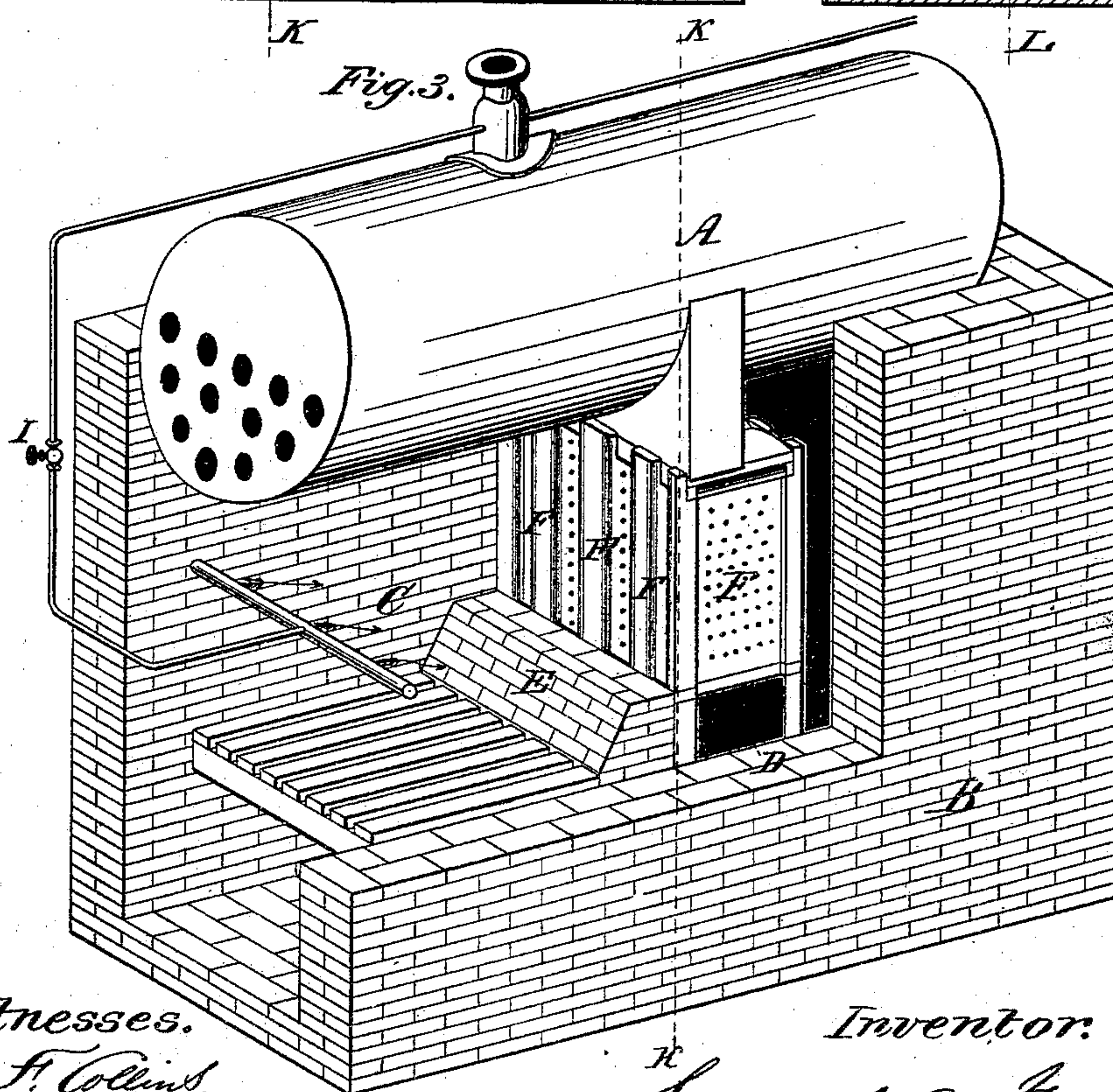
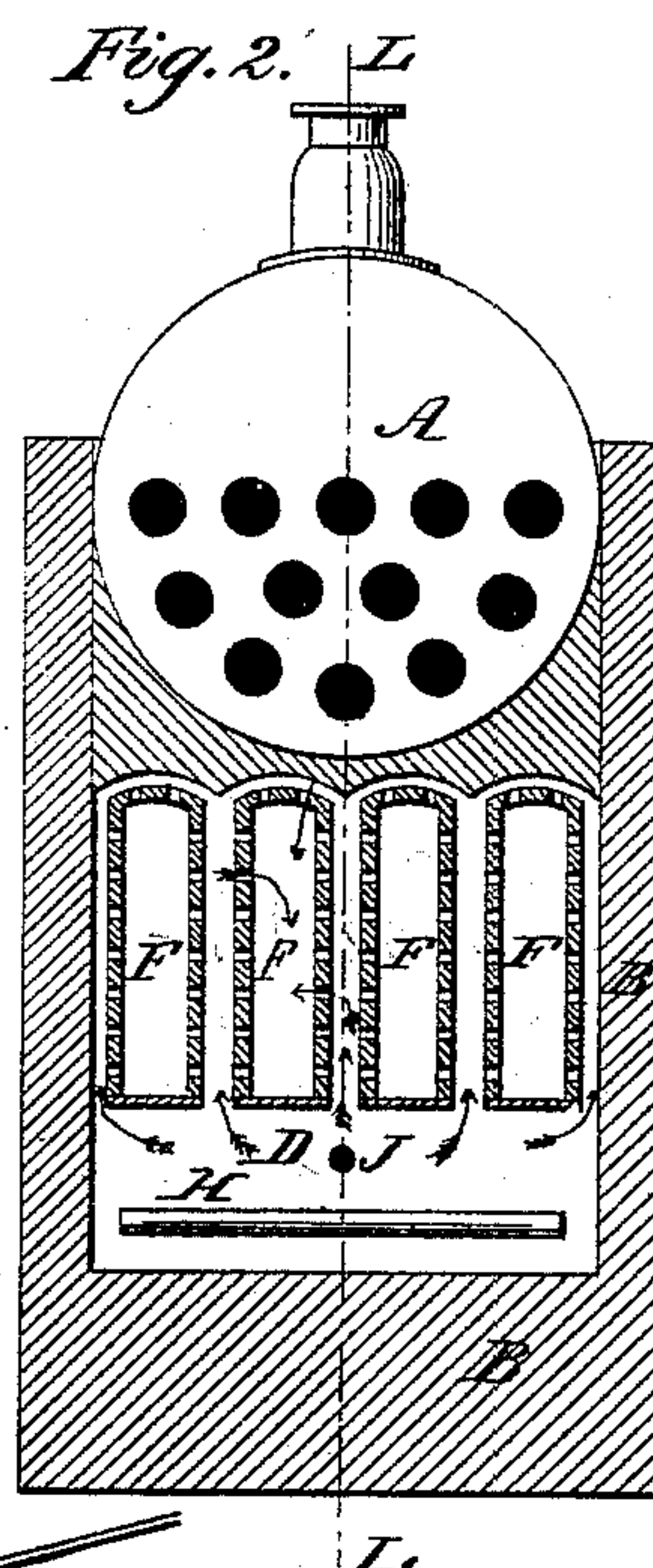
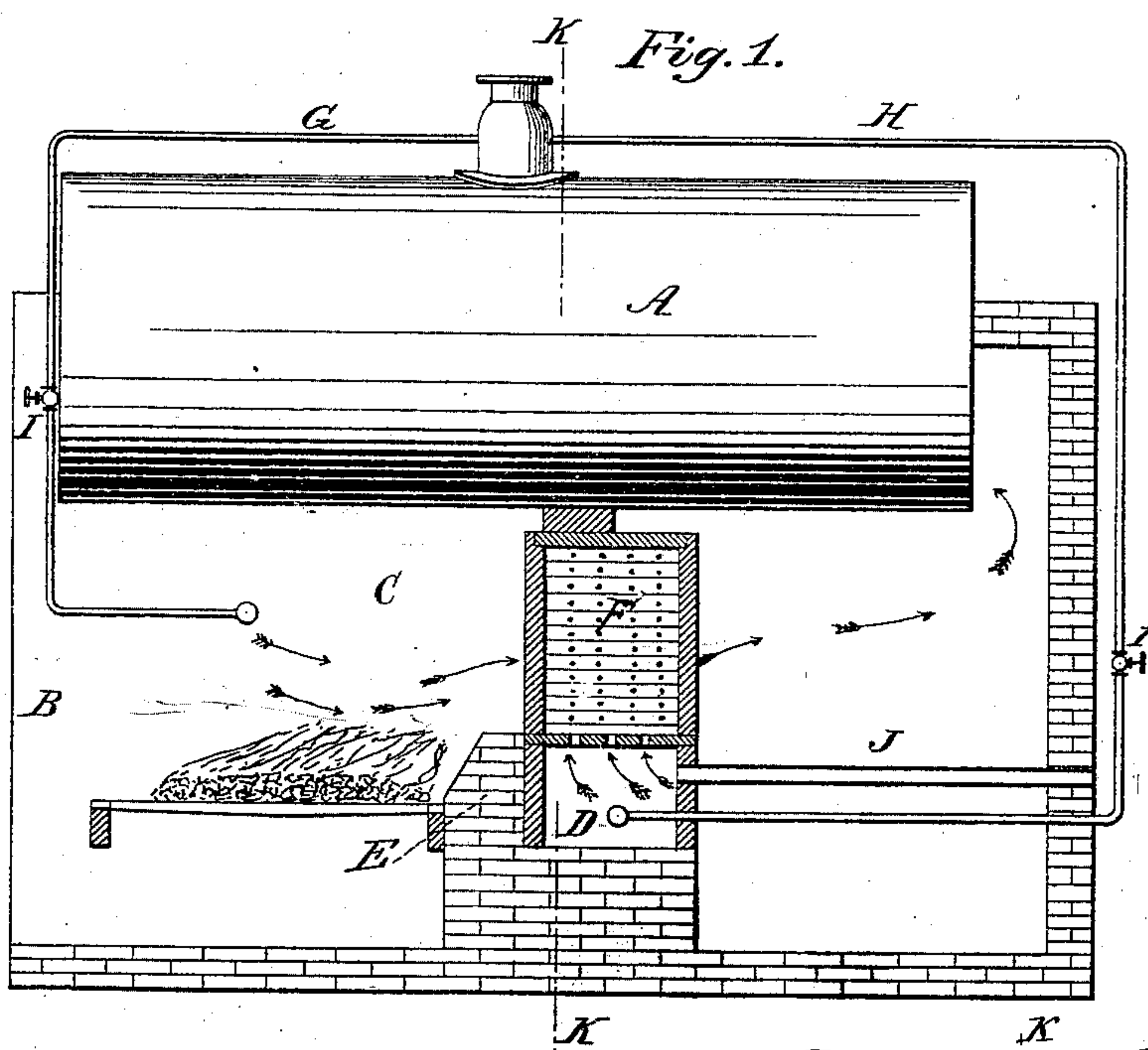


S. A. FORD.  
Smoke-Burning Furnaces.

No. 135,420.

Patented Feb. 4, 1873.



Witnesses.  
John F. Collins.  
J. G. King.

Inventor.  
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# UNITED STATES PATENT OFFICE.

SAMUEL A. FORD, OF CHICAGO, ILLINOIS.

## IMPROVEMENT IN SMOKE-BURNING FURNACES.

Specification forming part of Letters Patent No. 135,420, dated February 4, 1873.

*To all whom it may concern:*

Be it known that I, SAMUEL A. FORD, of the city of Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Smoke-Burners, of which the following is a specification:

My invention is especially adapted for use in connection with steam-boilers and all kinds of heating-furnaces, and provides a simple, cheap, and effective method of applying a well-known principle to the combustion of fuel and the complete consumption of the volatile hydrocarbon and other gases, which usually pass off as smoke. The principle alluded to is that of combining with the flame of burning fuel a suitable amount of atmospheric air at the time and place where the greatest expansion of the gases is had and the highest temperature obtained. To accomplish this purpose I construct in the rear of the bridge-wall in general use a chamber for heating air as nearly as may be to the same temperature as that of the furnace, and for distributing the same by means of generators rising above the bridge-wall, but immediately over the air-chamber.

When it is desirable to economize space or expense, the hot-air chamber may be constructed in the bridge-wall, or a large pipe may be introduced into the same, having proper openings underneath and connected with each perforated chamber; but the form I have shown in the accompanying drawing gives the best results. This chamber is constantly supplied with air by means of a suitable pipe or pipes leading to either the front, rear, or sides of the boiler-casing, as may be most convenient. These pipes are in all cases so arranged as to utilize the waste heat for partially heating the air while passing into the hot-air chamber.

The perforated chambers referred to form, by means of small walls and spaces, a series of vertical chambers or passages above the hot-air chamber, with which they are connected and through which the flame must pass. The walls of these perforated chambers are hollow and perforated with small holes; hence through them there is mingled with the flame a constant and ample supply of heated air from the hot-air chamber below. These perforated chambers may be constructed of fire-clay or metal, perforated as indicated; but in my experiments I have found fire-clay or fire-clay with a lining of metal preferable. The number and size of them may be varied according to circumstances.

To render the supply of air uniform, and to meet the variable demands of different stages of combustion, a small steam-pipe is conducted from the dome of the boiler to the hot-air chamber, and by means of small perforations in the same, underneath the hollow walls of each perforated chamber, the supply of heated air is readily and promptly controlled. When it is inconvenient to use steam any ordinary blast will answer the same purpose, but is more expensive. A steam-pipe is also taken from the dome to the front of the boiler and admitted either into the fire-box above the furnace-door and hence above the fuel or underneath the same, as may be most convenient. In either case the same object is accomplished, viz., to give an accelerated draft immediately after renewing the supply of fuel and in certain conditions of the atmosphere.

When it is inconvenient to use steam for this purpose a blast of heated air may be substituted.

In the accompanying drawing forming a part of this specification, the outline of an ordinary boiler with its setting is shown the better to illustrate the nature and application of my invention.

Figure 1 is a vertical longitudinal section through lines L L. Fig. 2 is a vertical cross-section through lines K K. Fig. 3 is a side elevation.

### *General Description.*

A represents an ordinary boiler; B, the brick-work incasing the same; C, the fire-box; D, the hot-air chamber; E, the bridge-wall; F F F F, the perforated chambers; G H, steam-pipes; I I, globe-valves to regulate the supply of steam; J, the air-pipe leading to hot-air-chamber D.

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

1. The hot-air chamber D and pipe J, in combination with the perforated chambers F, constructed and arranged substantially as described, and for the purposes set forth.

2. The combination of the perforated chambers F, hot-air chamber D, air-pipe J, and steam-pipes G and H, arranged substantially as specified and shown, and for the purposes set forth.

SAMUEL A. FORD.

Witnesses:

JOHN F. COLLINS,  
J. G. KING.