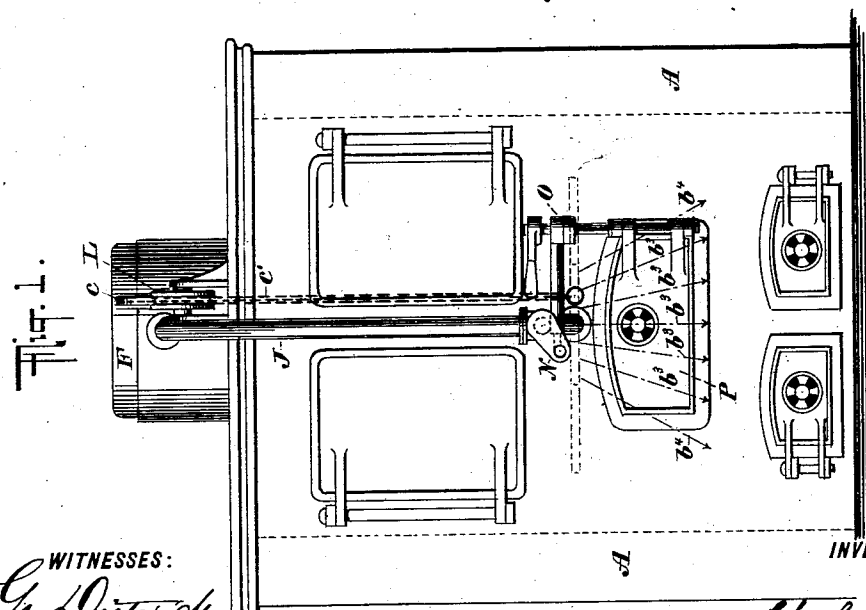
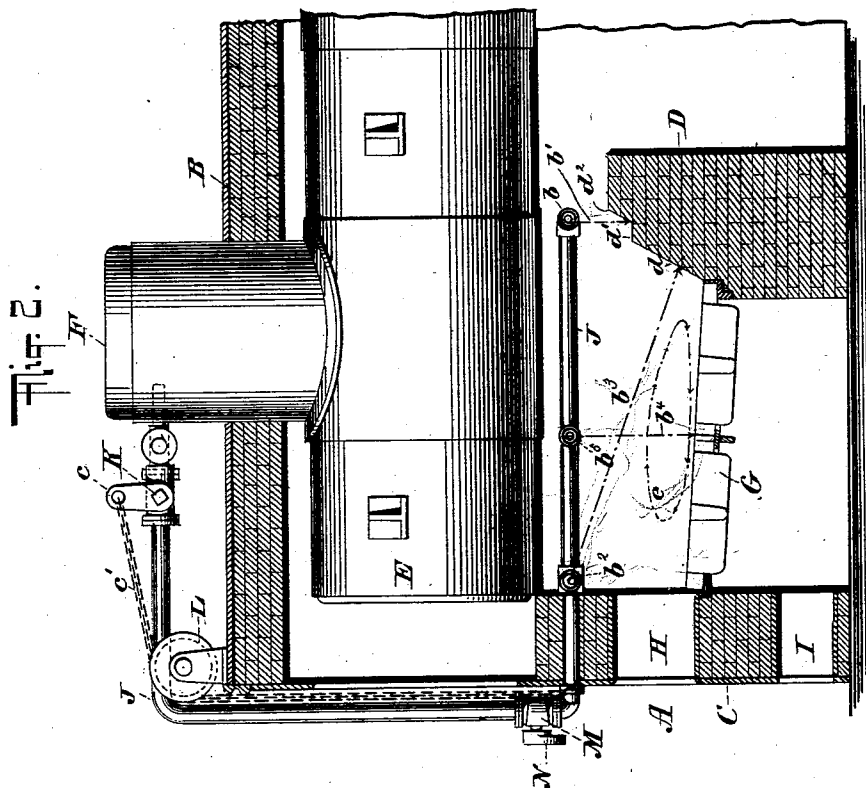


(No Model.)

C. A. GRAS.
FURNACE.

No. 568,900.

Patented Oct. 6, 1896.



WITNESSES:

Ge. Dittenoh.
Erige Mone.

INVENTOR

Charles A. Gras,
BY *Brisson & Thant*

ATTORNEYS.

UNITED STATES PATENT OFFICE.

CHARLES A. GRAS, OF NEW YORK, N. Y., ASSIGNOR TO FRANCIS DEIMEL,
OF SAME PLACE.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 568,900, dated October 6, 1896.

Application filed February 24, 1896. Serial No. 580,411. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. GRAS, a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Furnaces, of which the following is a specification.

My invention relates to furnaces, and has for its object to produce an efficient fuel-consuming furnace in which the smoke and gases of combustion are consumed to a large degree.

To this end my invention consists in the construction and arrangement hereinafter set forth and claimed, and also in the mode or method of consuming the smoke and gases.

My invention will be understood by referring to the accompanying drawings, in which—

Figure 1 is a front elevation of a furnace embodying my invention. Fig. 2 is a longitudinal section thereof, the door and its connecting mechanism being removed.

In the drawings, A A are the side walls, B is the top wall, C is the front wall, and D a back wall or fire-bridge, of my furnace.

E is a boiler mounted in the furnace and having a steam-dome F.

G is the grate of the furnace, H the fire-door opening, and I an ash-door opening.

The grate G preferably extends from the front wall of the furnace to the back wall or fire-bridge, and the face of the back wall is preferably inclined and stepped, as shown at d d' d'' —that is to say, a horizontal face d' joined on either side by an inclined face d d'' .

Leading from some suitable part of the boiler, preferably from the dome F, where the driest steam is to be found, is a steam-inlet pipe J, which extends through the wall of the furnace above the grate-bars and back wall.

At or near the end b the pipe is provided with a jet-forming means, such as an opening for a steam jet or jets b' , which steam jet or jets impinge against the back wall, preferably at about the place shown in the drawings. The

pipe J is also provided with steam-jet producers, as b^2 , at or near the front wall of the furnace, which jet-producers project jets b^3 , which are shown in the present instance as driving downward and impinging against the face d of the wall D.

By observing Fig. 1 it will be noted that the jets b^3 are here shown as divergent and flanked at either side by jets b^4 . These jets b^4 are shown clearly in Fig. 2 as downwardly jets issuing from jet-formers b^5 in communication with the pipe J. The pipe J may be provided with a valve K, whose connecting-lever c may be suitably manually operated, such as by means of an operating cord or chain passing over a sheave L and extending down the front of the furnace. The steam-pipe J may also be provided with a valve M, whose operating-lever N is connected with the operating mechanism O of the door P, so that the steam from the jets may be cut off as the door is opened.

I will now proceed to describe the process feature of my invention, having reference to the method or process as well as to the apparatus. To begin with, fire is started upon the grate-bars G, air being admitted thereto preferably through the ash-door openings I, and the end jets b' are set in operation. As soon as the fire has burned up and the blue flame has begun to appear on the coal, the jets b' are shut off by suitable independent means (not shown) and the jets b^3 are set in operation, which in the present instance throws an inclined curtain of steam above the coals, confining the smoke to a restricted space between the curtain of steam and the fire, and at the same time imparts a circulatory motion to the smoke and heavier gases, so that the smoke and heavier gases aforesaid are brought again and again into contact with the fire and are thoroughly consumed. The general path of these gases is indicated by the dotted ellipsoid e . The lighter gases, however, can pass freely through the steam-curtain and escape over the back wall D and into the chimney. In order to prevent the smoke and gases from escaping at the sides of the curtain, the jets b^4 are provided, which are preferably located about the middle of the length of the furnace and form additional side curtains to the inclined steam-curtain formed by the jets b^3 , so that the smoke and heavier gases are entirely confined within the space inclosed by the curtains, the front and back walls, and the coals.

Now while I have shown this invention as applied to stationary furnaces and boilers, it is obvious that it is equally applicable to locomotive and other movable boilers and furnaces, and consequently I desire to have the claims construed to include both stationary and movable furnaces and boilers.

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

10 1. The herein-described smokeless furnace comprising front, side and top walls and a stepped fire-bridge D, of a grate, an inclined steam jet or jets traversing the space above the grate and impinging against the face of
15 the fire-bridge, a steam jet or jets originating above and impinging upon the stepped por-

tion of the fire-bridge, combined with draft-producing means.

2. The combination in a furnace, of a grate, a back wall or fire-bridge D having an inclined stepped face combined with steam-jets as b^3 located above and impinging against an inclined face of the back wall, and a downwardly-projected steam jet or jets b' located above and impinging upon the stepped portion of the back wall, substantially as specified.

CHARLES A. GRAS.

Witnesses:

GEO. E. MORSE,
MAURICE BLOCK.