

(No Model.)

S. E. BABCOCK.

Furnace for Steam Boilers.

No. 230,218.

Patented July 20, 1880.

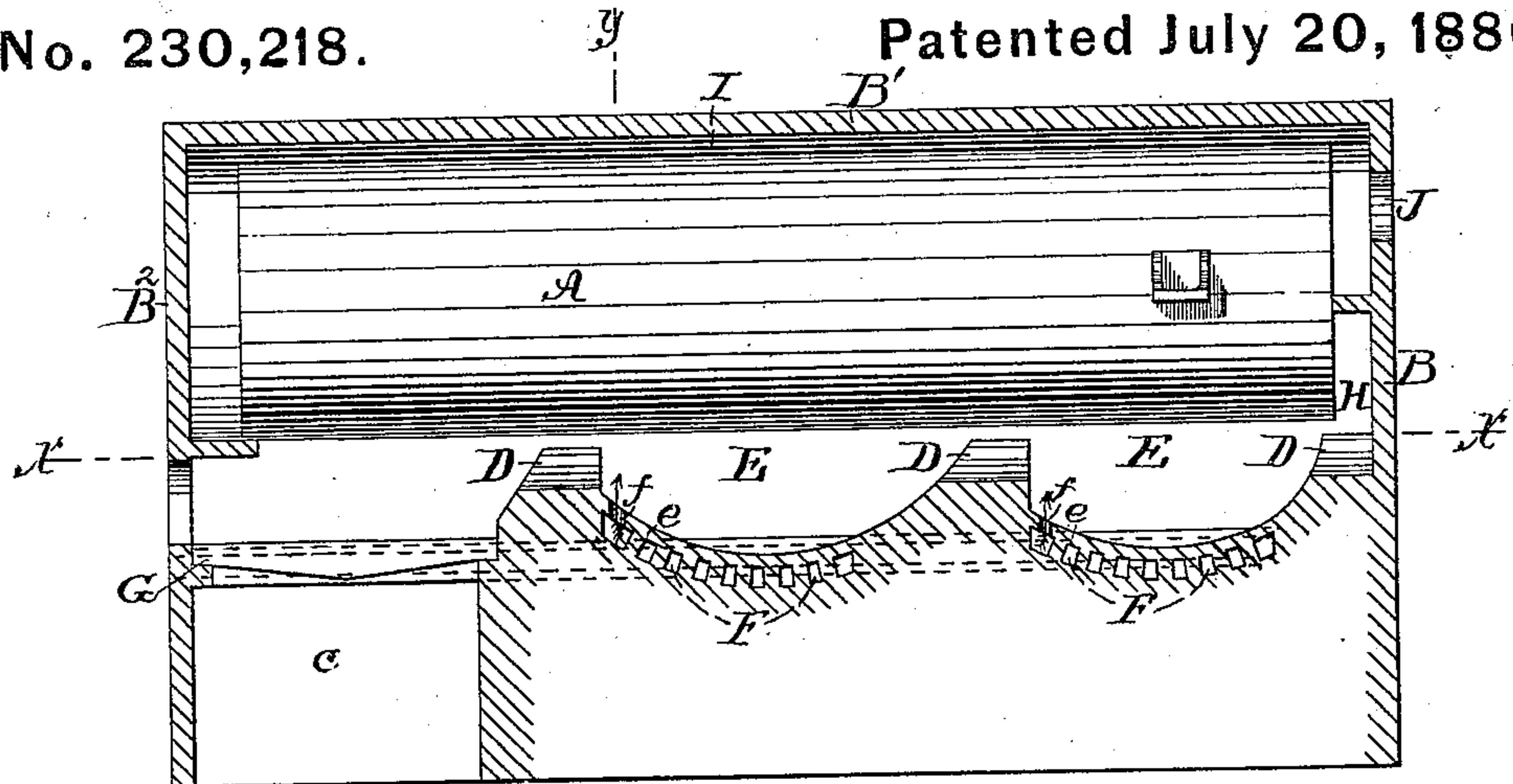


FIG. 1

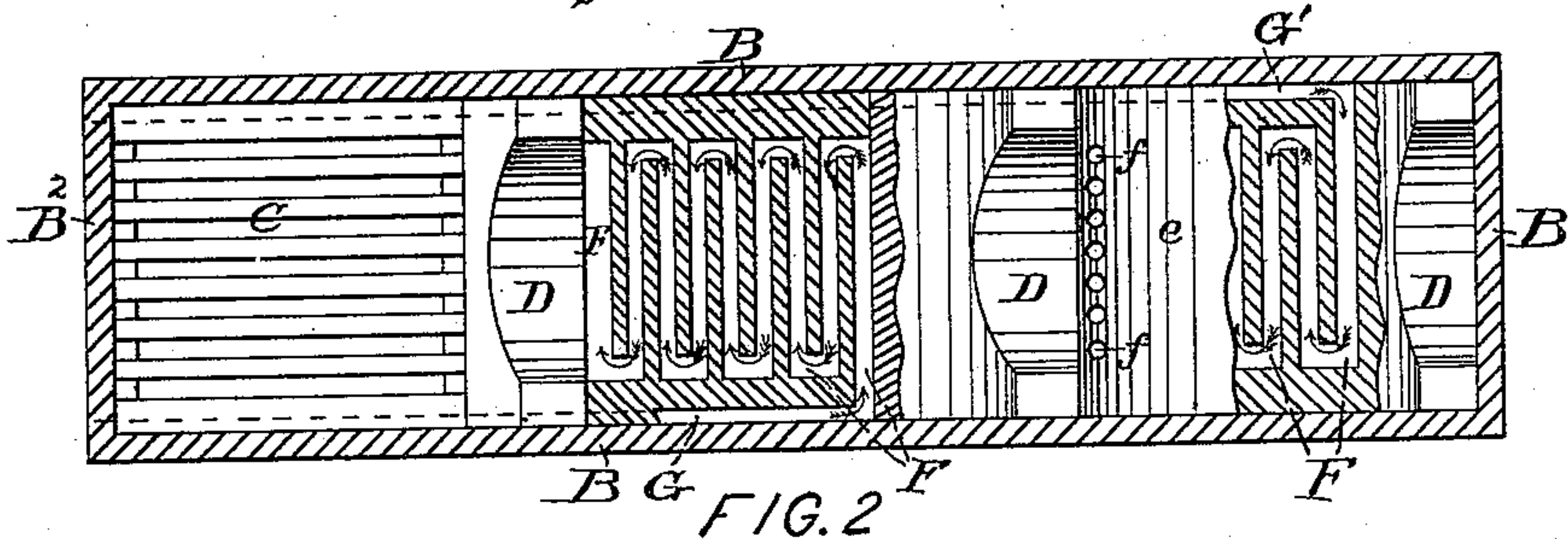


FIG. 2

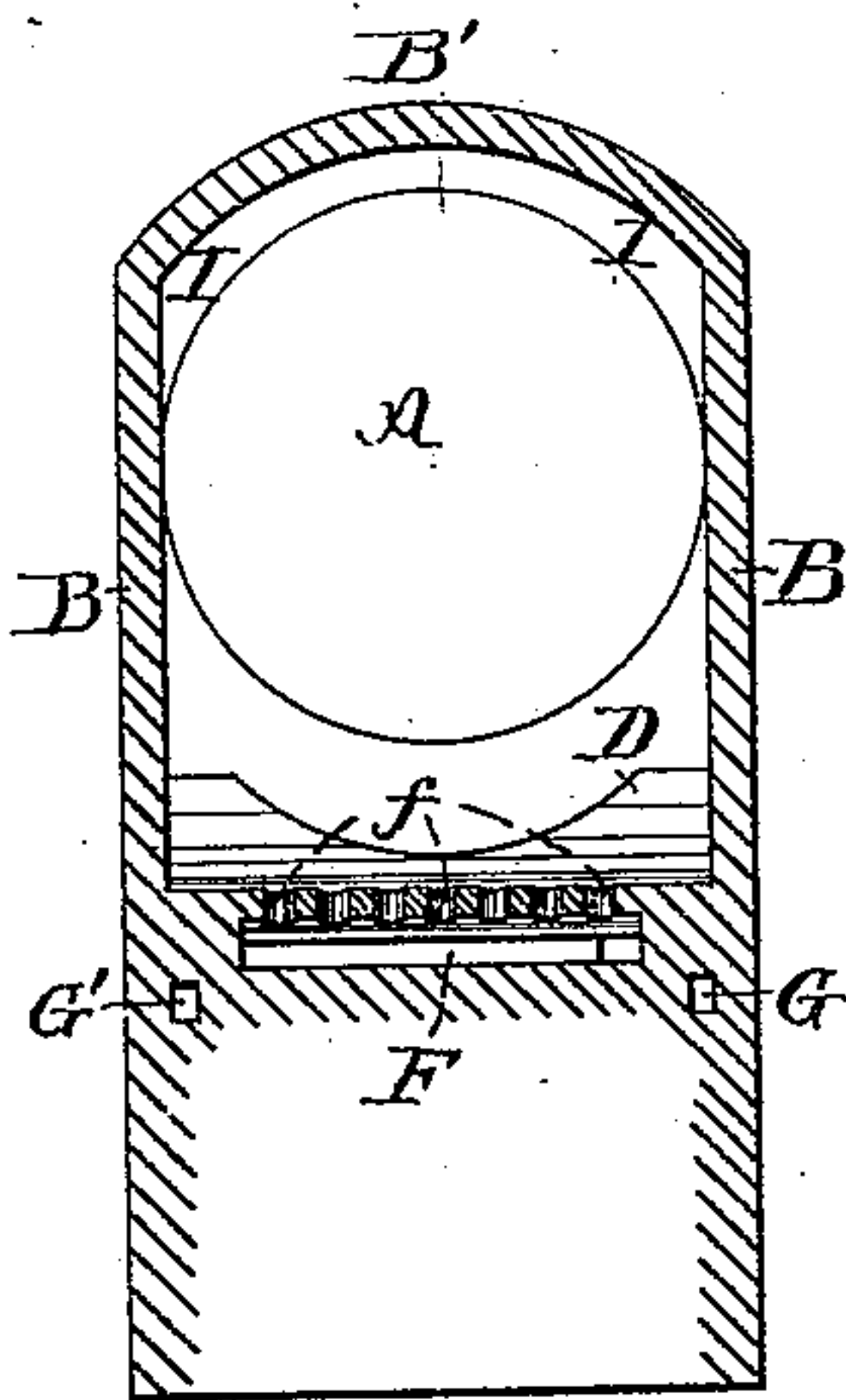


FIG. 3

Witnesses:

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Inventor:

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by

William H. Low,

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UNITED STATES PATENT OFFICE.

STEPHEN E. BABCOCK, OF TROY, NEW YORK, ASSIGNOR OF SEVENTEEN
TWENTY-FOURTHS OF HIS RIGHT TO D. STEWART DENNISON, JESSE B.
ANTHONY, AND THEODORE E. HASLEHURST, OF SAME PLACE.

FURNACE FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 230,218, dated July 20, 1880.

Application filed April 30, 1880. (No model.)

To all whom it may concern:

Be it known that I, STEPHEN E. BABCOCK, of Troy, in the county of Rensselaer and State of New York, have invented certain new and useful Improvements in Gas-Consuming Furnaces for Steam-Boilers, &c., of which the following is a specification.

My invention relates to gas-consuming furnaces in which air is admitted into a chamber lying beyond the fire-box for the purpose of producing a more perfect combustion of the unconsumed gases; and it consists in combining with each of said chambers transverse return air-ducts formed directly beneath the surface of the inverted arches. Said ducts commence at the rear end of each chamber and extend by means of return bends from side to side of the chamber until the rear of each preceding bridge-wall is reached, at which point the cover of the last cross-duct of each group is perforated so as to discharge the air therefrom upward and close behind the bridge-wall. The air in passing through said ducts becomes highly heated by the heat usually absorbed and wasted in the brick-work forming the bottom of the chamber in the usual form of boiler-setting. Said ducts are supplied with air, either in a natural or in an artificially-heated state, and either under pressure or by natural draft through side flues extending from the boiler-front through the side walls of the boiler-setting until each flue reaches the rearmost cross-duct of the system to which it connects. By this arrangement the heat commonly absorbed by the brick-work at the bottom of the chamber is utilized and the air, admitted to the rearmost transverse duct in its coldest condition, is constantly accumulating heat as it passes forward through the circuitous ducts until it enters the chambers in such a highly-heated condition that when its oxygen mixes with the escaping unconsumed inflammable gases to ignite them and intensify their combustion, the other heated constituents of the air will mingle and pass off with other combustible gaseous matter without lowering the temperature of the ignited gases.

Each of the reverberatory chambers, by reason of its peculiar shape, produced by the con-

cavity of its bottom and by the contracted opening at the rear of each chamber, which causes the escaping currents to reverberate, forms a space wherein the unconsumed gases escaping from the furnace and the air entering the chamber from the ducts are thoroughly commingled and ignited, increasing in temperature and expanding in volume until they reach the back end of the boiler, where they enter the tubes of the boiler, and from thence pass out through the usual flues to the chimney.

The object of my invention is to produce the highest degree of efficiency and economy in the consumption of fuel.

In the accompanying drawings, which form a part of this specification, and to which reference is herein made, Figure 1 is a longitudinal section of a boiler-setting containing my improvements; Fig. 2, a horizontal section of the same at the line *x x*, and Fig. 3 a transverse section at the line *y y*.

The boiler *A* is of the cylindrical variety that is usually provided with tubes or flues, through which the products of combustion pass in their course from the furnace to the smoke-stack.

The boiler-setting, which is commonly composed of brick-work, principally consists of the side and end walls, *B*, arched top *B'*, cast front plate, *B''*, and the internal parts, consisting of the furnace *C*, ash-pit *c*, bridge-walls *D*, reverberatory chambers *E*, and the air-ducts, hereinafter described. The chambers *E*, of which there may either be one or several, are formed at the rear of the bridge-walls *D*, and their bottoms *e*, beginning at a point below the lowest part of the bridge-wall, are made by an inverted arch whose curvature is continued to the top of the next bridge-wall, as shown in Fig. 1. The bottom of each chamber forms a covering for the air-ducts *F*, which run transversely from side to side under each chamber, and each group forms a continuous channel-way through which the air passes in a zigzag direction toward the front of the chamber, as indicated by the arrows in Fig. 2. The last transverse duct—*i. e.*, the one lying directly behind the bridge-wall—of each group

is provided with a series of apertures, *f*, opening upward through the bottom *e*, for the purpose of emitting the air from the ducts into the chambers E.

5 Air is supplied to the air-ducts F through the side flues, G and G', both of which have openings through the front plate, B², and these both extend backward, the first one until it connects with the rearmost transverse duct of
10 the group under the first chamber, and the other until it connects with the rearmost duct lying under the rear chamber.

After passing over the last one of the several bridge-walls D the flame and heated gases
15 enter the chamber H at the rear of the boiler, and from thence pass forward through the tubes of the boiler and, returning rearward through the arched flue I, escape to the smoke-stack through the outlet J.

20 When bituminous coal is used for fuel in this furnace the unconsumed gases, carbon, and other fuliginous matter that escape therefrom become so thoroughly mixed in the re-

verberatory chambers E with the currents of heated air that enter the chambers through
25 the apertures *f* that all the combustible particles are entirely consumed and the operation of the furnace is practically smokeless.

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

The combination, in a furnace, of one or more reverberatory chambers, E, having concave bottoms *e*, formed as herein described, and the transverse return air-ducts F, formed
35 beneath the bottoms of said chambers, arranged to receive the air in its coldest condition in the rearmost duct and deliver it in its hottest condition through the perforations *f*, at the rear of the bridge-walls D, as shown, and for the
40 purpose herein specified.

STEPHEN E. BABCOCK.

Witnesses:

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