

(No Model.)

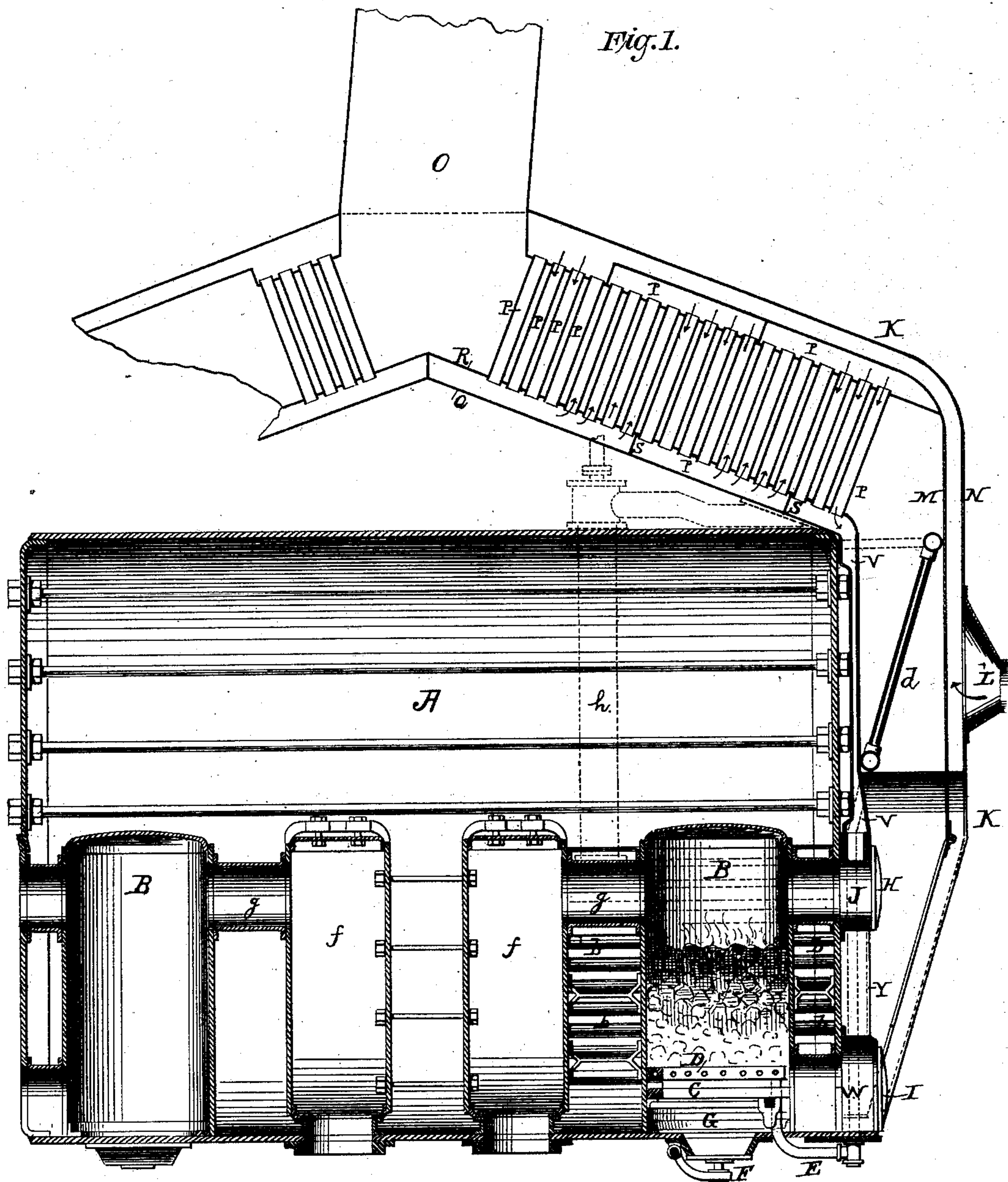
2 Sheets—Sheet 1.

W. W. DASHIELL.

APPARATUS FOR GENERATING HEAT.

No. 374,351.

Patented Dec. 6, 1887.



WITNESSES:

Gustav Dietrich
H. A. Matthies

INVENTOR

William W. Dashiell,
BY
Ellison & Gill,
ATTORNEYS.

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2 Sheets—Sheet 2.

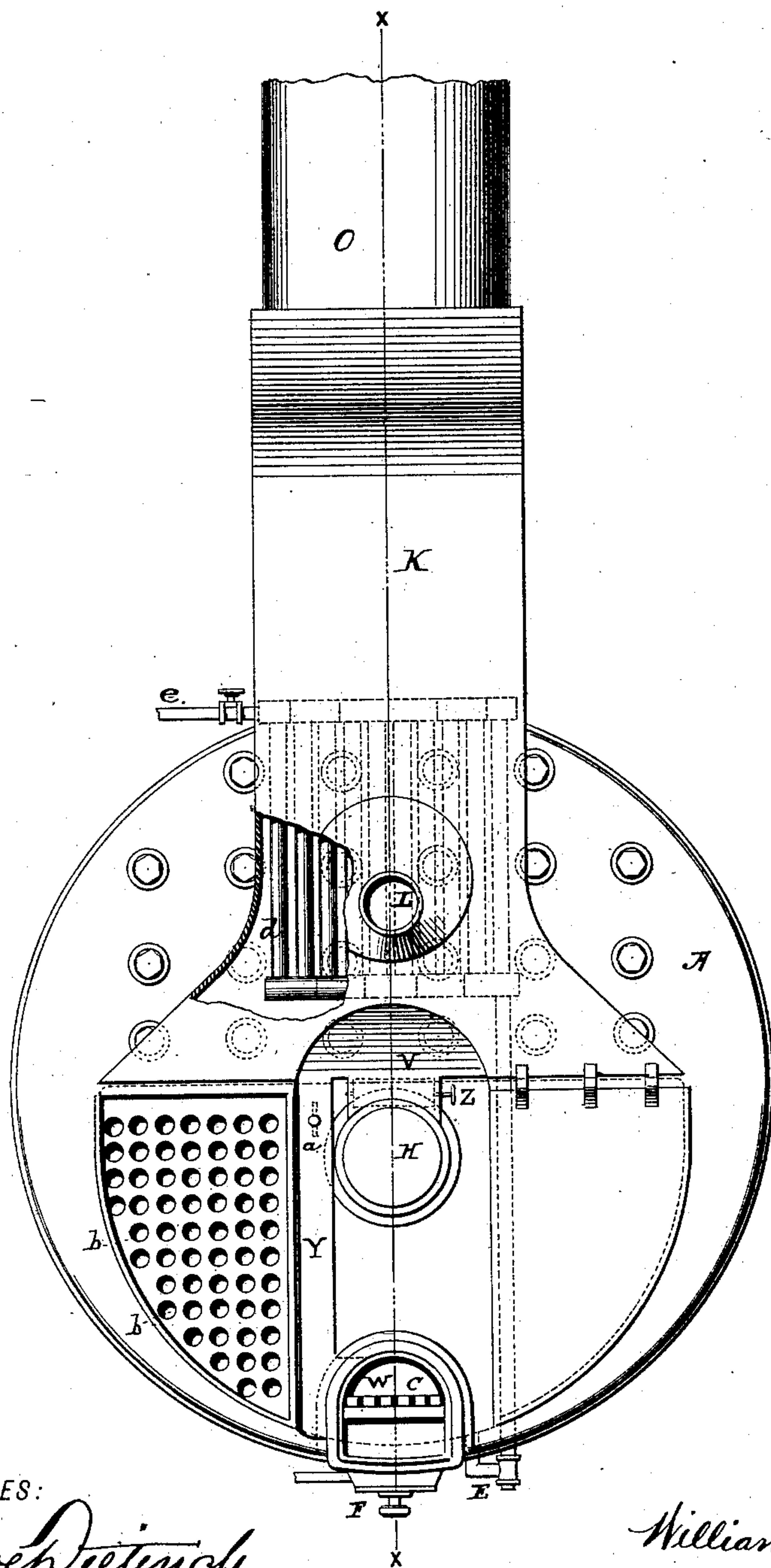
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Fig. 2.



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UNITED STATES PATENT OFFICE.

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

APPARATUS FOR GENERATING HEAT.

SPECIFICATION forming part of Letters Patent No. 374,351, dated December 6, 1887.

Application filed June 27, 1887. Serial No. 242,567. (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 it consists in the elements hereinafter described, and pointed out in the claims.

The invention is illustrated in the accompanying drawings as embodied in a marine boiler, Figure 1 being a central vertical longitudinal section through the boiler and furnace on the dotted line X X of Fig. 2, which is a front view of the same, a portion of the front of the furnace being omitted.

In the drawings, A designates the boiler, having a vertical furnace, B, at each end thereof, as shown in Fig. 1, the lower part of each furnace being provided with grate-bars C and with the perforated section or pipe D, which is in connection with a steam-supply pipe, E, as shown in Fig. 1. The upright furnace B (shown in the right-hand side of Fig. 1) is similar to the like-named element at the left-hand side of said figure. The latter, however, in order not to complicate the drawings, has been left without grate-bars or steam-pipes D. At the bottom of the furnace B is provided the door F, located below the ash-pit G, for the purpose of dumping the latter when desired. At each end of the boiler A the furnaces are provided with the doors H I, respectively, the upper door being for the introduction of coal to the fire, and the lower one leading to the ash-pit.

The apparatus constituting the invention involves the system of feeding air to the upper part of the fire and air and steam to the lower part of the same. The steam is supplied through the pipe E to the perforated pipe or section D, and the air is fed through the doorways J W from the uptake K. The air is supplied to the uptake through the pipe L, whence it passes between the walls M N of the uptake to a point in near relation to the stack O, where it turns downward through the tubes P, as indicated by the arrows, into the space formed between the walls Q R, which

is subdivided by partitions S, whereby the current of air is caused to pass upward and downward in a serpentine line through additional tubes P, in the manner indicated by arrows, finally entering the air space or flue V, which passes downward along the front of the furnace and opens into the doorway J, as shown in Fig. 1, and also into the side of the doorway W. The air space or flue V corresponds in outline with the form of the uptake above the coaling-door H, and from thence a section of said flue passes downward to the doorway W, the section being illustrated more fully in Fig. 2 and lettered Y. Above the doorway J the air-space V is provided with the damper Z, by which the amount of air entering the furnace above the fire may be regulated, and the section Y of said air-space is also provided with a damper, (lettered a,) by which the volume of air passing downward to the lower part of the furnace may be adjusted at will.

It will be observed from the following description that the air from the supply-pipe L is heated on its passage through the tubes P by the products of combustion, which pass from the flues b into the lower portion of the uptake K. The steam which enters the pipe E is thence fed to the perforated pipe or section D and is supplied by a coil, d, located within the uptake, and being in connection with a steam-supply by means of the pipe e, provided with a valve, as shown in Fig. 2. Within the boiler A each of the furnaces B is in connection with a combustion-chamber, f, through the medium of the enlarged tube g, and each of said combustion-chambers is connected with the inner ends of the tubes b, the outer ends of the tubes for each furnace passing to the end of the boiler and opening into the uptake K at its lower portion.

The arrangement of the flues b may be readily seen upon reference to Fig. 2, where one section of the furnace-front is omitted for the purpose of disclosing them. The form of the combustion-chambers f is similar to the outline of the furnace-front illustrated in Fig. 2, being substantially in the outline of a half-circle, this form permitting the arrangement of the tubes b upon each side of the furnace B. The lower end of the combustion-chambers f will be provided with a suitable man-hole, as shown.

In Fig. 1, by dotted lines, I have illustrated a connection between the air-space of the uptake formed by the walls Q R and the enlarged tube *g*, connecting the furnace with the combustion-chamber, said connection being denoted by dotted lines and lettered *h*, and its purpose being to admit an additional supply of air to the upper part of the combustion-chamber for the purpose of insuring the burning of all of the water-gas.

I have omitted in Fig. 1 the uptake from the left-hand end of the furnace A, since this portion is an exact duplicate of the uptake illustrated at the right-hand end thereof. Where a single furnace B is made use of, only one uptake K will be employed.

In the operation of the invention the fire is first started and the coals allowed to become incandescent, air in the meantime being admitted through the doorways J W, as above described. After the bed of coals has become incandescent steam is admitted through the pipe *e* into the coil *d*, whence it passes through the pipe E into the pipe D, which permits its escape into the bed of coals. The air becomes heated and the steam superheated by reason of the products of combustion ascending through the uptake before they enter the furnace. The steam discharged into the furnace through the pipe D becomes decomposed by the incandescent carbon, water-gas being thereby formed, which is burned, owing to the introduction of hot air either from the doorway J or from said doorway and the connection *h*, provided to admit an additional supply of air, the combustion being completed in the chamber *f*, and through the tubes *b*, which pass to the uptake. By this means the heat is thoroughly distributed throughout the heating-surfaces of the boiler, and not, as heretofore, concentrated in the furnace, the injurious effects of which have been a subject of great loss and annoyance.

Another advantage in the construction presented is that any cold air entering the furnace during the introduction of fuel will become heated before coming in contact with the flues *b*, and hence the latter will not be subject to the effect of the sudden contraction created in the boilers now in use.

An important object gained by the present construction is that a very large heating-surface is obtained as compared with the grate-surface and that the heating-surface is brought down to the bottom of the boiler, thus affording a thorough circulation of the water, at the same time leaving a large steam-room or evaporating-surface in the upper part of the boiler, whereby the usual priming and lifting of the water by sudden release of steam are reduced to a minimum. There are many other advantages gained by the construction presented, which will be appreciated without specific mention, and among these it may be mentioned that the tubes *b* are so arranged that they may be very readily cleaned and that the parts are so arranged as to readily admit a man within

the boiler and allow abundant room for him to clean the same.

In addition to what has been referred to above, it should be noted that the constant current of air passing through chambers or jackets lining wholly or in part the walls of the uptake abstracts the heat from the products of combustion as they ascend to the stack, thus reducing the temperature of the stoke-hole and avoiding the heating of the rooms of the vessel above the boiler.

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 doorway J. 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 combination of the vertical fire-box having suitable doors, the combustion-chamber connected at its upper end by a tube with the upper end of said fire-box, the boiler inclosing the vertical fire-box, and the tubes passing from the combustion-chamber upon opposite sides and below the upper end of the fire-box to the uptake, substantially as and for the purposes set forth.

2. In a furnace, the fire-box having a steam-delivery below the fuel, combined with the boiler, the combustion-chamber connected with the fire-box by a tube above the fuel, the uptake containing air-chambers and leading to the fire-box above and below the grate-bars, and tubes connecting the combustion-chamber with the lower end of the uptake, substantially as and for the purposes set forth.

3. In a furnace, the vertical fire-box provided with air-inlets above and below the grate-bars and with a steam-delivery at its lower portion, combined with the boiler, the combustion-chamber connected with the fire-box by a tube and being wider than the fire-box, and tubes passing from the combustion-chamber on each side of the fire-box to the uptake, substantially as and for the purposes set forth.

4. In a furnace, the vertical fire-box provided at its lower end with grate-bars and with the perforated section D, which is in commu-

nication with a steam-supply pipe, combined with the uptake having air-chambers in connection with an air-supply pipe, one of said chambers being close to the front of the boiler
5 and in connection with the doorways J and W, respectively, and being provided with regulating-dampers, the steam-connection for the section D being located within the uptake, as at d, substantially as and for the purposes set
10 forth.

5. In a furnace, the boiler and the fire-box provided with doors and grate-bars, combined with the uptake having a double casing on its

outer and inner portions forming air chambers or conduits, tubes connecting these air-cham- 15
bers at their upper portion, an air-supply pipe leading into the outer chamber, and a delivery to the fire-box from the inner chamber, substantially as set forth.

Signed at New York, in the county of New 20
York and State of New York, this 25th day
of June, A. D. 1887.

WILLIAM W. DASHIELL.

Witnesses:

CHAS. C. GILL,

W. A. C. MATTHIE.