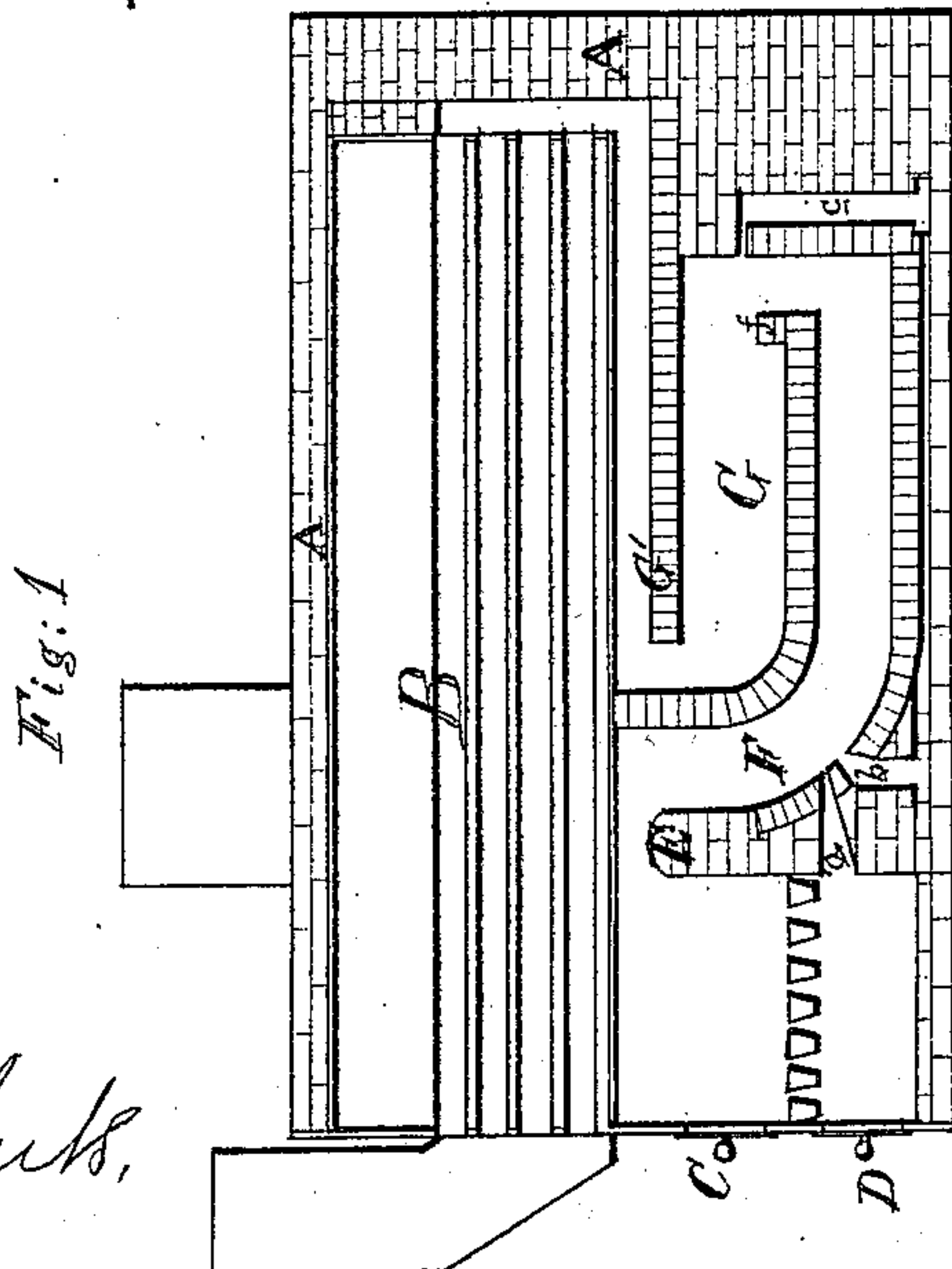
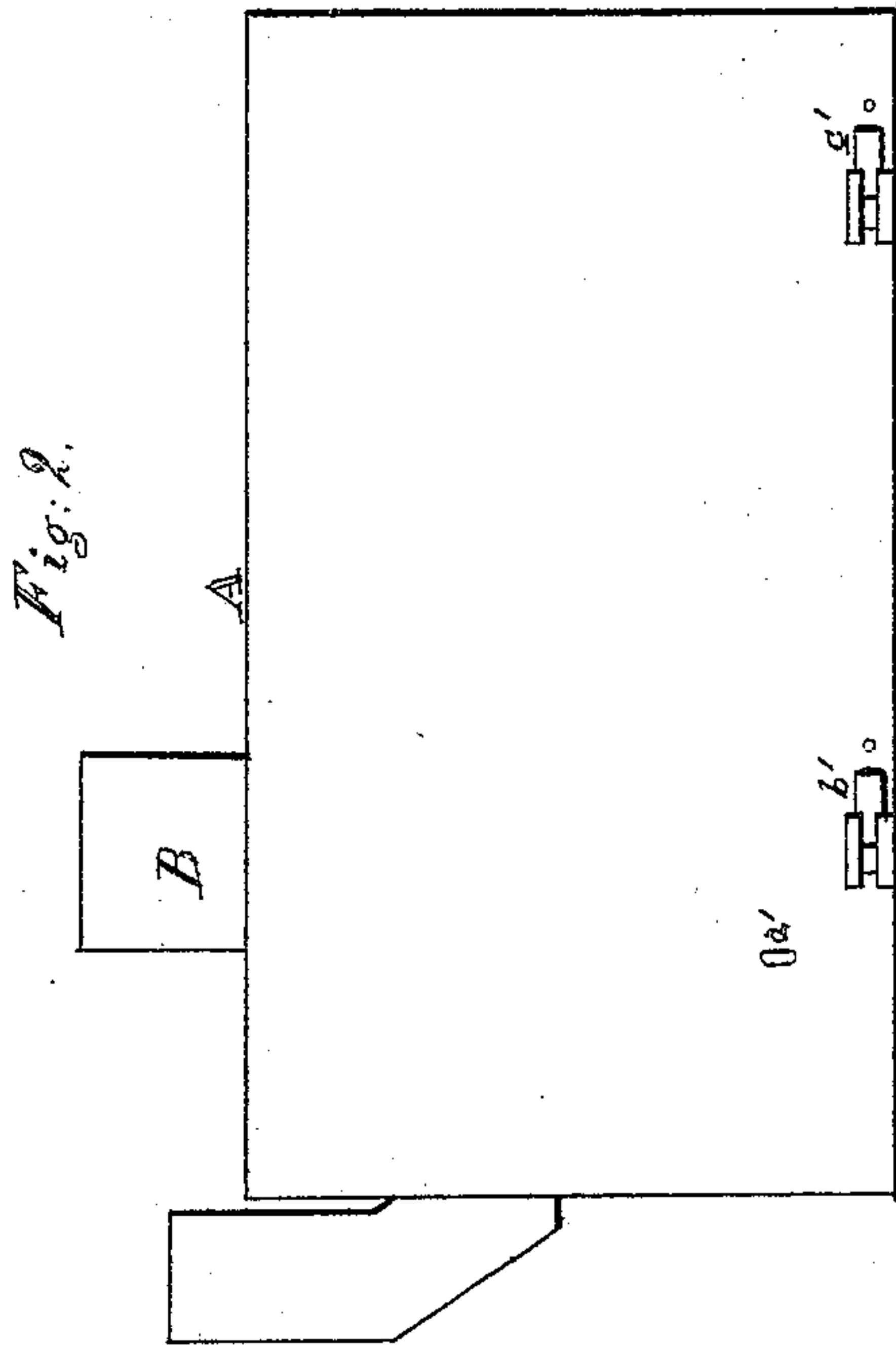
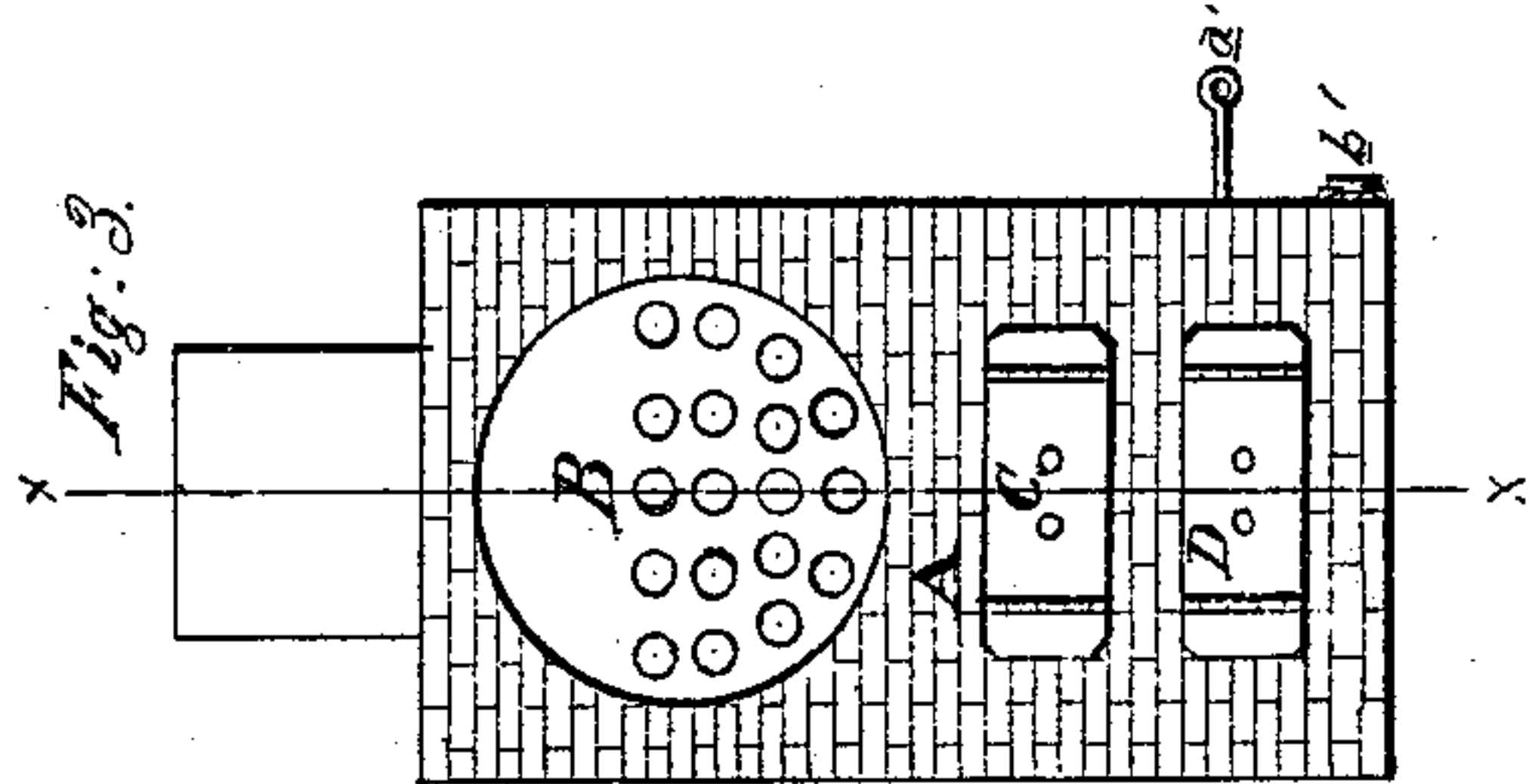


*R. S. Dillon,*

*Steam Boiler Furnace.*

*No. 98,238.*

*Patented Dec. 28, 1869.*



Attest.  
*R. F. Ebert,*  
*James Thier*

Inventor  
*Richard S. Dillon*  
Per Attorney  
*Thos S. Sprague*



# United States Patent Office.

RICHARD S. DILLON, OF DETROIT, MICHIGAN, ASSIGNOR TO HIMSELF  
AND GEORGE H. RUSSELL, OF SAME PLACE.

Letters Patent No. 98,238, dated December 28, 1869.

## IMPROVEMENT IN STEAM-BOILER FURNACES.

The Schedule referred to in these Letters Patent and making part of the same.

### To whom it may concern:

Be it known that I, RICHARD S. DILLON, of Detroit, in the county of Wayne, and State of Michigan, have invented a new and useful Improvement in Method of Setting Steam-Boilers; and I do declare that the following is a true and accurate description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, and being a part of this specification, in which—

Figure 1 is a longitudinal section through the boiler and arch, taken on the line *x-x* in fig. 3.

Figure 2 is a side elevation of the arch, showing the supplementary air-inlets; and

Figure 3 is an elevation of the front of the arch.

Like letters refer to like parts in each figure.

The nature of this invention relates to an improvement in the method of setting steam-generators, so that the entire products of combustion of bituminous coal or other fuel may be entirely consumed.

It consists in so constructing the arch in which the boiler is encased and suspended, that a reverberatory chamber is formed under the central portion of the boiler, in which, by the admission of a fresh supply of air, regulated in quantity to the requirements of the fuel used, perfect combustion takes place. The flames passing thence under the boiler and through its tubes, impart their heat to the water contained in the boiler, as hereinafter described.

Also, in the arrangement of the air-ducts and valves for introducing atmospheric air at the proper points to promote combustion, and regulating the supply to the requirements of circumstances.

In the drawings—

A represents an arch of brick or other material, in which is suspended a tubular or other steam-generator, B.

C are the furnace-doors, through which fuel is introduced; and

D are draught-doors, opening into the ash-pit.

At the back of the grate, a bridge-wall, E, rises from the foundation to within a short distance from the bottom of the boiler.

Immediately in the rear of the bridge-wall is a diving-flue, F, into which the products of combustion are compelled to pass. Leading into this flue from the ash-pit, is an air-duct, *a*, whose opening may be regulated or closed by a sliding damper, *a'*, operated from the outside of the arch.

B is a second air-duct, entering the flue near the first, but rising from a horizontal flue in the bottom of the arch. A damper or valve, *b'*, at its mouth, serves to regulate the amount of air passing through this duct into the flue F.

At the end of the flue F is a deflector-flange, *f*, which serves as a bridge-wall, to break up the column of smoke and gases, and causes them to commingle with the air admitted with them in the reverberatory chamber G, in which the flue terminates.

At the rear end of this chamber, a third air-duct,

*c*, delivers a supply of air into the reverberatory chamber.

This duct is also supplied with an external valve, *c'*, as shown in fig. 2.

The arch G' of the reverberatory chamber is carried forward nearly to the bridge-wall.

The operation of this improvement is as follows:

Fuel is placed on the grate and ignited, the draught-doors D being opened for the admission of air to support the combustion, which proceeds in the usual manner, the smoke and unconsumed gases passing with the flames over the bridge-wall into the flue F. Here a volume of air is brought through the duct *a* into the flue, which air, mingling with the gases thrown off by the fuel, the whole is drawn into the reverberatory chamber G, the flange *f* at the end of the flue serving to break up and intimately mix the air and gases, when perfect combustion ensues if a sufficient amount of oxygen have been admitted; if not, a further supply is introduced through the duct *c*, by opening its valve *c'*, which will cause the gases to ignite and be consumed. The flames passing out of the chamber at its front end, and over its arch G', and thence along the under side of the boiler, returning through its tubes, impart thereto the greatest per cent. of available heat.

Under certain conditions it becomes necessary to close the draught-doors D, when, of course, no air will enter the flue through the duct *a*. In this case, the valve *b'* may be opened, and air admitted to the flue through the duct *b*.

The valves *a'*, *b'*, and *c'*, are intended to regulate the admission of air to the unconsumed products of combustion in such amount as will insure their ignition and perfect combustion.

The walls of the flues and reverberatory chamber being heated to a high degree, small particles of carbon readily ignite from the heat radiated from them in passing through. The currents of gases being also highly heated in their passage, are ready to flash into flame as soon as the proper amount of oxygen comes in contact with them.

Locomotive and marine boilers may be constructed upon the principle herein described, by carrying back the water-legs of the furnace, and forming a reverberatory chamber within the shell, either with boiler-plate shells having circulation of water between them, or built in with fire-brick or other refractory material.

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

In the construction of boiler-furnaces, the flue F and reverberatory chamber G, provided with air-ducts *a*, *b*, *c*, furnished with appropriate valves *a'*, *b'*, and *c'*, or their equivalents, the whole so arranged as to operate in the manner and for the purpose herein set forth.

Witnesses:

RICHARD S. DILLON.

J. HENRY BAINES,

H. F. EBERTS.