

No. 664,372.

Patented Dec. 25, 1900.

P. H. BAGLEY.

SMOKELESS FURNACE FOR STEAM BOILERS.

(Application filed Jan. 23, 1900.)

(No Model.)

Fig. 1.

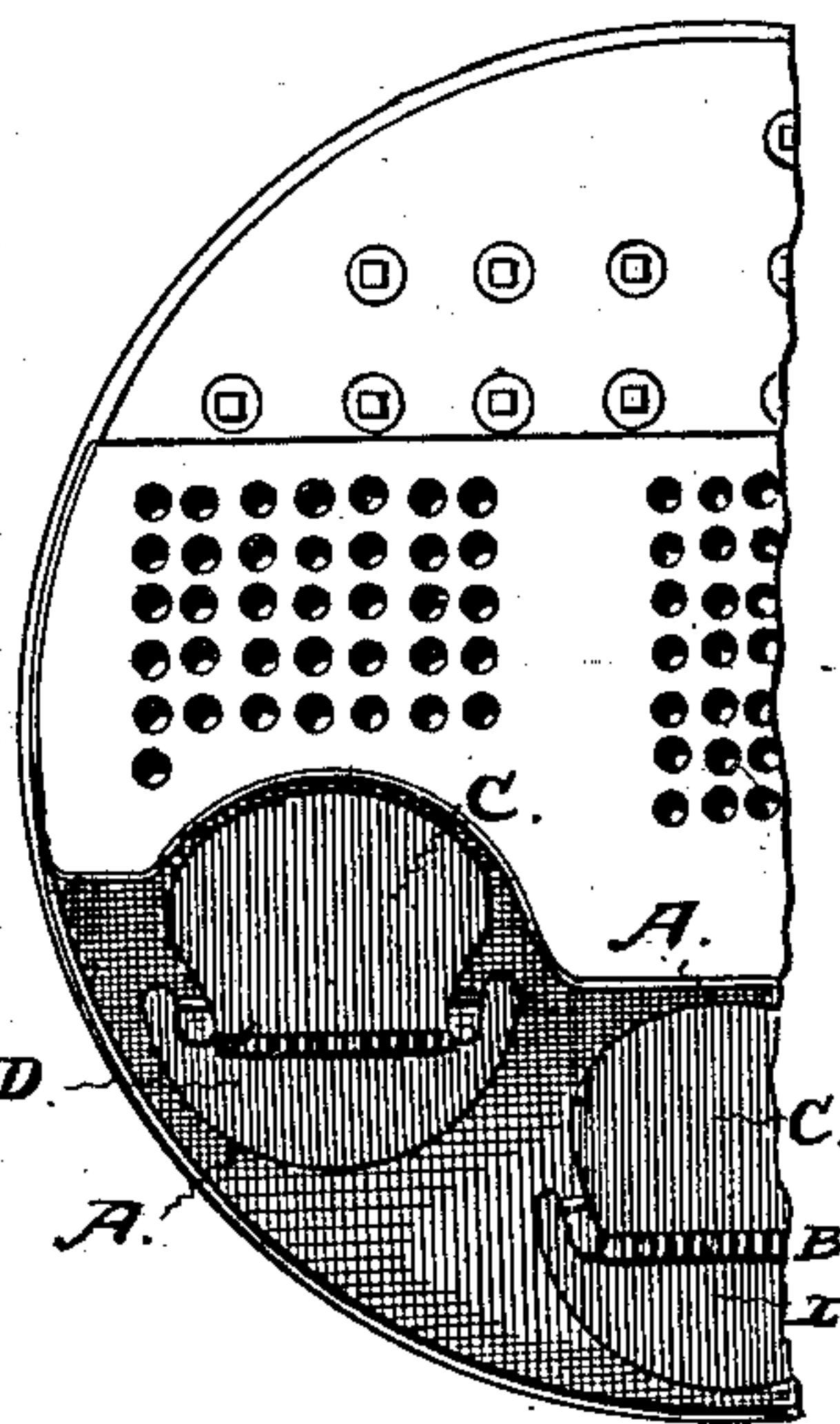
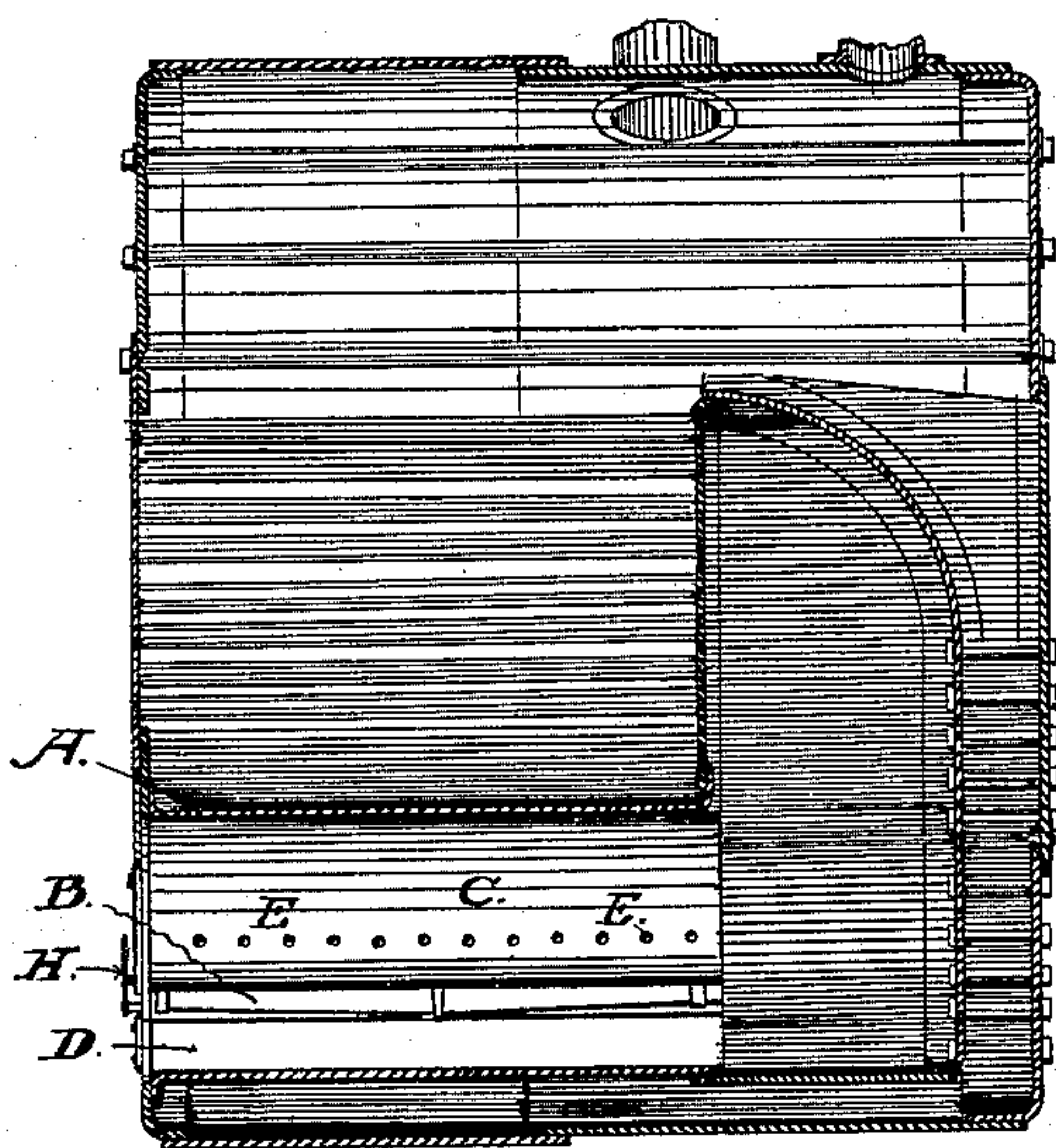
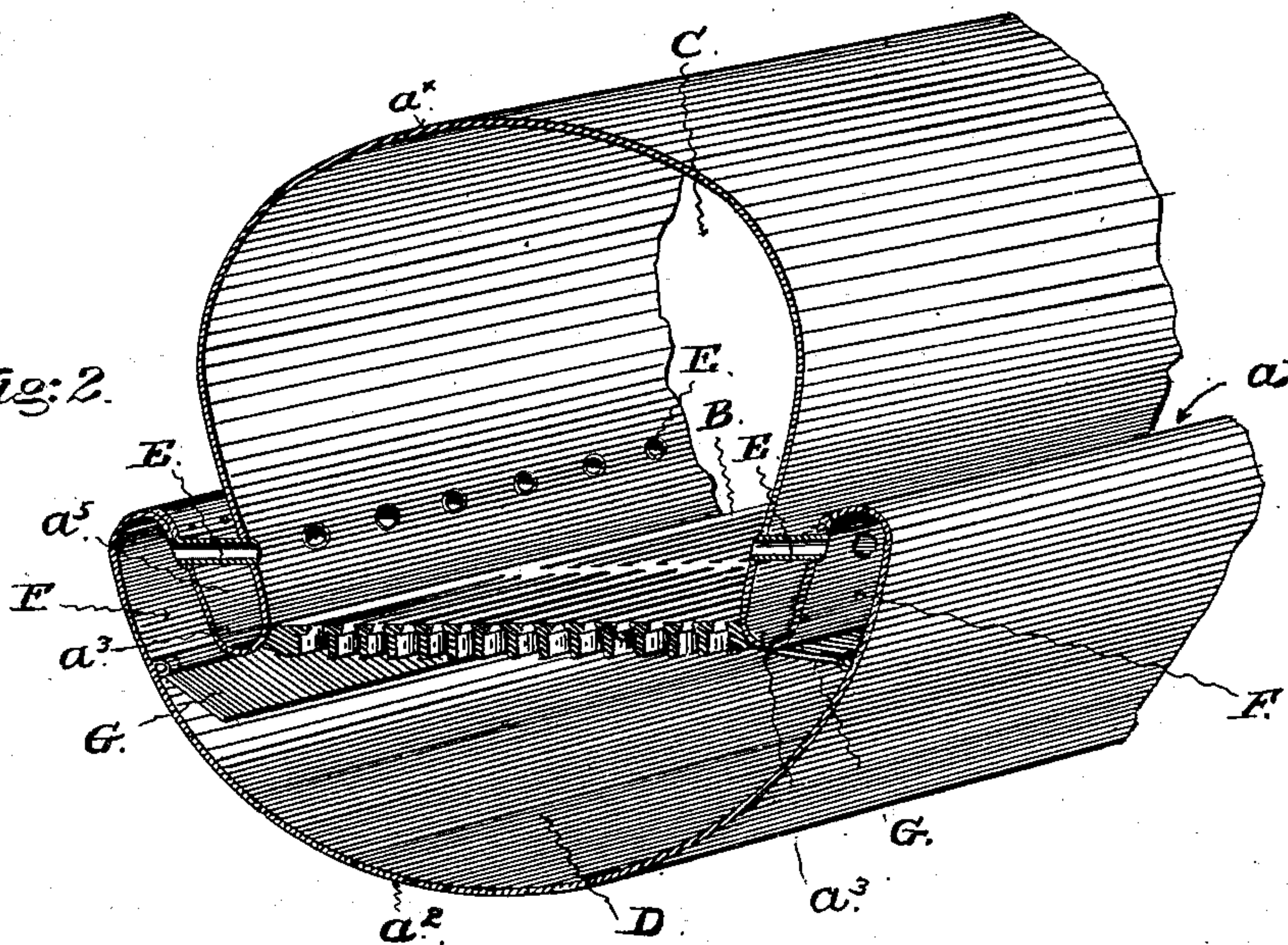


Fig. 3.

Fig. 2.



Witnesses:

A. Reginald
Jos. P. Batten

Inventor:

Perkins H. Bagley
By
Smith & Co.
His Attys.

UNITED STATES PATENT OFFICE.

PERKINS H. BAGLEY, OF ALAMEDA, CALIFORNIA.

SMOKELESS FURNACE FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 664,372, dated December 25, 1900.

Application filed January 23, 1900. Serial No. 2,438. (No model.)

To all whom it may concern:

Be it known that I, PERKINS H. BAGLEY, a citizen of the United States, residing in the city and county of Alameda, in the State of California, have invented new and useful Improvements in Smokeless Furnaces for Steam-Boilers, of which the following is a specification.

This invention relates to improvements made in furnaces for burning coal without the production of smoke; and the improvements consist in a certain novel construction and combination of fire-box or fire-chamber and means or devices for introducing and distributing air in jets or streams above the fuel and for regulating the quantity of air so admitted while the furnace is in operation, as hereinafter fully described, and pointed out in the claims at the end of this specification, reference being had to the accompanying drawings, forming a part thereof.

Figure 1 is a longitudinal section of a marine boiler with a fire-box constructed in accordance with this invention. Fig. 2 is a front view with the front plate removed. Fig. 3 is a perspective view of the inner shell of the fire-box, showing the form in which the same is constructed for a marine boiler.

In the drawings and the following description I show and explain the application of the present improvements to the furnace of a marine boiler of the return tubular type. It is not my intention, however, to confine or limit my invention to that form or type of boiler alone, as the invention is applicable to all furnaces or fire-boxes of the locomotive-boiler type as well as to those having a generally circular form.

In the several figures of the drawings, A indicates the inner shell of the fire-box; B, the grate-surface; C, the fire-chamber above the grate, and D the inclosed space under the grate, termed the "ash-pit."

E E are air-tubes opening at the outer ends into an air box or chamber F and into the fire-chamber C at their inner ends. These tubes are spaced at uniform distances apart on a horizontal line extending from the front of the furnace back to the bridge-wall, the outlet ends of the tubes being placed at proper height above the grate-surface to keep them uncovered or sufficiently clear of the fuel to

avoid choking the outlets. At the same time the line of outlets is brought as low down as practicable that the air-jets may be discharged and mix with the gaseous products close to the surface of the fuel. The bottom of the air-chamber F opens into the space D below the grate-surface, and communication between the air-chamber and the ash-pit is controlled by a damper G, having a handle H on the outside of the furnace.

The shell of the fire-box is so formed or constructed that the air-tubes and the air-supply chamber are surrounded by water-spaces in direct communication with the water-spaces of the boiler, thereby effectively protecting the tube sheets and walls of the air-chamber.

The shell is bent to a cylindrical form generally, so as to produce the arched crown a^x and the curved bottom a^2 ; but the sides are formed with a double or complete return-bend, by which the upper half or portion a^x of the shell is bent in a short curve a^3 upwardly for a short distance and then outwardly and downwardly, so as to join the curved bottom portion a^2 . The lower and inner curves a^3 a^5 are situated in the same horizontal plane and the bottom of the curve is usually on a level with the bottom of the grate-bar, while the top bend returns downwardly to join the bottom portion of the shell. The spaces or compartments between the convolutions formed by bending the sheet upon itself in this manner form the air-space F, that is practically an upward continuation of the air-space below the grate-surface and the water-space a^5 —that is, an extension of the surrounding water-space downward to the grate-bars between the fire and the air-space. The tubes E, which extend through this water-space, are fixed at one end in the dividing-sheet between that space and the air-space and at the other end are fixed in the inner sheet. By using hollow stay-bolts for these tubes they can be made to act as stays as well as conductors for air, thereby rendering the use of stay-rods unnecessary.

The damper that controls the admission of air to the chamber F and serves to regulate the quantity discharged through the tubes into the fire-box is hinged to the side of the shell to open and close from below against the bottom bend of the sheet. The handle H

is fixed on the end of the shaft that is brought through the furnace-front as a means of closing the damper and for setting it at different angles to regulate the supply of air to the tubes from the outside.

Where it is necessary or more convenient to make the shell of separate sheets, the seams are placed in the outer bends, where they are not exposed directly to the fire.

In operating with an air-blast or forced pressure introduced in the usual way into the space below the grate-surface the air-chambers F receive their supply of air through the damper-controlled openings in the bottom, or direct connection with the blower may be made by a pipe leading directly into the chamber F from the outside.

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

1. A boiler-furnace in which the shell is formed with return-bends along the sides producing an extension of the air-space below the grate-surface on either side upward above

the level of the grate-surface, a downward extension of the water-space of the boiler between said upwardly-extending air-space and the fire-space, and the air-tubes connecting the said inclosed air-space with the fire-space above the grate-surface across the intervening water-space.

2. A boiler-furnace having the sides of the fire-box formed or provided with double return-bends inclosing on each side an air-compartment and an intervening water-compartment; the former communicating with the water-space of the boiler, a damper controlling the admission of air to the air-compartment and air-tubes opening at the outer ends into the air-compartment and at the inner ends into the fire-box above the grate-surface.

In testimony that I claim the foregoing I have hereunto set my hand and seal.

PERKINS H. BAGLEY. [L. S.]

Witnesses:

EDWARD E. OSBORN,
M. REGNER.