

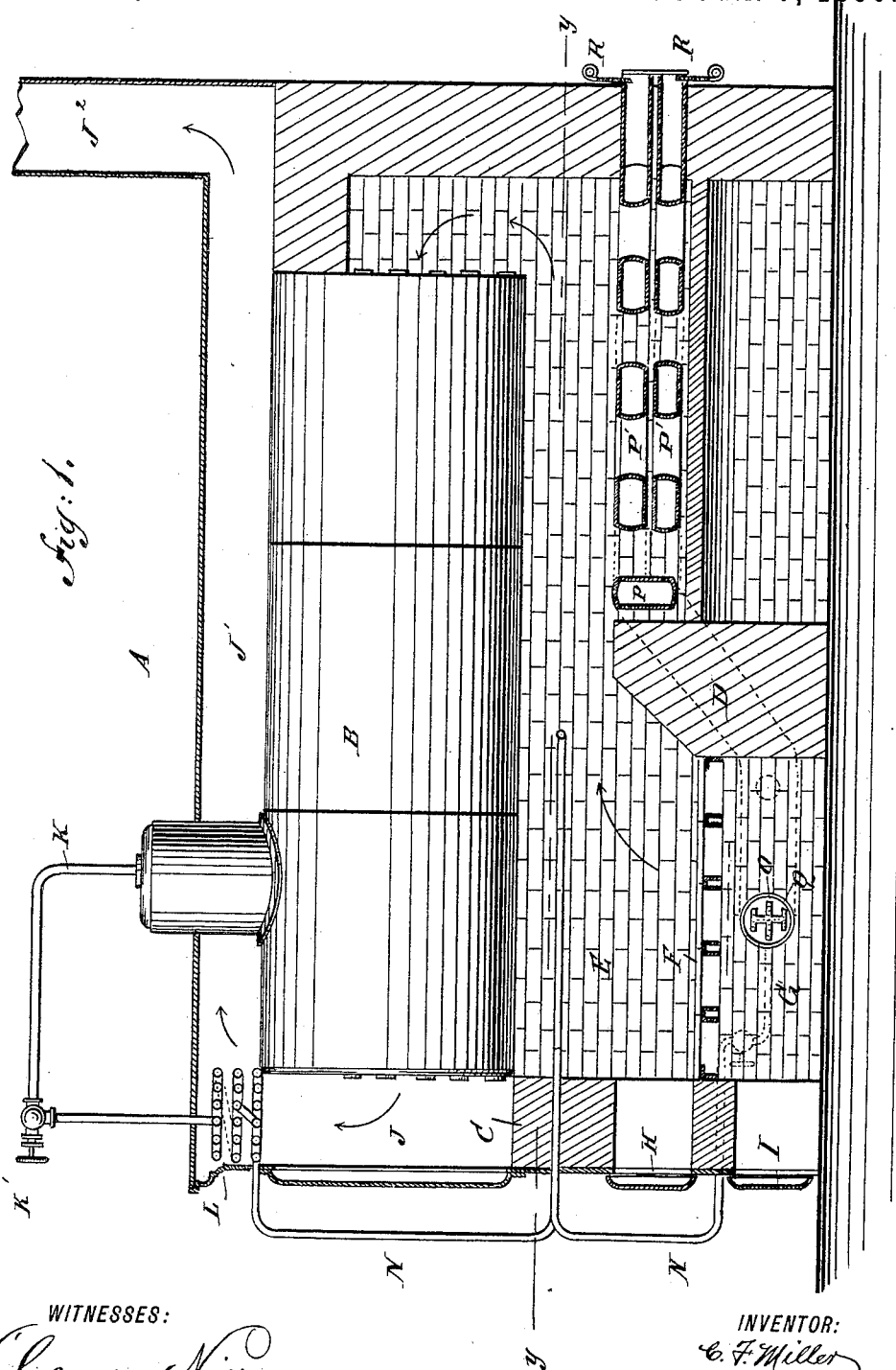
(No Model.)

2 Sheets—Sheet 1.

C. F. MILLER.
FURNACE.

No. 418,955.

Patented Jan. 7, 1890.



WITNESSES:

Alnas Niora
C. Sedgwick

INVENTOR:

C. F. Miller
Munn & Co.

BY

ATTORNEYS.

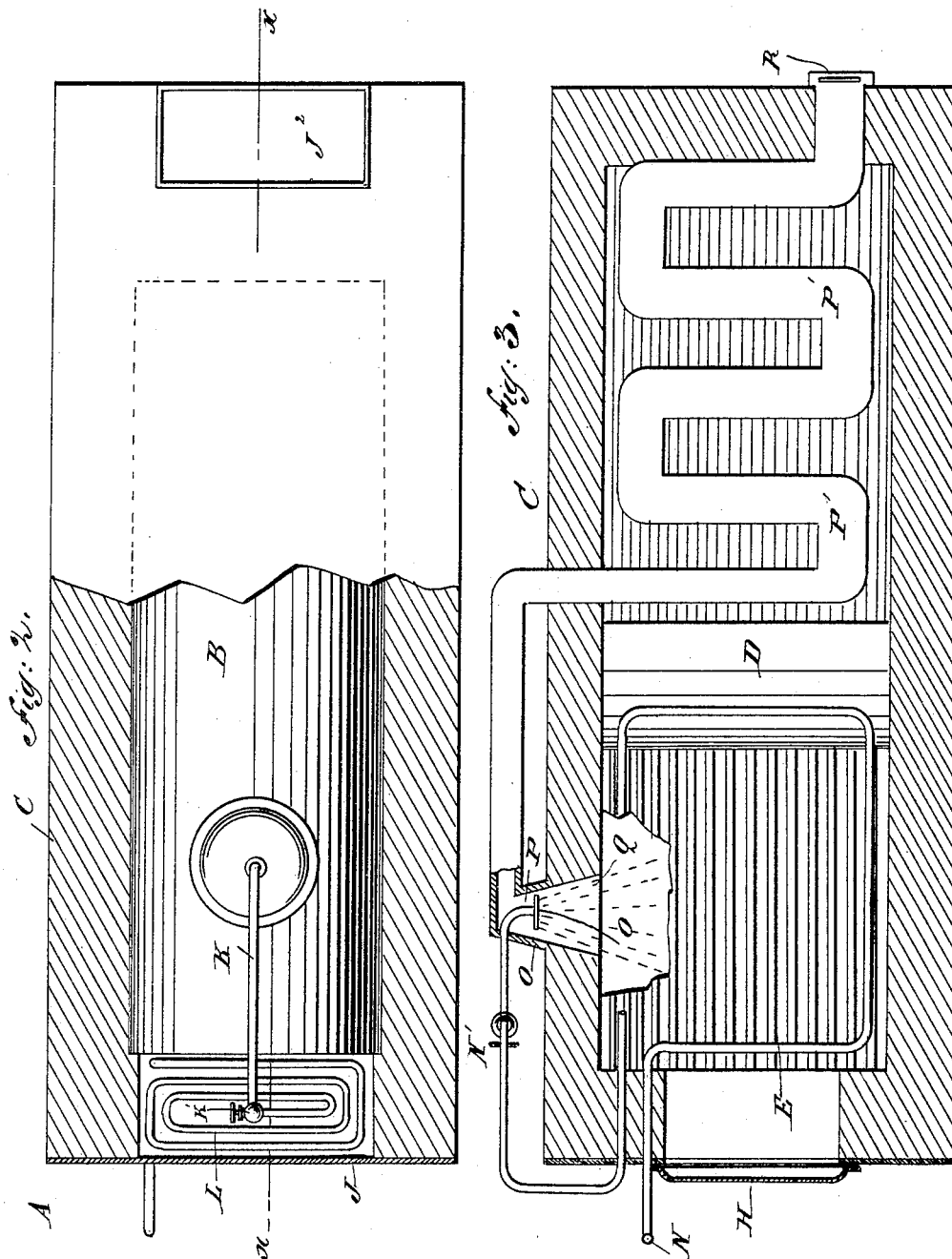
(No Model.)

2 Sheets—Sheet 2.

C. F. MILLER.
FURNACE.

No. 418,955.

Patented Jan. 7, 1890.



WITNESSES:

Charles Vida
Co. Bedgwick

INVENTOR:

C. F. Miller

BY

Munn & Co

ATTORNEYS.

UNITED STATES PATENT OFFICE.

CHARLES F. MILLER, OF LANCASTER, PENNSYLVANIA.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 418,955, dated January 7, 1890.

Application filed September 27, 1889. Serial No. 325,257. (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. MILLER, of Lancaster, in the county of Lancaster and State of Pennsylvania, have invented a new and Improved Furnace, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved furnace adapted to be fired with waste fuel—such as coal-dust, shavings, sawdust, spent tan, &c.—and at the same time serving as a generator for hydrogen gas and adapted to the consuming of all noxious and waste gases.

The invention consists of certain parts and details and combinations of the same, as will be fully described hereinafter, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional side elevation of the improvement on the line *x x* of Fig. 2. Fig. 2 is a plan view of the same with parts broken out, and Fig. 3 is a sectional plan view of the improvement on the line *y y* of Fig. 1.

The improved furnace A is provided with the usual steam-boiler B, set in brick-work C, provided with the bridge-wall D, the fire-place E, and the usual grate-bars F, below which is arranged the ash-pit G.

The fire-box E is provided with the usual fuel-inlet door H, and a similar door I leads to the ash-pit G. The heat arising in the fire-box E travels over the bridge-wall D along the under side of the boiler B to the rear end of the brick-work, and then passes through the flues of the boiler B into a channel J, extending upward on the front of the boiler B, and leading into a horizontal channel J', extending rearward on top of the boiler B into the chimney J².

A steam-pipe K leads from the dome of the boiler B, and is provided with a valve K' for regulating the flow of steam from the boiler. The pipe K connects with a coil of pipe L, arranged in the upper part of the channel J, and forming a superheater for superheating the steam passing through the pipe K from the boiler B. This superheater may be placed at the rear of channel J, or, in cases where two or more boilers form a battery, it may be

placed at the end of flue before it reaches the smoke-stack. The coil of pipe L connects with the pipe N, extending downward and leading into and around the fire-box E, so as to be exposed to the heat in the said fire-box. The pipe N then leads downward, and is provided near its lower end with a valve N', and at its extreme end is provided with a series of perforated pipes forming a nozzle O, said extreme end and the nozzle extending into the pipe P and discharging into a cone-shaped funnel Q, opening under the grate-bars F into the ash-pit G.

A pipe P extends along the outside of the brick-work C to the rear of the bridge-wall D, and then opens into the space in the rear of the bridge-wall underneath the boiler B. The pipe P then branches into several pipes P', coiled in the rear part of the brick-work C, and exposed to the heat passing over the bridge-wall D to the rear end of the boiler B. The branch pipes P' finally extend to the rear wall of the brick-work C, and are then provided on their outer ends with slides R for regulating the supply of cold air to the said branch pipes P'.

The operation is as follows: When the furnace is fired up, the steam generated in the boiler B in the usual manner is permitted to pass into the pipe K and from the latter to the superheater L, in which the steam is superheated. The superheated steam then passes down the pipe N and is again subjected to heat in the fire-box E, so that the superheated steam is converted into highly-heated gaseous steam, hydrogen or water gas, which passes finally to the lower part of the pipe N and the nozzle O and into the pipe P, to be discharged through the funnel Q, underneath the grate-bars F, and then acts as a blast, forcing the fire, and when the gases reach the heated coals they are instantaneously ignited and combustion of all the fuels immediately takes place, thereby producing a wonderful saving. The discharge of the water-gas in the pipe P causes a draft in the latter, whereby air from the outside is drawn through the branch pipes P' into the said pipe P, to be discharged with the spray of water-gas or hydrogen underneath the grate-bars F. As the air is heated in its passage from the outside to the funnel Q it becomes

highly-heated oxygen, so that the oxygen is mixed with the hydrogen gas, and at the same time the mixture is forced under the grate-bars and passes up through the same to produce a complete combustion of the fuel on top of the grate-bars F, at the same time consuming all the gases.

The fuel on the grate-bars may be coal-dust, slack, shavings, spent tan-bark, leather shavings, wet or dry, &c. This fuel usually packs very solidly on the grate-bars F, and in burning has very incomplete combustion; but the combustion is complete in this apparatus, as the mixture of hydrogen and oxygen passes through the fuel from underneath, and is continually forcing same, and all the heat required to heat same in retorts is again submitted to boiler B, as the ash-pit doors are kept very tightly closed.

The amount of air admitted to the pipes P' is regulated by the slides R, and the amount of hydrogen permitted to pass into the end of the pipe P and the funnel Q is regulated by the valve N'.

It will be seen that the oxygen-blast may be connected for drawing in all kinds of noxious gases that cannot be dispensed with without highly heating same, and then they are fuel in themselves, such as have often caused trouble and annoyance around manufacturing establishments; but when highly heated they make a fuel in themselves, thus lessening the expense of other fuel.

It will be seen that by this device the heating capacity of the furnace is increased, so that steam may be generated in a very short time. It will also be seen that the fireman has entire control of the fire by simply increasing or decreasing the supply of oxygen and hydrogen, which at the same time increases or decreases the flame from the fire. This may be done in an instant. It will be

seen that high chimneys are not necessary to burn this or other fuel, as there is little, if any, natural draft required where this blast is used.

This apparatus may be applied to any steam-boiler by changing the location of superheater L, so as to take up all the waste gases after passing through the tubes of boiler.

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

1. In a furnace, the combination, with the boiler having a passage leading from its front end to the rear end over the top of the boiler, and a fire-box, of an air-pipe leading from the outside of the furnace into the fire-box below the grate, a superheater arranged in the passage at the front end of the boiler and connected to the dome of the boiler, and a pipe leading from the superheater into the fire-box and then out, and having its end projecting into the discharge end of the air-pipe, substantially as described.

2. In a furnace, the combination, with the boiler B, the fire-place E, and bridge-wall D, of the pipe leading from under the rear end of the furnace up to the bridge-wall, thence out and opening into the fire-place below the grate, the coil of pipe L, arranged in the passage, through which the products of combustion pass from the boiler-tubes to the chimney, the pipe K, connecting the coil with the dome of the boiler, and the pipe N, leading from the coil into the fire-place, and thence out and into the discharge end of the pipe P, substantially as herein shown and described.

CHARLES F. MILLER.

Witnesses:

D. MILES SHERTZ,
GEO. W. LEONARD.