel over the rear horizontal duct and extending up tight to the boiler or roof of furnace.

2. The combination, in the fire-box of a boiler or other furnace, of a duct from the back edge of the grate, with another duct intersecting the first duct and connecting at its top with the fire-chamber and at its bottom with a chamber connected with the outer air, with a wall over the first duct and in the rear of the second duct, which extends up tight to the boiler or roof of the furnace.

3. The combination, in the fire-box of a boiler or other furnace, of a bridge-wall running above the grate-level, with a duct at about the grate-level, with a dumping-plate forming the floor of said duct, with a wall slightly in the rear of the bridge-wall, resting on an arch or lintel and continuing up tight to the boiler or roof of furnace.

4. The combination, in the construction of the combustion-chambers of a boiler or other furnace, of two ducts from the fire-chamber, one above the other, with a duct passing from outside under the rear combustion-chamber, with a duct passing into the rear combustion-chamber, all four ducts meeting at a common point.

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Witnesses:

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