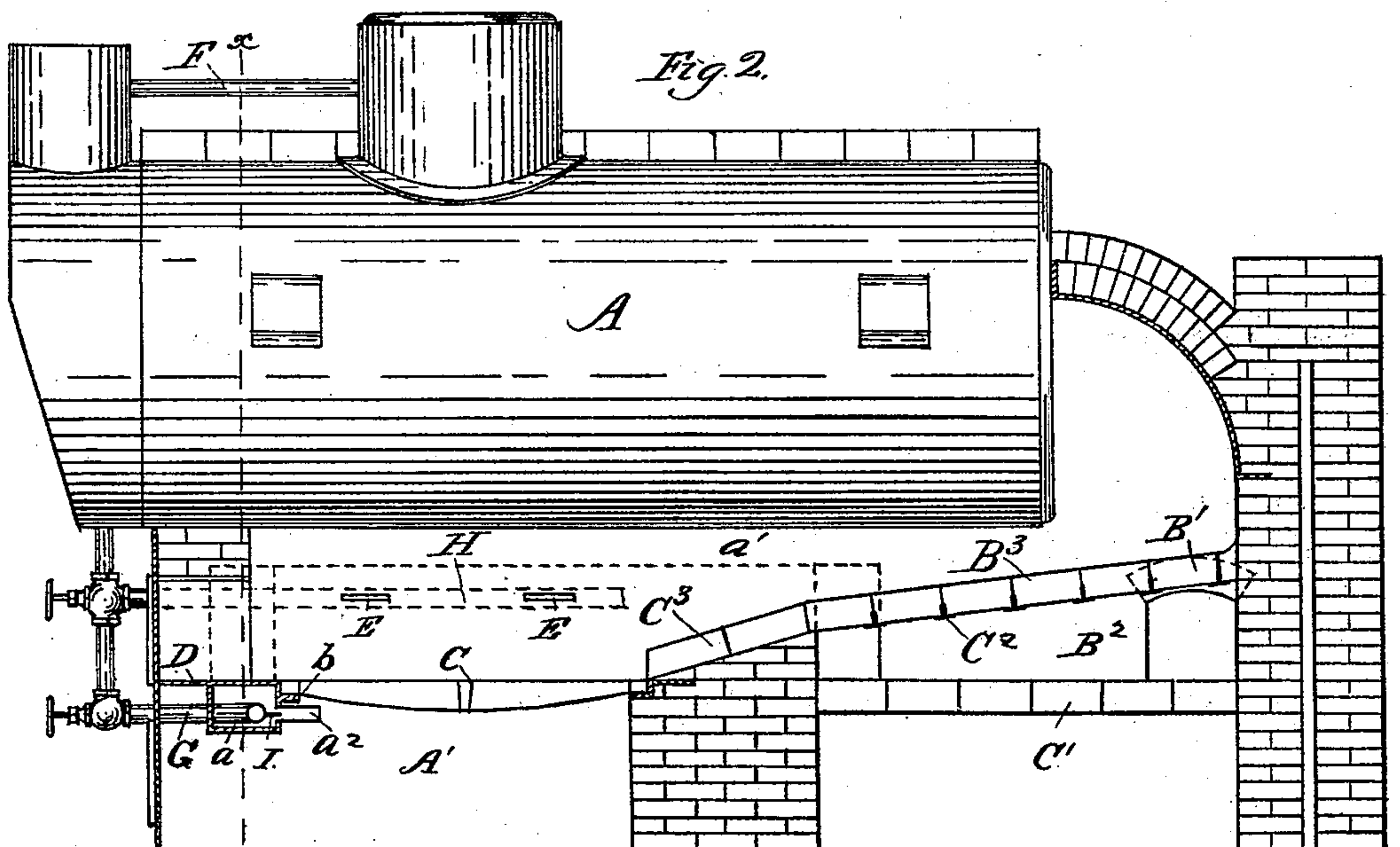
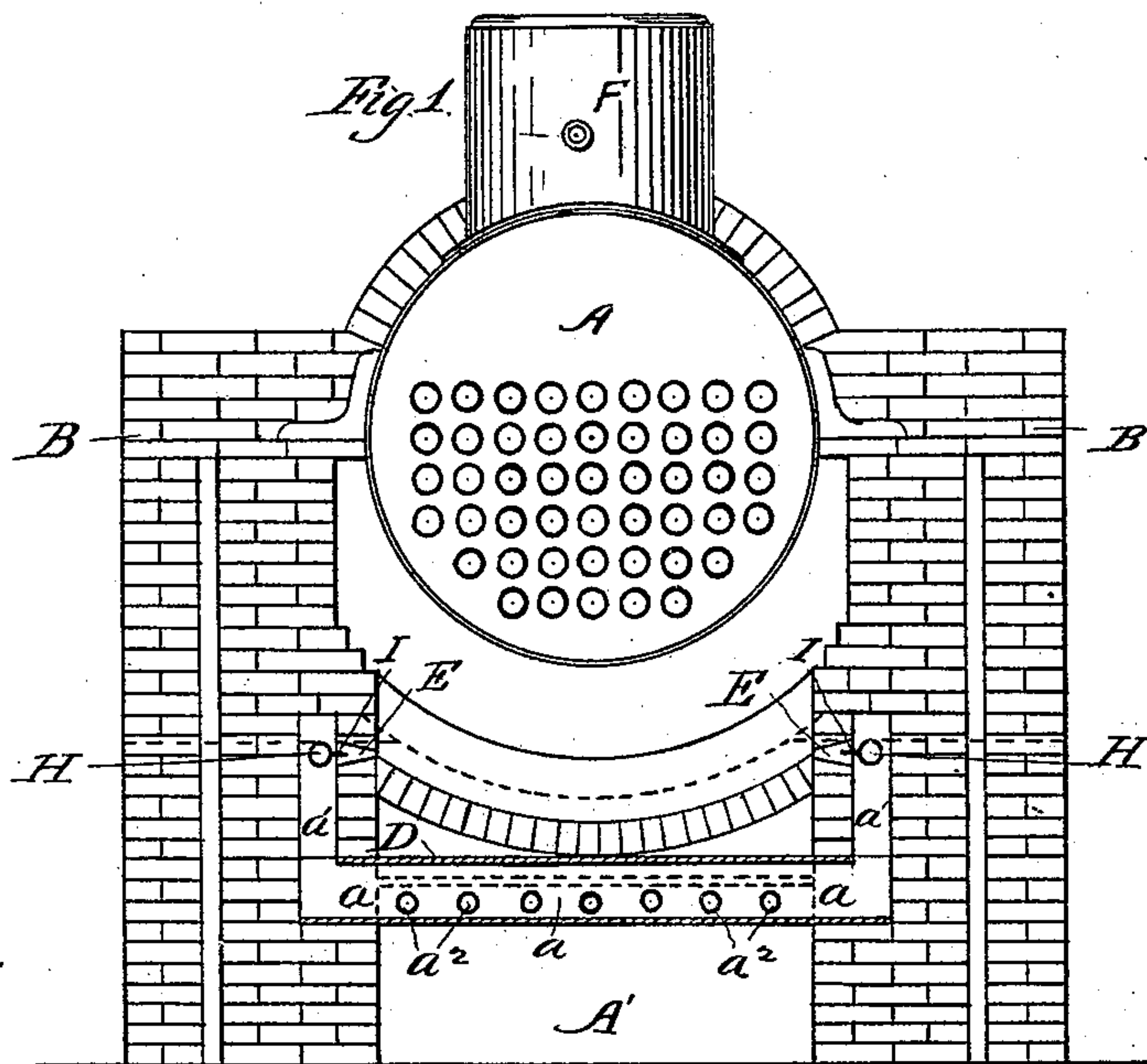


(No Model.)

G. E. BUSCHICK.  
BOILER FURNACE.

No. 250,882.

Patented Dec. 13, 1881.



Witnesses:  
L. M. Freeman.  
W. A. Schonfeld.

Inventor:  
G. E. Buschick,  
By G. B. Coupland & Co.,  
attys



# UNITED STATES PATENT OFFICE.

GUSTAVUS E. BUSCHICK, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF  
TO W. HENRY WILLIAMS, OF SAME PLACE.

## BOILER-FURNACE.

SPECIFICATION forming part of Letters Patent No. 250,882, dated December 13, 1881.

Application filed December 13, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, GUSTAVUS E. BUSCHICK, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Boiler-Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, that will enable others skilled in the art to which it appertains to construct and make use of the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, forming a part of this specification.

Figure 1 is a transverse section of a steam-boiler and furnace embodying my improvement in the plane  $x x$ , Fig. 2; and Fig. 2, a longitudinal section of the inclosing-walls and furnace.

The object of this invention is an improved mode of constructing furnaces, and relates more especially to steam-boiler furnaces inclosed in brick walls, one of the principal objects being to so construct a furnace as to utilize the brick surface or lining exposed to the action of the fire as a conductor to heat the air to a high degree of temperature before it passes into the combustion-chamber and is brought in contact with the fuel, in this manner forming a perfect combustion of all the inflammable gases contained in the fuel, consuming and utilizing such gases as would otherwise escape in the form of smoke.

Referring to the drawings, A represents a steam-boiler, B the brick walls inclosing the furnace, C the line of the grate-bars, and A' the ash-pit. The front ends of the grate-bars rest upon the lug or projection  $b$ , cast integral with the horizontal plate D, which fills in the space between the end of the grate-bars and the furnace-front. Underneath the plate D, and formed integral therewith, is the air-chamber  $a$ , having connection with the draft-flues or air-passages  $a'$  on each side of the furnace, as shown in Fig. 1 of the drawings. The air-passages  $a'$  are located behind the fire-brick forming the lining of the furnace, and are of a rectangular form, as shown in Fig. 1 of the drawings, and by the dotted line immediately underneath the boiler in Fig. 2, the lower line of the air-passages  $a'$ , located in the side walls, being on a level with the grate-surface. In the air-chamber  $a$ , at the front end and below the im-

mediate line of the grate-surface, are inserted a series of tubes,  $a^2$ , for the purpose of discharging the heated air underneath the grate-bars at that point.

Instead of admitting the air necessary to produce combustion through the ash-pit at the front end of the furnace, as is usually the case, the air is introduced through the cold-air flue B', leading from the outside through the side walls or directly through the rear wall at the back end of the boiler. The air admitted through the cold-air flue B' passes into the compartment or chamber B<sup>2</sup>, formed by the inverted arch B<sup>3</sup> and the brick flooring C'. The inverted arch B<sup>3</sup> is supported by means of the cast-iron arch-bars C<sup>2</sup>, and is a continuation of the sloping bridge-wall C<sup>3</sup>, the air-chamber B<sup>2</sup> communicating with the air-passages  $a'$  at a point just back of the bridge-wall, as shown in Fig. 2 of the drawings.

The rectangular parts E in the side walls form communicating passages between the hot-air flues  $a'$  and the combustion-chamber, and are for the purpose of admitting a small quantity of heated air at a point above the fire or grate-surface.

The steam-pipe F has the branch pipes G and H. The branch pipe G, leading into the air-chamber  $a$ , has a branch extending lengthwise of the air-chamber  $a$ , said branch having a series of blow-pipes or nozzles,  $i$ , inserted into and corresponding in number to the air-tubes  $a^2$ . This arrangement is for the purpose of employing a steam-jet to increase and force the draft. The branch or branches H of the steam-pipe F lead into the hot-air flues  $a'$ , as shown by the dotted lines in Fig. 2 of the drawings, and are for the purpose of supplying a jet of steam in connection with the hot air passing into the combustion-chamber through the openings E.

The operation is as follows: When the fire is first ignited the air necessary to produce combustion should be admitted through the ash-pit doors until the inclosing-walls are heated; then close the ash-pit doors, when the air will be supplied spontaneously through the cold-air flue B' into the compartment B<sup>2</sup>, from whence the air passes into the side passages,  $a'$ , and thence to the combustion-chamber through the ports E and the hot-air chamber  $a$ .



The advantages of this form of construction are that the air, being admitted at the rear of the inclosing-walls, passing under the inverted arch B<sup>3</sup> and into the side flues or passages, a', is heated to a high degree of temperature before entering the combustion-chamber, thus utilizing the heat that would otherwise be lost by being absorbed by the lining of the furnace and inclosing-walls, and at the same time preventing the brick from rapidly burning out.

By making use of the steam-jet the draft may be quickened and a higher degree of temperature attained in the furnace than would be possible under ordinary circumstances, and a greater portion of the volatile gases ignited and burned that would otherwise escape in the form of smoke.

The steam-pipe F is provided with proper valves, as shown in Fig. 2 of the drawings, for controlling and regulating the amount of steam admitted into the furnace.

It will be further observed in the construction of the furnace that the largest area is over the grate-bars, and by means of the sloping bridge-wall and inclined arch the area is gradually decreased in the direction of the rear end of the boiler, for the reason that the heat is the most intense immediately over the fire, and the air or heat, highly rarefied, requiring more space, and as the rear end of the furnace is approached the heat is less rarefied, requiring less space, and at the same time confining the heat close to the boiler and forming a perfect combustion-chamber.

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

1. A steam-boiler furnace adapted to receive the air necessary to produce combustion through the cold-air flue B', located in the back part of the inclosing-walls, which leads into the heating chamber or compartment B<sup>2</sup>, which occupies the whole space behind the bridge-wall, and is covered by the roof B<sup>3</sup>, and which, in turn, communicates with the air passages or flues a' in both sides of the inclosing-walls, substantially as herein described.

2. The combination, with the hot-air chamber or compartment B<sup>2</sup>, which occupies the whole width behind the bridge-wall, of the inverted inclined arch B<sup>3</sup> and the brick floor C', on a level with the grate C, or thereabout, substantially as and for the purpose described.

3. The combination, with the side passages or flues, a', having the ports E, communicating with the combustion-chamber at a point above the grate-bars, of the steam-pipe F and the branch pipe H, all arranged to operate as herein shown and described.

4. In a steam-boiler furnace, the coke-plate D, arranged to extend the whole width of the furnace at the front end of the grate-bars, combined with the air-chamber a, formed integral therewith, substantially as described.

GUSTAVUS E. BUSCHICK.

Witnesses:

L. M. FREEMAN,  
W. A. SCHONFELD.