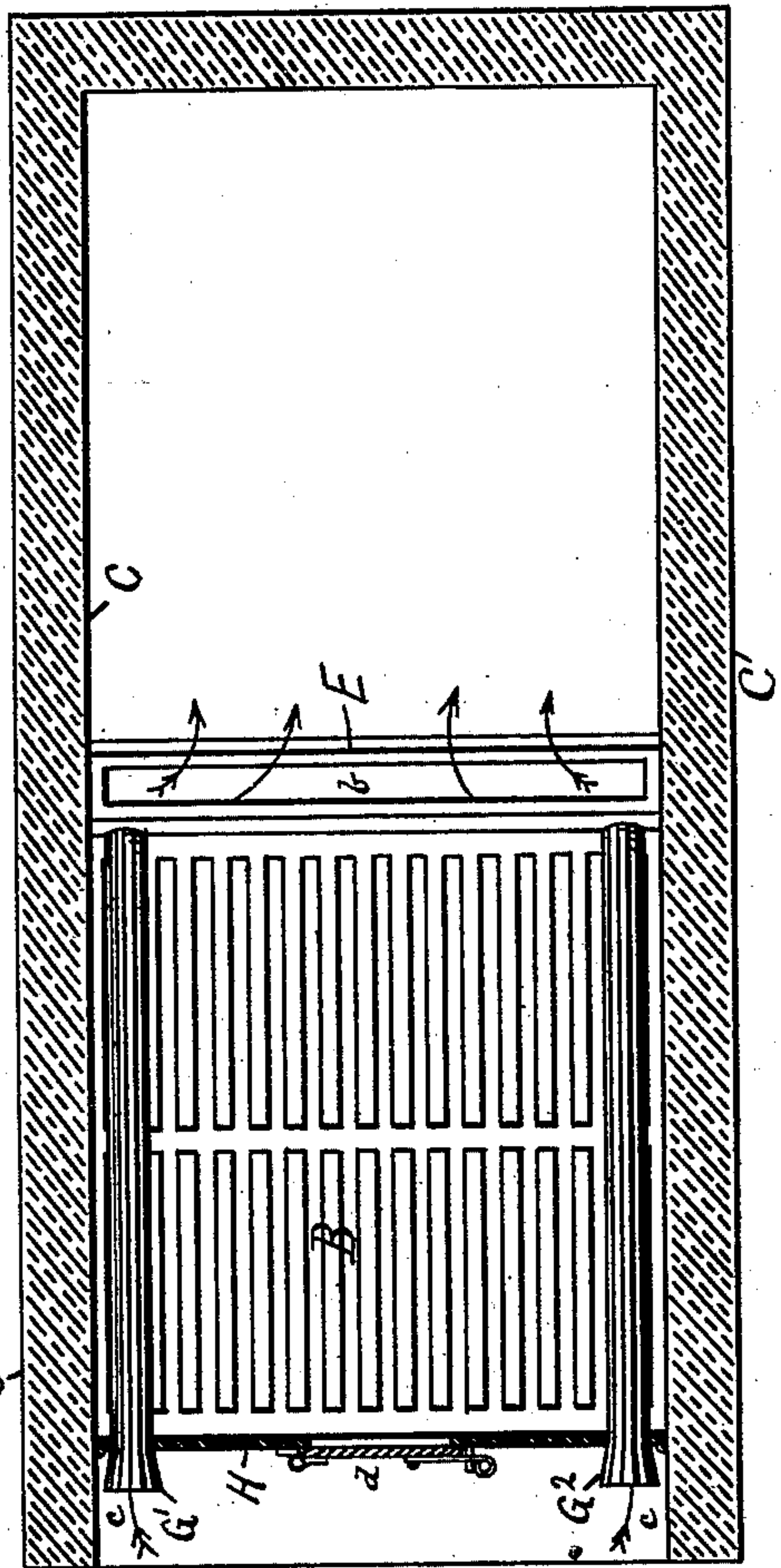
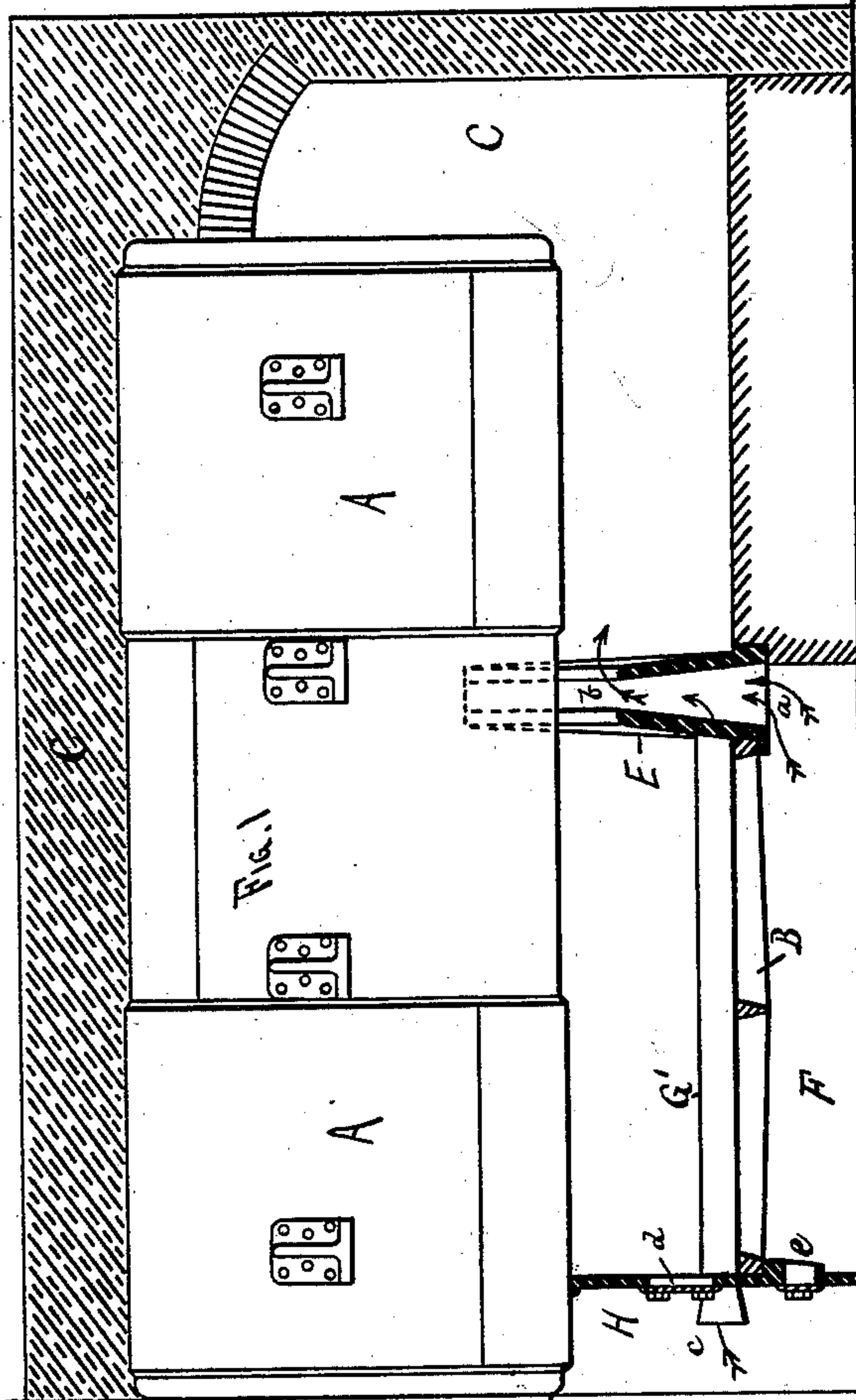
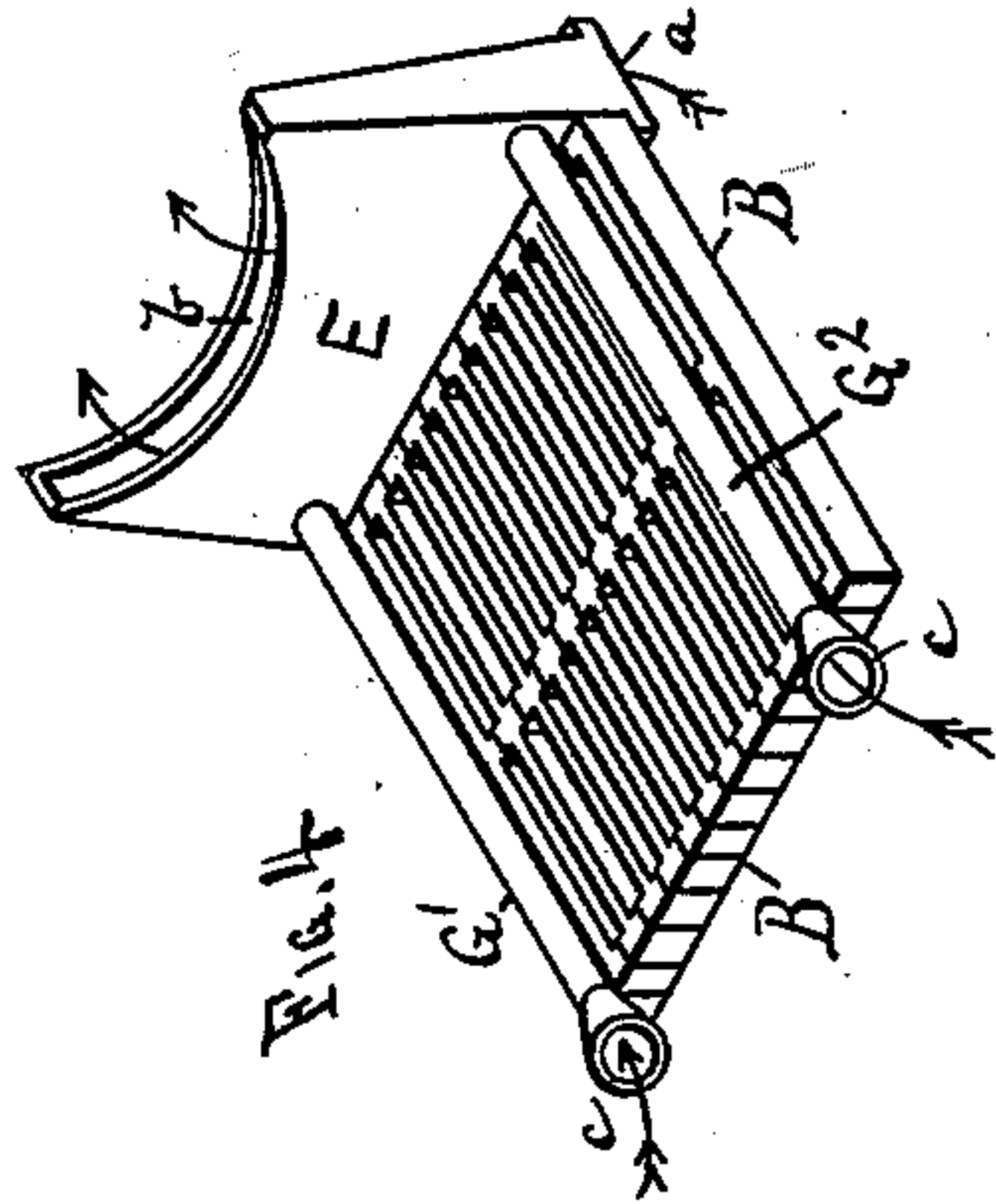
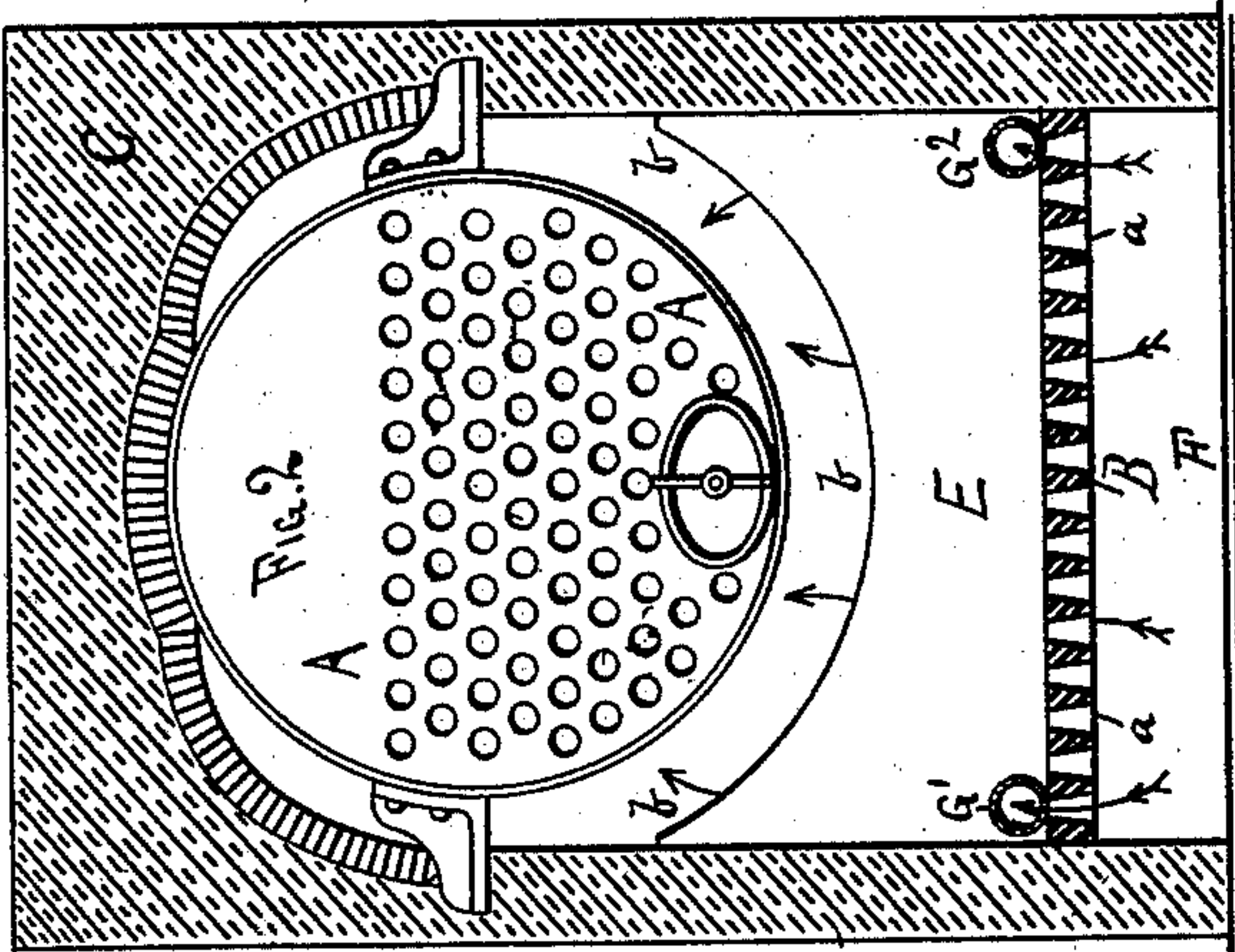


(No Model.)

A. CRAWFORD.  
SMOKE CONSUMING FURNACE.

No. 299,965.

Patented June 10, 1884.



WITNESSES.  
*L. Starkey*  
*Louis Fessler Jr.*

Alexander Crawford.  
INVENTOR, BY  
Louis Fessler & Co.  
Attys.



# UNITED STATES PATENT OFFICE.

ALEXANDER CRAWFORD, OF DULUTH, MINNESOTA.

## SMOKE-CONSUMING FURNACE.

SPECIFICATION forming part of Letters Patent No. 299,965, dated June 10, 1884.

Application filed January 23, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, ALEXANDER CRAWFORD, a citizen of the United States, and a resident of Duluth, in the county of St. Louis and State of Minnesota, have invented certain new and useful Improvements in Smoke-Consumers for Boilers, Furnaces, &c., of which the following is a specification.

This invention relates to apparatus attached to the fire-chambers of boilers, furnaces, &c., for consuming the carbon and other combustible matter carried off with the smoke; and it consists in the construction of the parts, as hereinafter specified and claimed.

This invention may be applied to any fire-box, furnace, or other place where heat is generated by the combustion of wood or coal; but for the purpose of illustration I have shown it applied to an ordinary boiler in the accompanying drawings, in which—

Figure 1 is a longitudinal section, and Fig. 2 is a cross-section. Fig. 3 is a plan view with the boiler removed. Fig. 4 is a perspective view, reduced and detached, of the grate and hot-air-supply apparatus.

A is the boiler; B, the grate; C, the brick-casing, and D the smoke-stack, all arranged in the ordinary manner.

Across the rear of the grate B is arranged a hollow bridge-wall, E, opening downward into the ash-pit F at *a*, and upward beneath the boiler A at *b*, the upper surface of the bridge-wall being concave to conform to the outline of the boiler, and leaving a space between it and the boiler for the passage of the smoke and flame from the grate to the flues, as shown, the concave form of the bridge-wall thus causing all parts to be equidistant from the boiler.

G' G<sup>2</sup> are two pipes opening into the open air at *c* and passing backward through the fire-box front H upon either side of the fire-door *d* and over the top of the grate B and into the hollow bridge-wall E, so that air-passages are formed from the outside into the hollow bridge-wall. By passing the pipes G' G<sup>2</sup> through the fire-box the air within them is highly heated and passes into the hollow bridge-wall, and a strong current created through the pipes into the bridge-wall, where-

by a supply of hot air thereto is maintained. The bridge-wall also opening down into the ash-pit F, the air entering at the draft-door *e* is also heated by contact with the fire in the fire-box above and enters the hollow wall in that condition, so that two sources of supply of hot air—viz., through the pipes G' G<sup>2</sup> and the ash-pit F—are provided. The bridge-wall itself, being in direct contact with the fire, also serves to increase the heat of the air as it passes through it, so that a large supply of intensely-heated air is constantly pouring out through the opening *b*. The exit port or opening *b*, it will be observed, is narrower than the entrance-port *a*, so that the air is gradually compressed by the converging walls of the bridge-wall E, and thus increases the force of the air and adds to its temperature. At the exit-port *b* this highly-heated air comes in contact with the flame and smoke from the fire-box, and, combining with the carbon and other combustible matter therein, completely consume them, so that nothing remains to pass to the smoke-stack but the unconsumable gases and the air.

I have found by experiment that the proper proportion for the bridge-wall E for a grate seven feet square is about nine inches wide at *a*, five inches wide at *b*, and running up to within about nine inches of the boiler, although these proportions may be varied to suit different kinds of boilers or furnaces, or to adapt them to different kinds of fuel.

The pipes G' G<sup>2</sup> may be made of any size or suitable material to resist the action of the fire, and any number may be used and arranged in any suitable manner. Two pipes six inches in diameter is about the right proportion when used in connection with a grate seven feet square.

Any kind of fuel may be used, but it is especially applicable to furnaces using bituminous coal.

By this arrangement also the bridge-wall of furnaces is utilized as a vehicle for conveying the hot air.

What I claim as new is—

A hollow tapering bridge-wall, E, open at its upper and lower ends, said bridge-wall being hollowed out or cut away to form a concave up-

per end, in order that all parts shall be equi-  
distant from the boiler, and provided at its  
lower end with a ledge to support one end of  
the grate, in combination with pipes G' G<sup>2</sup>,  
5 communicating with said bridge-wall near its  
lower end, resting on the grate and extending  
the entire length of the same, substantially as  
set forth.

In testimony whereof I have hereunto set my  
hand in the presence of two subscribing wit- ro  
nesses.

ALEXANDER CRAWFORD.

Witnesses:

C. N. WOODWARD,  
LOUIS FEESER.