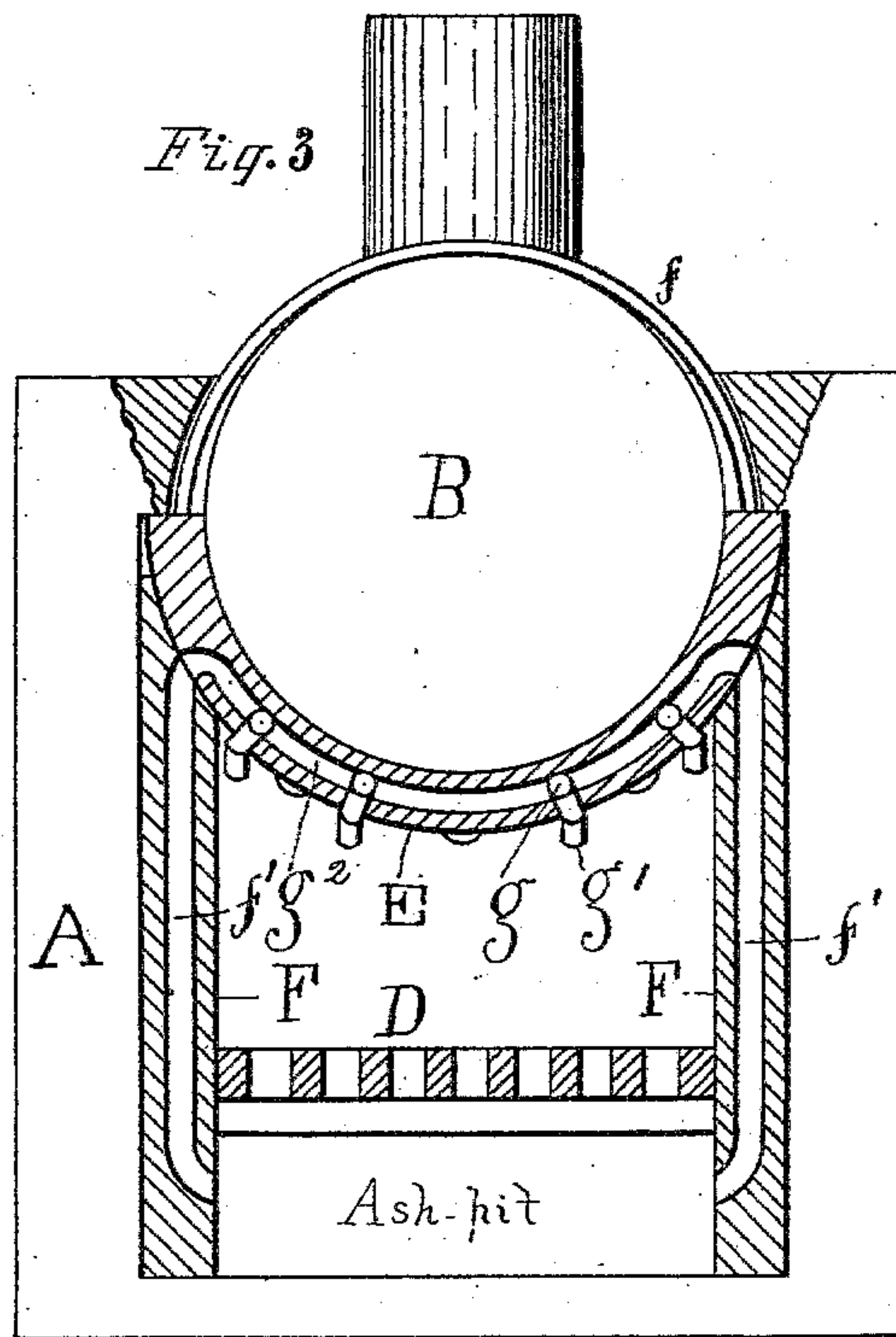
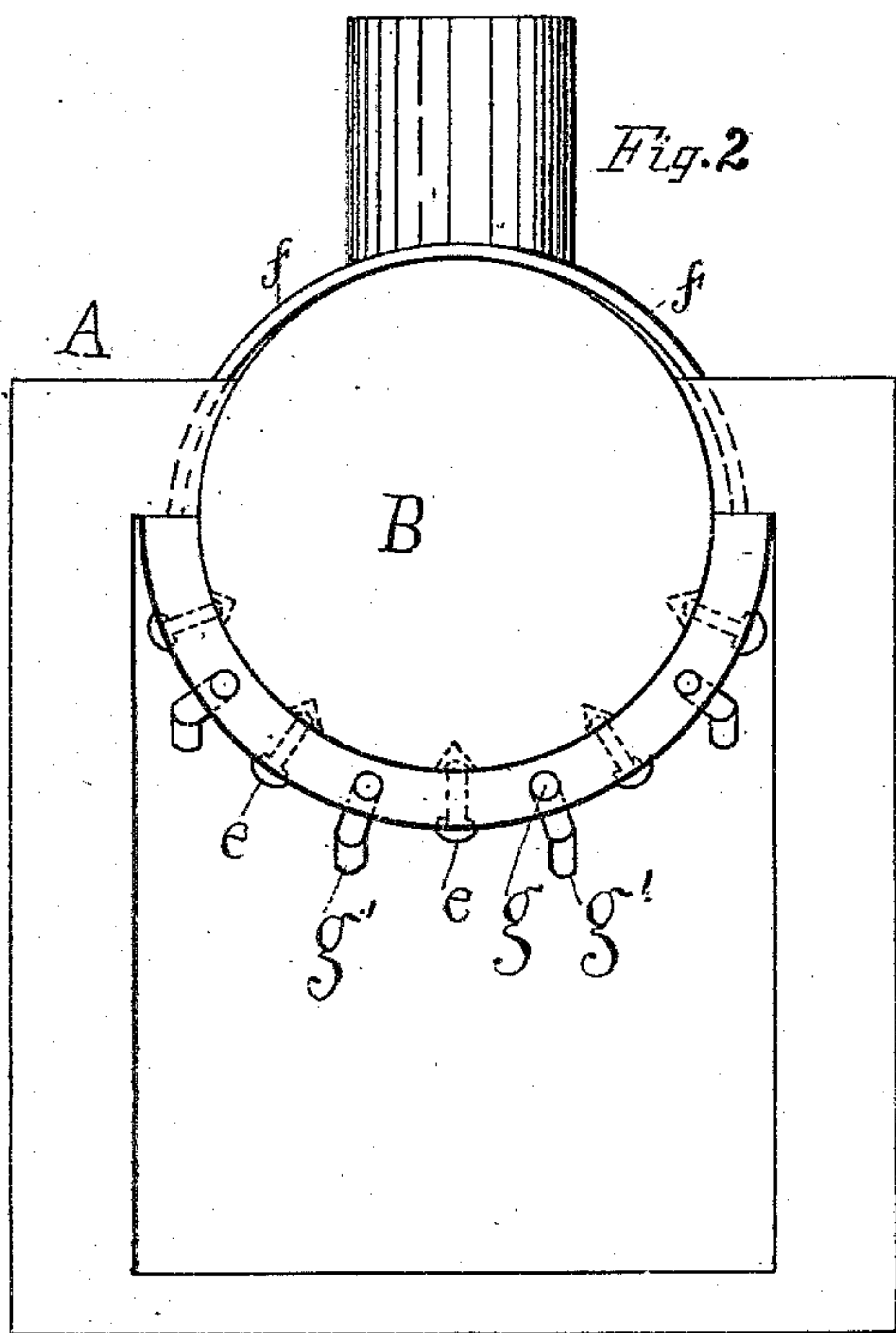
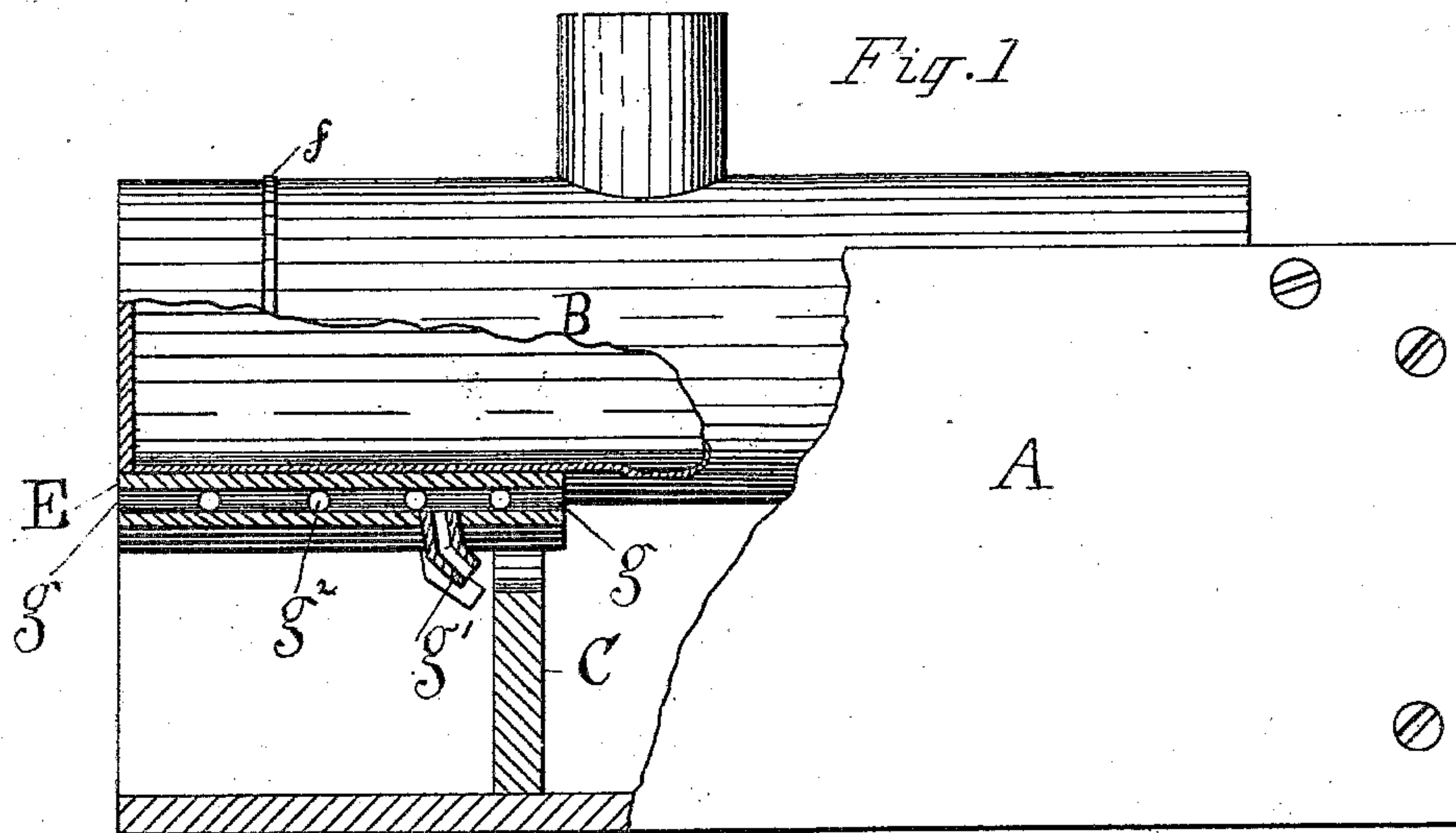


(Model.)

C. McMILLAN.
STEAM-BOILER AND FURNACE LINING.

No. 296,768.

Patented Apr. 15, 1884.



WITNESSES

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CHARLES McMILLAN, OF CHICAGO, ILLINOIS.

STEAM-BOILER AND FURNACE LINING.

SPECIFICATION forming part of Letters Patent No. 296,768, dated April 15, 1884.

Application filed December 8, 1879. Renewed March 16, 1882. Again renewed March 11, 1884. (Model.)

To all whom it may concern:

Be it known that I, CHARLES McMILLAN, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful
5 Improvements in Steam-Boiler-Furnace Linings, of which the following is a specification.

This invention relates to linings for protecting the crown-sheets of steam-boilers from the destructive influences of the heat and flames
10 of a furnace, and for supplying air to the products of combustion.

Heretofore bridge-walls have been provided with a perforated extension, through which the flames pass, and which conforms to and is in
15 close contact with the boiler immediately over said wall, but at no other point, and thereby affording no protection to the crown-sheets over the grate-bars. Linings of brick, upon
20 their under surface flat, but upon their upper surface concave, and conforming in shape and supported in contact with the crown-sheets over the grate-bars by means of steam-pipes
25 entering the sides of the boiler and passing under and upon the outside of the lining, have also been used; but these linings, though protecting the crown-sheets, diminish the effectiveness of the heat upon the same, and also the evenness of temperature of the boiler, by reason of the necessarily increasing thickness
30 given them on either side of and between the longitudinal center of the boiler and the side wall of the furnace, to have them flat upon their under surface. Furthermore, the steam-pipes supporting said linings not only strain
35 the boiler-sheets, but are in a very short time, by reason of their exposed position in the furnace, burned off, thereby putting out the fire and letting the lining drop, unless otherwise supported.

40 The object of this invention is to protect the crown-sheets of a boiler immediately over the grate-bars from the destructive influences of the burning fuel upon the same, and to maintain said boiler at substantially an even temperature without strain upon the same or perceptibly diminishing the area of the fire-chamber. A further object is to conduct air from
45 the outside of the furnace directly to the products of combustion, near the upper edge of and over the bridge-wall, and finally to direct
50 the current of air thus conducted downwardly

at substantially an oblique angle toward the rear end of the furnace.

In the accompanying drawings, in which similar letters indicate the same parts, Figure 55 1 is a side elevation of a furnace, with parts broken away to show the attachment of my lining to the boiler and the relative position to the fire-wall of the outlets to the air-ducts of the same. Fig. 2 is an end elevation of the
60 same. Fig. 3 is a similar view of a furnace, with parts broken away to show the band suspending and holding in contact with the boiler the lining for the same, and of a lining for the side walls of the furnace, provided with per-
65 forations opening into the ash-pit, and the transverse perforations in the boiler-linings.

A represents the furnace, with the boiler B suspended in the same; C, the fire-wall, and D the grate-bars, all of which are of the ordi-
70 nary construction.

E is a lining of tiling, made of one or a series of plates or pieces concave on their upper and convex on their lower surface, to correspond with the crown-sheets of a boiler, and
75 of sufficient thickness, breadth, and length to effectually protect the crown-sheets of the boiler over the grate-bars from the corroding and destructive influences of the flames, and to admit of a series of longitudinal and trans-
80 verse perforations between its opposite surfaces. The lining E is secured to and in contact with the boiler by means of bolts *e*, as shown in Fig. 2, or by a band, *f*, entering said linings and passing over the boiler, to suspend
85 them in contact therewith, as shown in Figs. 1 and 3, the band affording a convenient means when it is unnecessary or impractical to use the bolts, though in some cases both may be used to relieve the strain upon the boiler re-
90 sulting from the weight of the lining. The plate or plates forming the lining are provided with a series of longitudinal perforations extending from end to end, as shown in Fig. 1, or from the front end of the furnace to an in-
95 let a short distance from the front side of the bridge-wall, provided with an elbow or tube, *g'*, for directing the air to the flames at an oblique angle toward the back of the furnace, so that the draft of the furnace will facilitate the
100 introduction instead of retarding it, as would be the case if the tubes were turned in the op-

posite direction, or at a right angle to the plates. Although it is preferable to use these tubes as described, because a better draft is thereby obtained through the perforations, yet it is
 5 obvious that they may be omitted, and the perforations in the plates be made to extend at an oblique angle instead thereof without departing from the gist of my invention.

g^2 are transverse perforations in the linings
 10 E, opening into the perforations g , the purpose of which will be hereinafter fully explained.

F F are plates of tiling, forming linings for the side walls of the furnace, and secured thereto by bolts or other means. They may, how-
 15 ever, be secured to a removable section of the furnace, as indicated in Fig. 3, so that when a larger fire-chamber is required they can be taken out, or vice versa when a smaller one for summer use is required. These plates ex-
 20 tend from the front of the furnace to the bridge-wall, and from the bottom to the boiler-linings, to which they are neatly joined, and provided with a series of vertical perforations, f' , leading from the ash-pit, corresponding in
 25 number to the transverse perforations g^2 in said linings, into which they open, so that heated air may be conducted from the ash-pit to the flames in the fire-chamber.

By my construction it will be seen that the
 30 tilings forming the lining of the boiler are not only made a means of conveying air to the flames, but a medium to absorb and conduct the heat from the fire-chamber direct to the boiler, at the same time retaining a sufficient
 35 quantity to maintain the contents of the boiler at an even temperature, should that of the fire-chamber vary.

It has been found by actual experiment that sufficient heat is absorbed by the tiling and imparted to the boiler to generate steam suffi- 40
 cient to run an engine for hours after the fire upon the grate-bars has been withdrawn or died out.

Having thus described my invention, what I claim, and desire to secure by Letters Pat- 45
 ent, is—

1. The combination, with a steam-boiler, of a lining of tiling having plain concavo-convex faces corresponding with and suspended by the boiler in close and direct contact with 50
 the boiler over the fire-chamber, substantially as described.

2. The combination, with a steam-boiler, of a perforated lining conforming in shape to and suspended in close contact with the entire con- 55
 tiguous surface of the boiler, said perforations forming air-inlets not having contact with the boiler, substantially as described.

3. A lining for steam-boilers, concavo-convex in form, held in contact with the boiler, 60
 and provided with a series of perforations, forming air-inlets, terminating in elbow-tubes, substantially as described.

4. The combination, with a steam-boiler, of a perforated concavo-convex lining suspended 65
 in contact with the same over the fire-chamber, and of a perforated side lining for the fire-chamber, substantially as described.

CHARLES McMILLAN.

Witnesses:

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 S. S. SCHOFF.