

(No Model.)

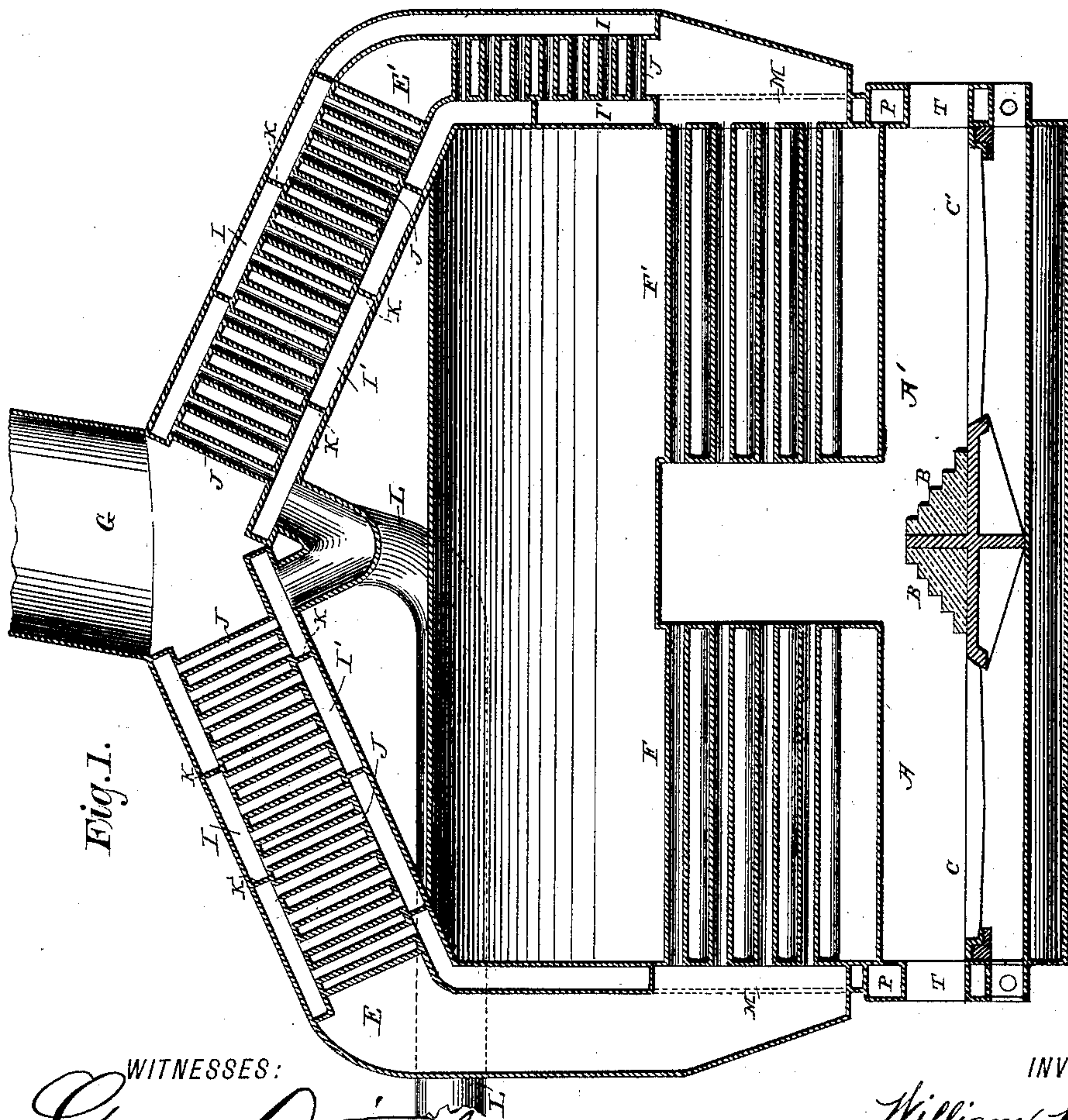
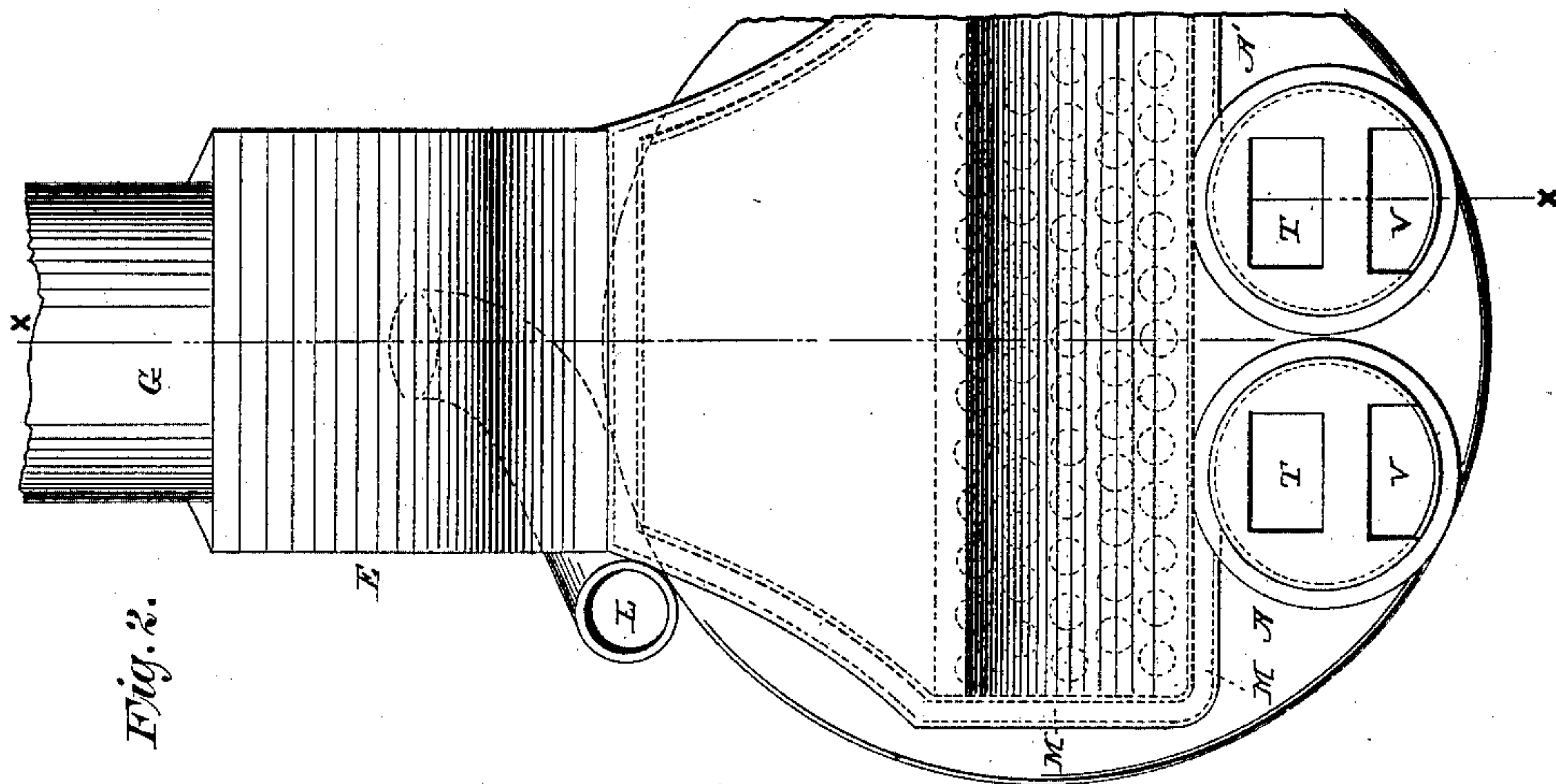
2 Sheets—Sheet 1.

W. W. DASHIELL.

APPARATUS FOR GENERATING HEAT.

No. 374,350.

Patented Dec. 6, 1887.



WITNESSES:

Gustave Dietrich
Joseph H. Winston

INVENTOR

William W. Dashiell,
BY

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ATTORNEYS.

(No Model.)

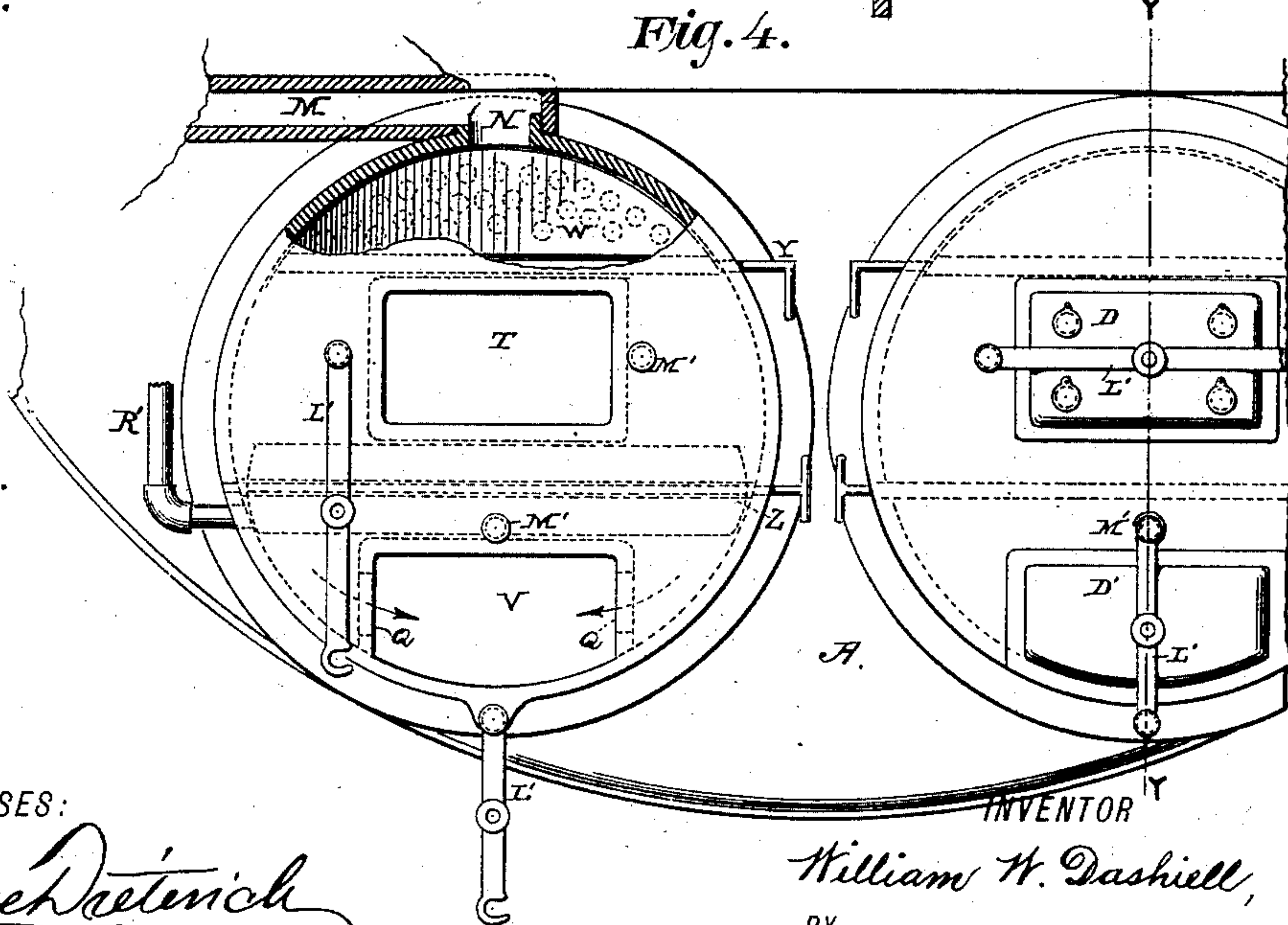
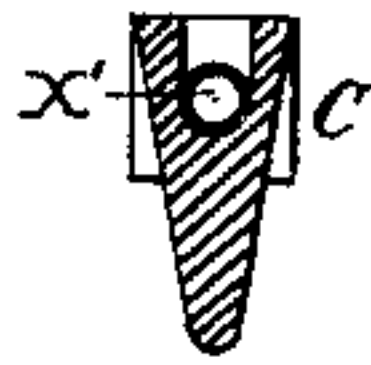
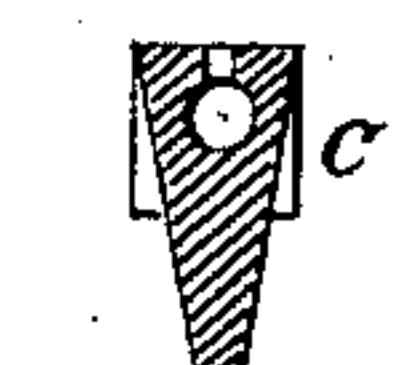
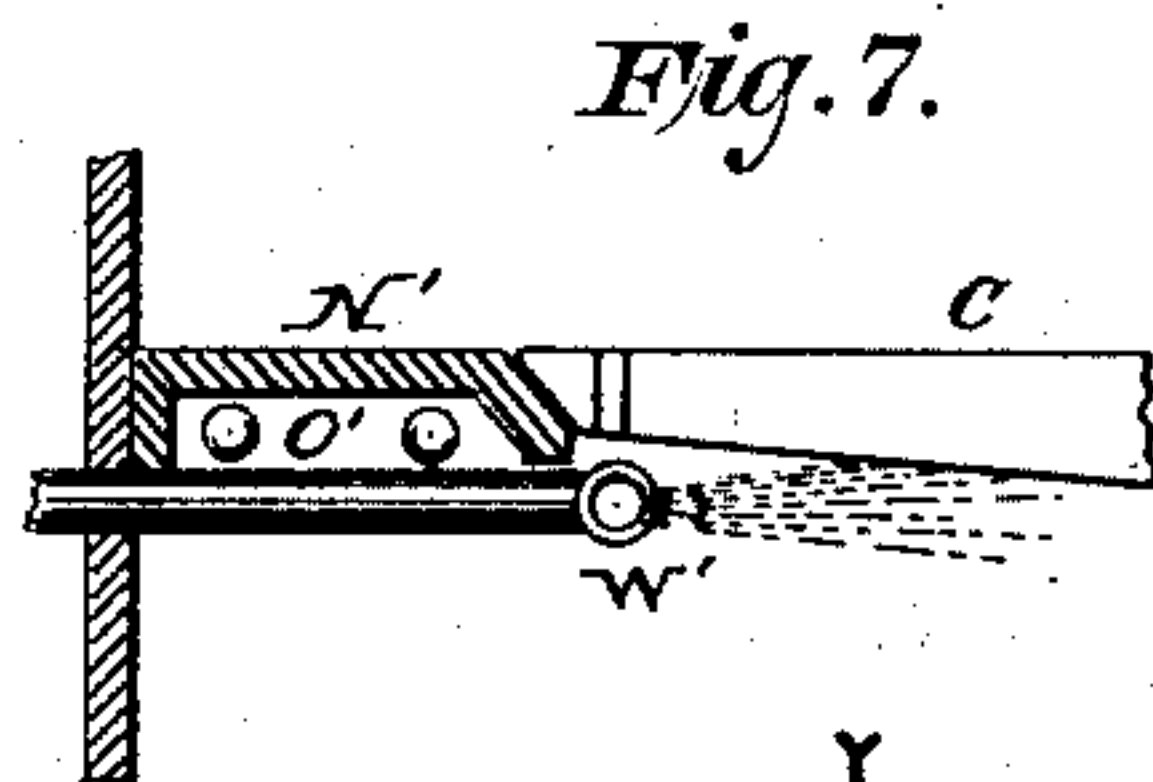
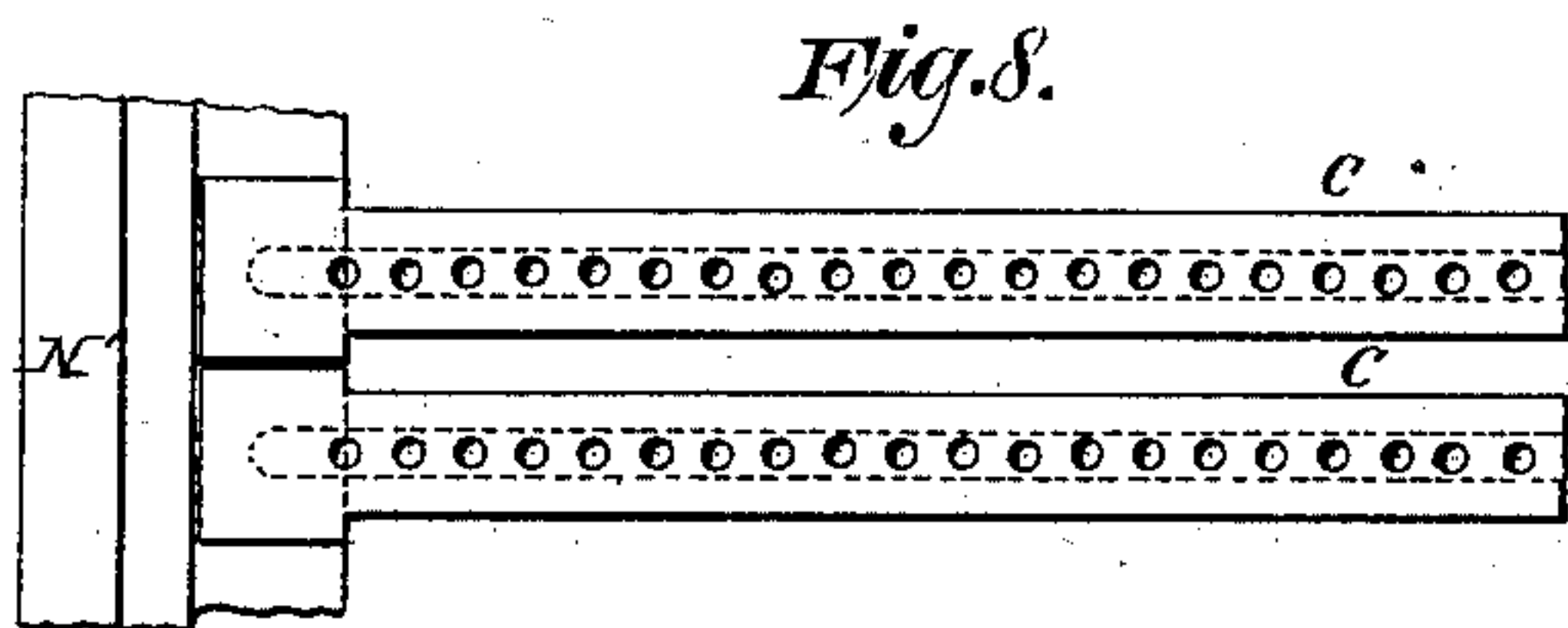
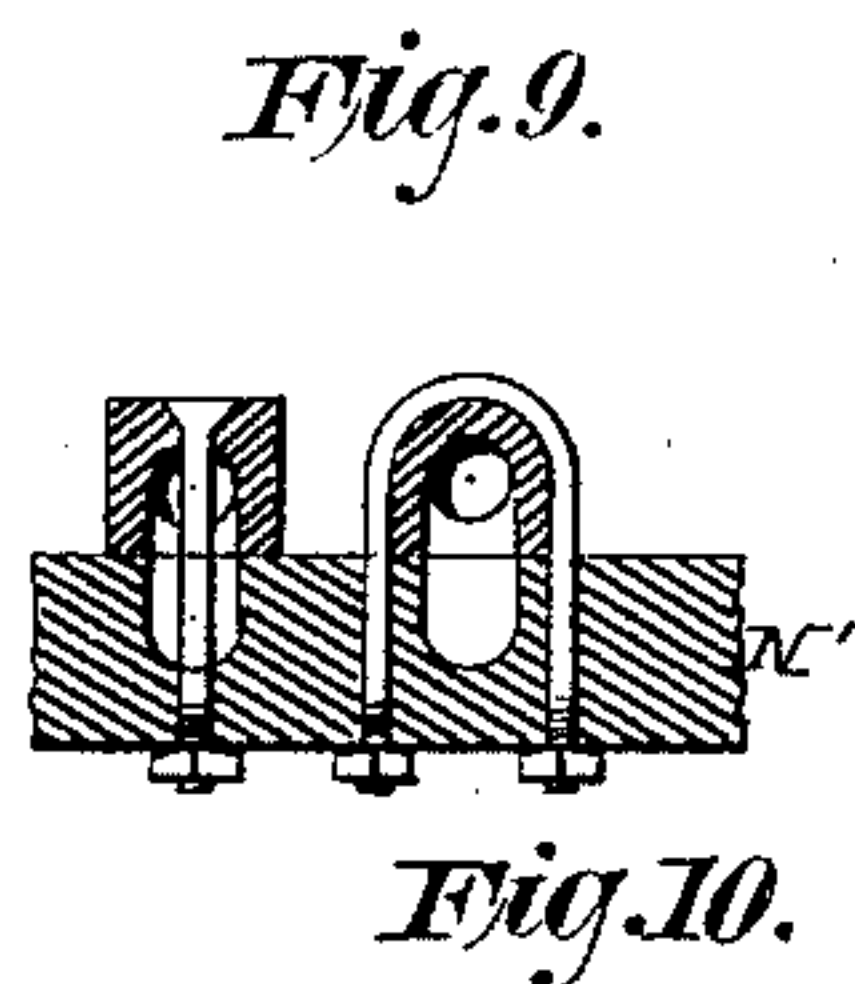
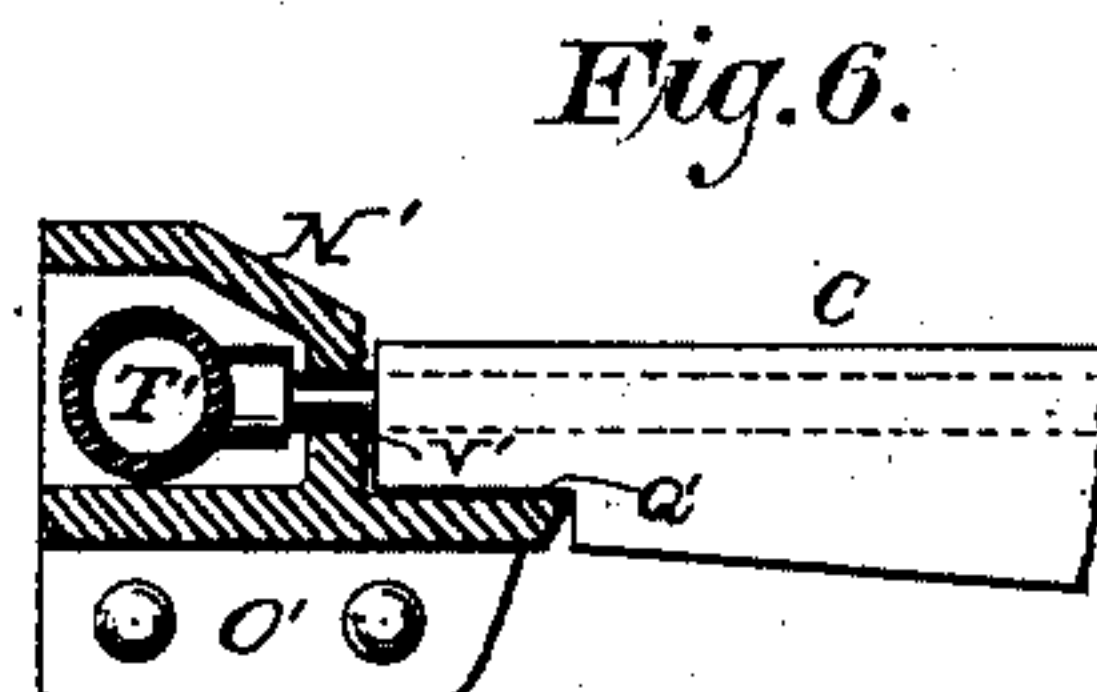
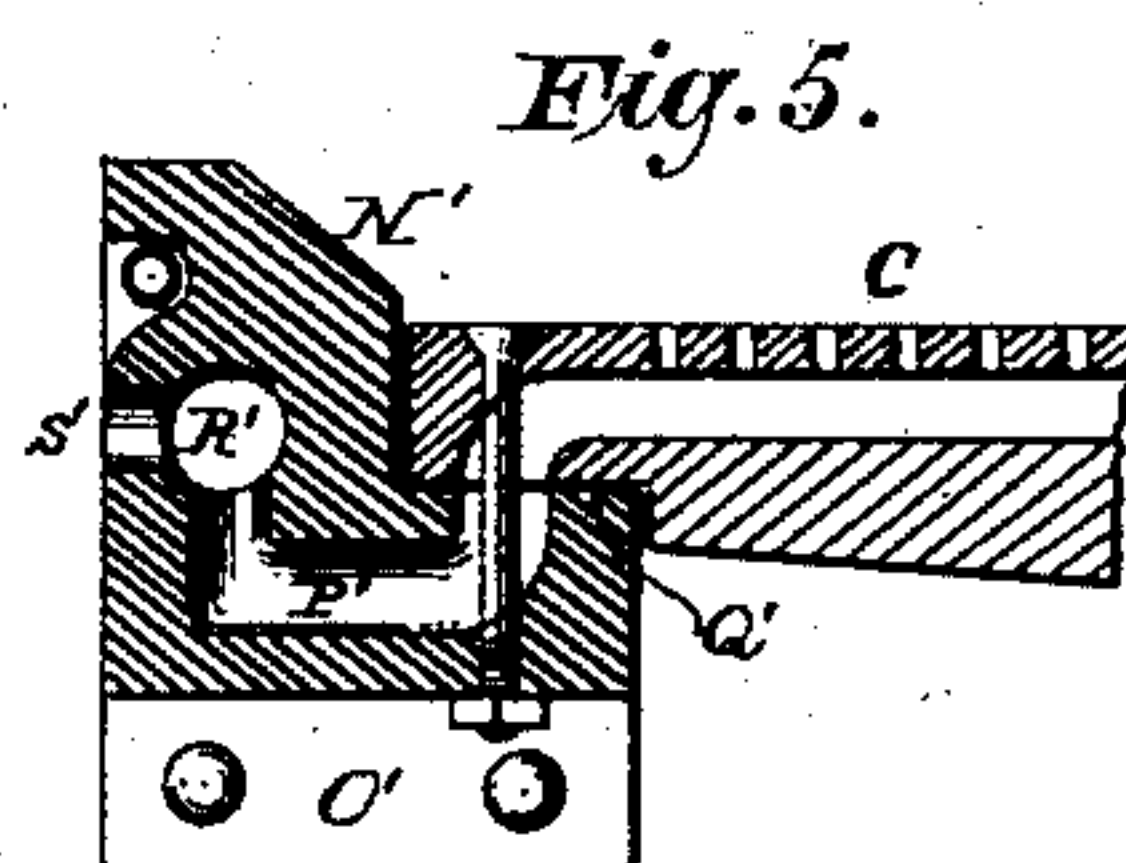
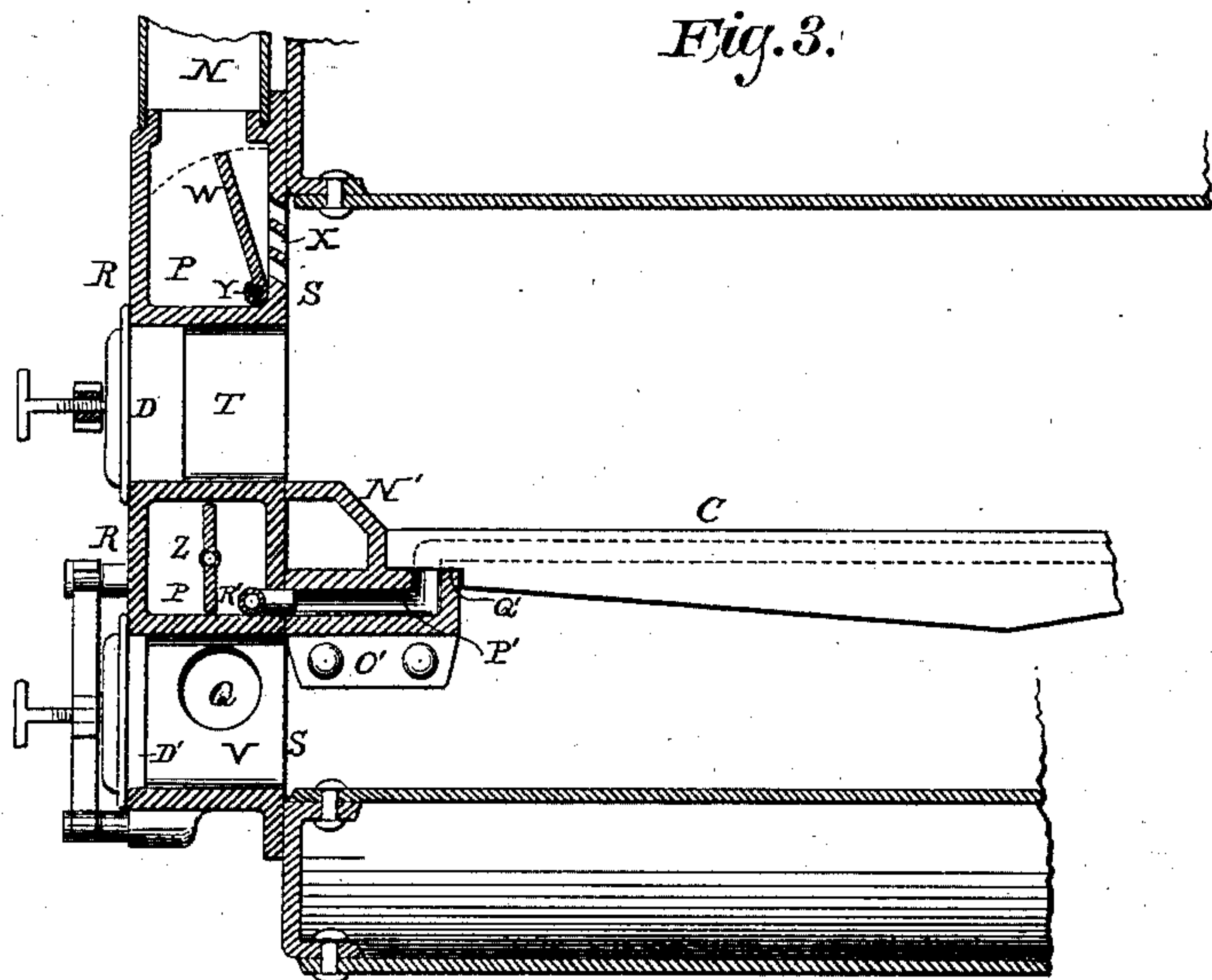
2 Sheets—Sheet 2.

W. W. DASHIELL.

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No. 374,350.

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WITNESSES:

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WILLIAM W. DASHIELL, OF BERGEN POINT, NEW JERSEY.

APPARATUS FOR GENERATING HEAT.

SPECIFICATION forming part of Letters Patent No. 374,350, dated December 6, 1887.

Application filed March 9, 1887. Serial No. 230,202. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM W. DASHIELL, a citizen of the United States, and a resident of Bergen Point, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Apparatus for Generating Heat, of which the following is a specification.

The invention relates to improvements in apparatus for generating heat, and its distinctive characteristics will be pointed out in the detailed description hereinafter presented, reference being had to the accompanying drawings, in which I illustrate the invention embodied in a double furnace for a marine engine, each fire-box having two sets of doors, one set being at each end.

Figure 1 is a vertical longitudinal section of the furnace through the broken line *xx* of Fig. 2. Fig. 2 is a front elevation of the furnace, the doors to the fire-box in this, as well as in Fig. 1, being omitted. Fig. 3 is an enlarged central vertical longitudinal section through one fire-box of the furnace, the section being taken on the broken line *yy* of Fig. 4. Fig. 4 is a correspondingly enlarged view, partly in section, of the lower portion of the furnace, the doors on one of the fire-boxes being shown in position and being omitted from the other thereof. Figs. 5 and 6 are detached sectional views of the modified forms of dead-plates and hollow perforated grate-bars. Fig. 7 is a detached modified form of dead-plate and grate-bar, and illustrates a modified arrangement of pipes for supplying steam below the fire. Fig. 8 is a detached top view of the dead-plate and grate-bars, said view being presented for the purpose of illustrating the aperture along the upper side of said bars, through which steam may be delivered into the fire; and Fig. 9 is a detached view illustrating two different forms for securing the grate-bars to the dead-plate. Figs. 10, 11, and 12 are detached transverse sectional views of different forms of grate-bars, which may be used in the furnace for the purpose of carrying the invention into effect.

In the drawings, A A' designate the fire-boxes; B, the bridge-wall; CC', the grate-bars; DD', the doors for the fire-box; EE', the uptakes, and FF' the flues through which the products of combustion pass to the stack G.

I will first describe the construction of the novel parts of the furnace, and then point out the methods of utilizing them in the generation of heat according to my invention.

The uptakes EE' connect at their upper ends with the stack G, whence they pass downward—one at each end of the furnace—and communicate with the flues FF', respectively, as more clearly indicated in Fig. 1. The upper and lower walls of the uptake E are formed of two separated metal plates forming between them air spaces or chambers II', connected by tubes J, around which the products of combustion circulate on their passage to the stack G. The chambers II' are provided with partitions K, those in one chamber alternating in their position with relation to those in the other, in order to cause the air to circulate from one chamber to the other through the connecting-tubes J. The chamber I' is extended below the chamber I, as shown, and communicates with chambers leading to the upper and lower sides of the grate-bars, as hereinafter explained. The uptake E' is also constructed with air-chambers II', connected by tubes J, and provided with alternating partitions K, similar to the like-named features in the uptake E, with the exception that a greater number of the tubes J are employed and the chamber I is of increased length. The chambers and tubes in each uptake are designed to accomplish similar functions, however, and connect with chambers at each end of the furnace, which supply air above and below the fire.

The chambers are supplied with air from a suitable suction-blower (not shown) connected with the pipe L, which has branches leading directly into the chambers I and I', respectively, as indicated in Fig. 1.

It will be seen upon reference to Fig. 2 that the uptakes EE' extend laterally at their lower portions and terminate directly above the furnace-doors, the parallel dotted lines representing the passages M for the air around the flues FF', said passages being also shown by dotted lines in Fig. 1, and the purpose of which is to direct the air from the chambers I I' of the uptakes to the short passages N, connecting the passages M with the chambers P, as shown in Figs. 3 and 4, which encircle each

fire-box and terminate in discharge-apertures Q at opposite sides of the entrance to the ash-pit, as indicated in full lines in Fig. 3 and dotted lines in Fig. 4. The chambers P are formed between two plates, R S, constituting the ends of the fire-boxes, and pass entirely around the openings T for the introduction of the fuel and along the top and sides of the openings V to the ash-pits, as more clearly indicated in Figs. 3 and 4.

Between the plates R S above the opening T is provided a damper, W, with which to close to a greater or less degree the apertures X, formed in the plate S above the grate-bars, the damper being operable by means of the handle-bar Y. (Shown in Fig. 4.)

At a point between the openings T V to the fire-box there is provided in the chamber P an additional damper, Z, having a handle extending beyond the chamber, the purpose of the damper being to control the passage of air through the discharge-apertures Q to the ash-pit below the grate-bars. The position of the damper Z (shown in Figs. 3 and 4) is such that the air above the same may pass unrestricted to the discharge-apertures Q; but it will appear obvious that should the damper be turned so as to give it a more or less horizontal position the space through which the air passes downward may be restricted or entirely closed.

The openings T V are provided with suitable doors, D D', as shown in Figs. 3 and 4, adapted to be secured by the bars L', hung upon a pivot at one end and provided with a hook upon the other to engage the stud M', a screw being supplied at the center of the bars to lock the same in position across the face of the door.

Across the front end of each fire-box, and in close relation to the plate S between the openings T V therein, is secured the dead-plate N' by means of rivets passing through end flanges, O', (shown in Figs. 3, 5, 6, and 7,) the dead-plate illustrated in Fig. 3 being provided with a series of apertures, P', in line and corresponding in number with the hollow grate-bars C C', the adjoining ends of which rest over the inner ends of said apertures upon the shoulder Q', formed on the dead-plate. Each of the apertures P' is in communication with a steam-pipe, R', (see Fig. 4,) by which steam is supplied to the grate-bars during the time the furnace is in use, being permitted to escape therefrom into the fire through the perforations along the upper surface of said bars. (Shown in Figs. 5, 8, 10, and 11.) The object of having the hollow grate-bars perforated along their entire length is to cause the escaping steam to be finely subdivided and evenly distributed.

The dead-plate N' admits of various modifications within the scope of the invention, some of which are illustrated in Figs. 5, 6, and 7, that in Fig. 5 differing from the dead-plate shown in Fig. 3 in that in the former the steam is admitted to the transverse cham-

ber, R', formed therein through a single port, S', whence it escapes through the apertures P' into the hollow grate-bars, the latter being secured by bolts passing through them and the dead-plate, as clearly indicated in Fig. 5. In Fig. 6 the dead-plate is shown as being cast hollow, with a transverse steam-pipe, T', introduced therein, and connected by a series of short pipes or nozzles, V', with the hollow grate-bars. If for any reason it should not be desired to employ hollow grate-bars, the dead-plate may be constructed as shown in Fig. 7, and the steam introduced below the bars through a transverse perforated pipe, W', in connection with an ordinary supply-pipe, although I prefer to employ the hollow bars perforated along their upper portion either in line with their vertical longitudinal center, as shown in Figs. 5, 8, and 11, or along their sides, as illustrated in Fig. 10. If desired, the grate-bars may be cast with a longitudinal groove along their upper surface of sufficient depth to receive pipes X', (see Fig. 12,) perforated along their upper surface, and into which the steam could be directed instead of into what is technically a hollow perforated bar.

The modified forms of grate-bar may be readily understood from the drawings without a more detailed description.

In the use of the furnace the fuel will be placed upon the grate-bars and ignited in the customary manner, air being supplied through the pipe L and steam through the pipe R', and the products of combustion being permitted to escape through the stack G after heating the air on its passage downward through the chambers I and I' and passages M, as indicated in Figs. 1 and 2, to the chambers P, encircling the doors to the fire-boxes, the chambers P, for clearness of illustration, being more particularly shown in Figs. 3 and 4. The air, as aforesaid, may escape into the fire-box above the grate-bars through the apertures X and below the grate-bars through the apertures Q, the air at both points promoting combustion, as well as serving other important functions in connection with the steam. The steam issuing in jets through the hollow grate-bars becomes finely subdivided and evenly distributed, as above mentioned, and in addition is superheated by the bars, which, as will be understood, obtain their heat from the fire.

During the use of the furnace, a hot bed of coals being on the grate-bars, only sufficient air is allowed to enter under the grate-bars to form carbonic oxide. Steam is admitted through the grate-bars and decomposed by the ignited fuel into hydrogen gas and carbonic oxide, the oxygen of the steam having united with a portion of carbon, thus decomposing the steam and forming two inflammable gases—hydrogen and carbonic oxide. These, with the carbonic oxide formed by the admission of air under the grate, are made to

burn by the introduction of air through the apertures X. Thus it will be plainly seen that my object in introducing air below the grate is not for the purpose of producing perfect combustion, but for the purpose of only partially consuming the carbon by the air, and thus maintain the heat which is expended in the decomposition of the steam, perfect combustion of the gases thus formed taking place only after they have reached the top of the fuel and come in contact with the air above the same.

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

1. In a furnace, the fire-box having grate-bars and an end composed of plates RS, forming between themselves the air-chamber P, and provided with door-openings T V and discharge-apertures above and below the grate-bars, combined with the uptake having air-chambers communicating with the chamber P and with an air-supply, substantially as set forth.

2. In a furnace, the fire-box having grate-bars and the air-chamber P at its end, said chamber having discharge-apertures above and below the bars, combined with the uptake having air-chambers I I', connected by tubes and being in communication with the chamber P and with an air-supply, substantially as set forth.

3. In a furnace, the fire-box having grate-bars and an end composed of plates forming between themselves the air-chamber P, and provided with door-openings T V, discharge-apertures above and below the grate-bars, and dampers W Z, one of the dampers being above and the other below the opening T, combined

with the uptake having air-chambers communicating with the chamber P and with an air-supply, substantially as set forth.

4. In a furnace, the fire-box having the air-chamber P at its end, said chamber having the discharge-apertures above and below the bars, combined with the uptake having air-chambers in communication with the chamber P and connected with an air-supply, the hollow perforated grate-bars, and a steam-connection between said hollow bars and a steam-supply, substantially as set forth.

5. In a furnace, the fire-box having an end composed of plates RS, forming between themselves the air-chamber P, and provided with door-openings and discharge-apertures above and below the grate-bars, combined with a perforated steam-delivery below the fire and a pipe connecting said delivery with a steam-supply, substantially as and for the purposes set forth.

6. In a furnace, the fire-box having the air-chamber P at its end, said chamber having discharge-apertures above and below the grate-bars, combined with the uptake having air-chambers in communication with the chamber P and connected with an air-supply, a perforated steam-delivery below the fire, and a pipe connecting said delivery with a steam-supply, substantially as and for the purposes set forth.

Signed at New York, in the county of New York and State of New York, this 5th day of March, A. D. 1887.

WILLIAM W. DASHIELL.

Witnesses:

CHAS. C. GILL,
HERMAN GUSTOW.