

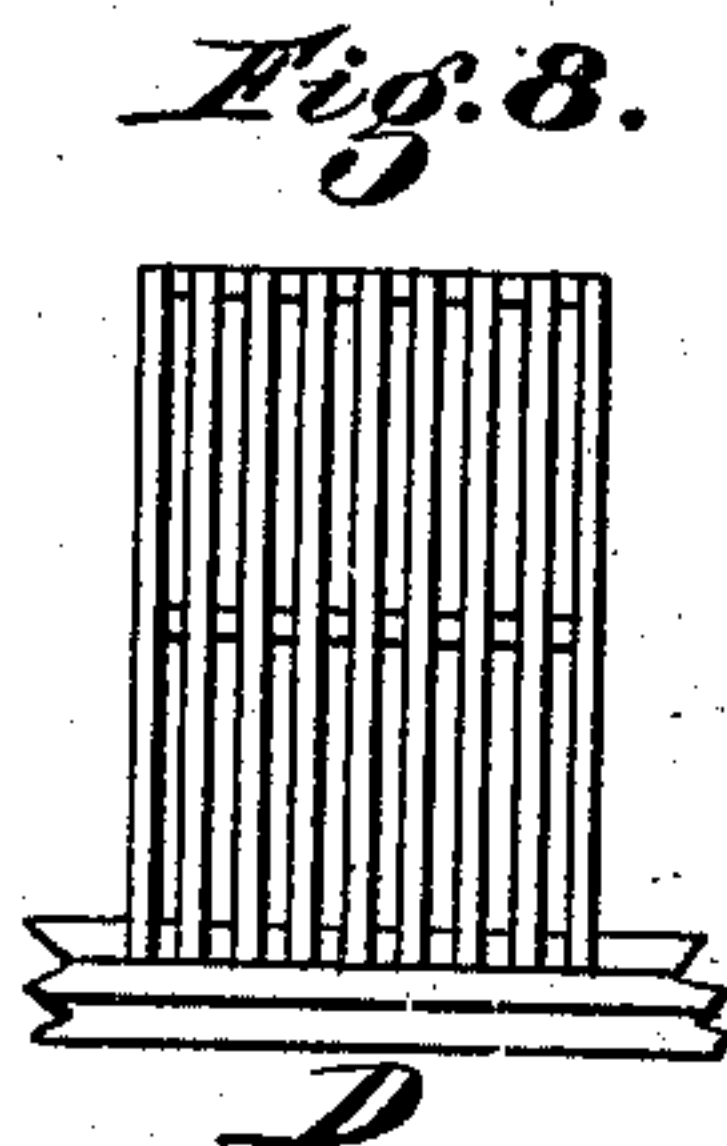
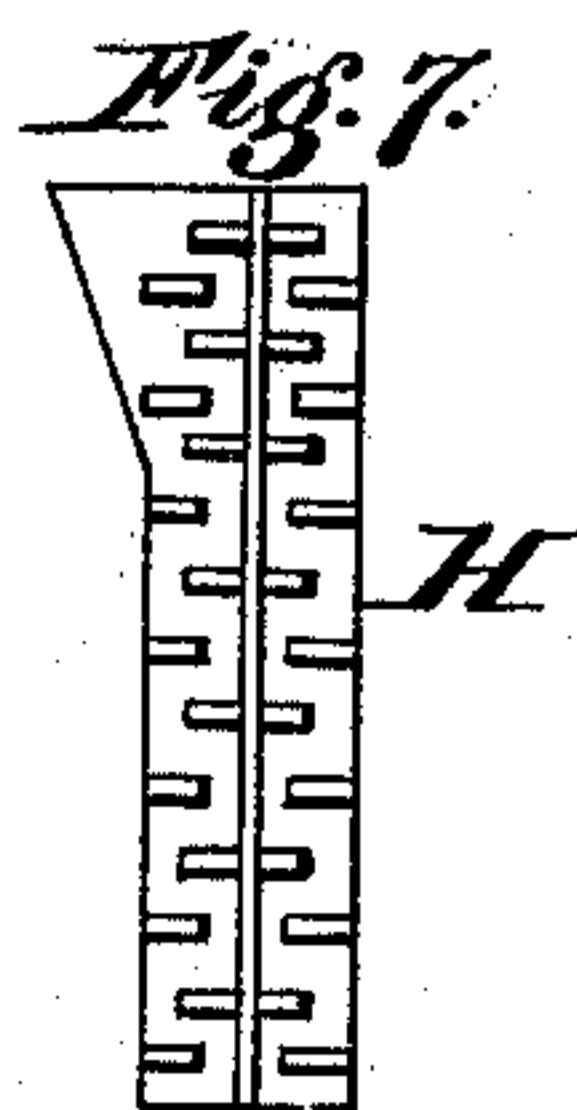
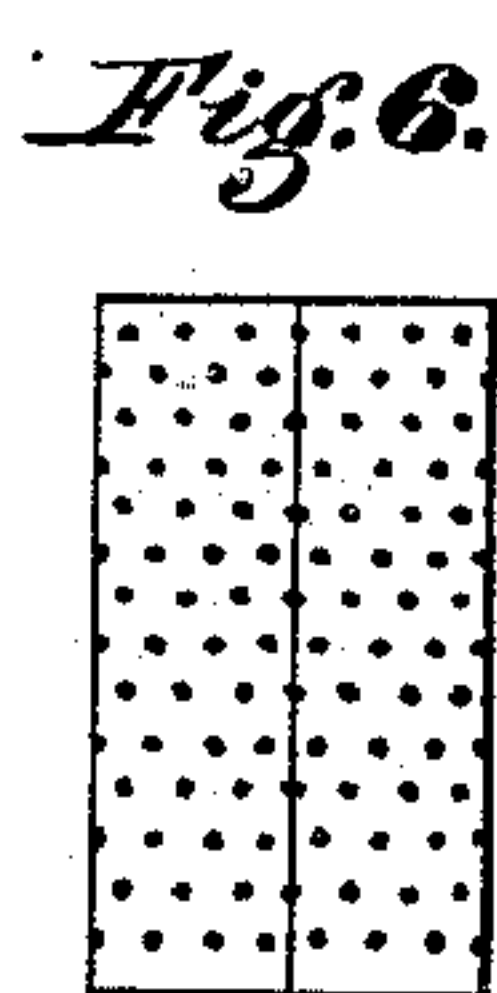
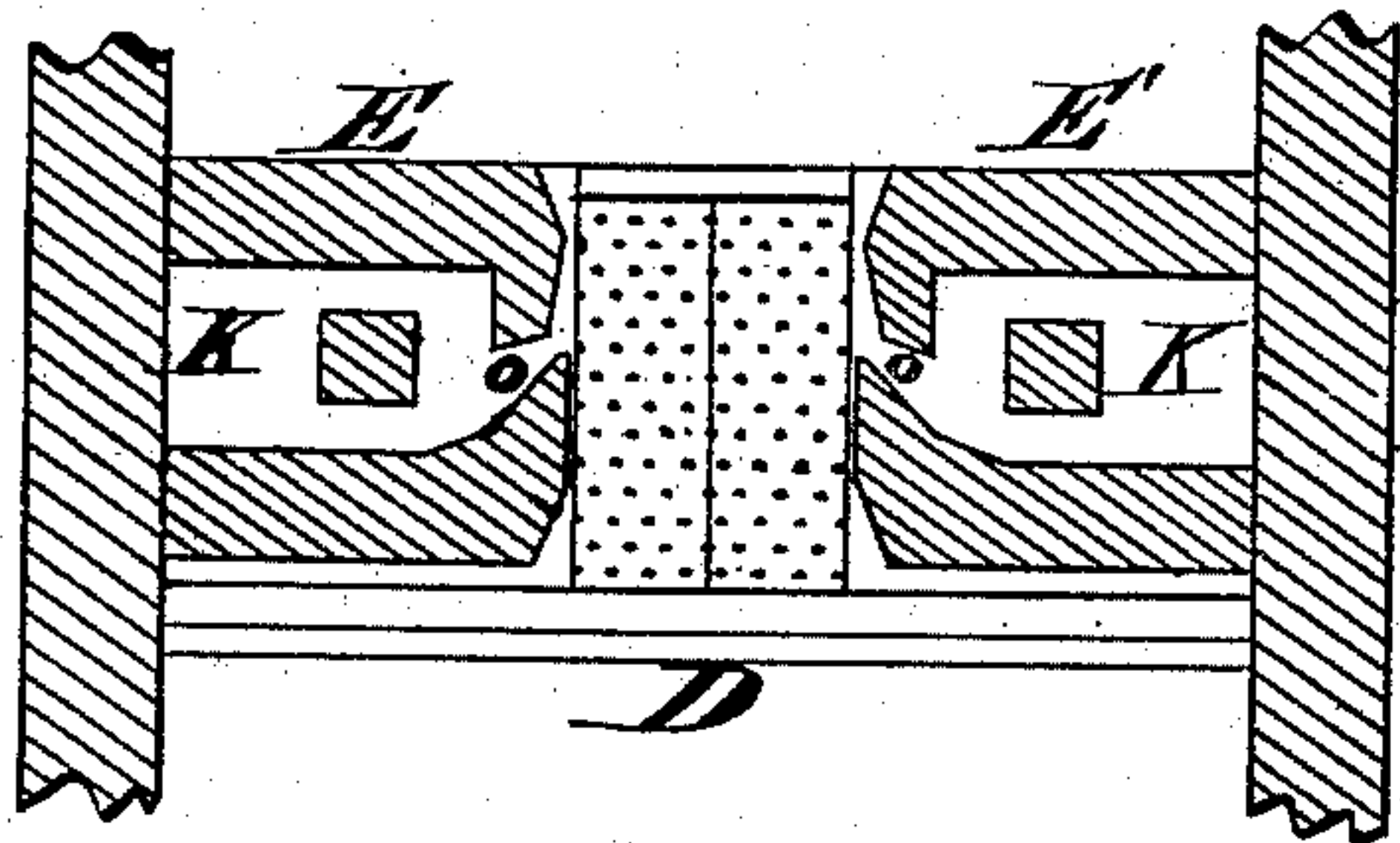
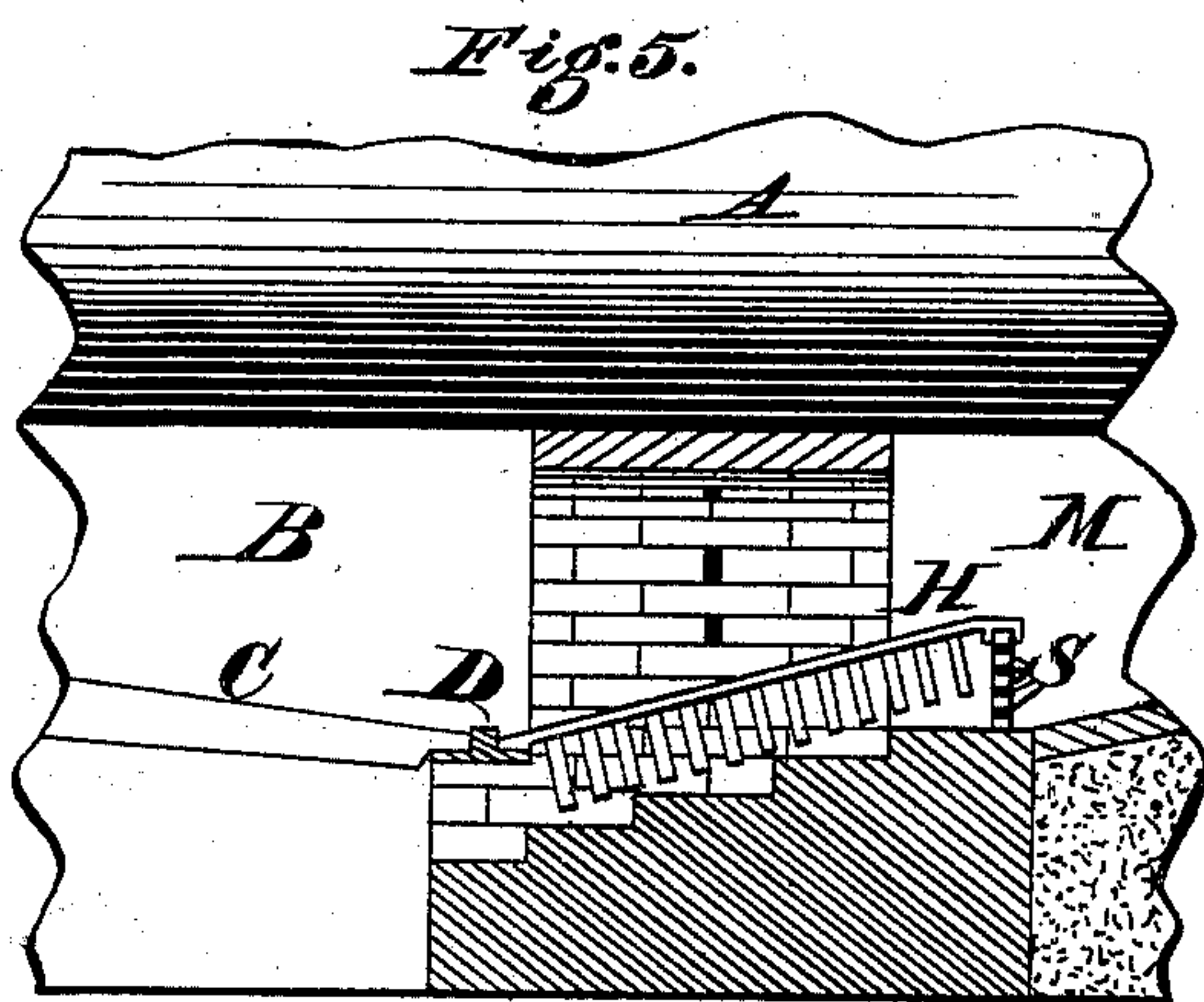
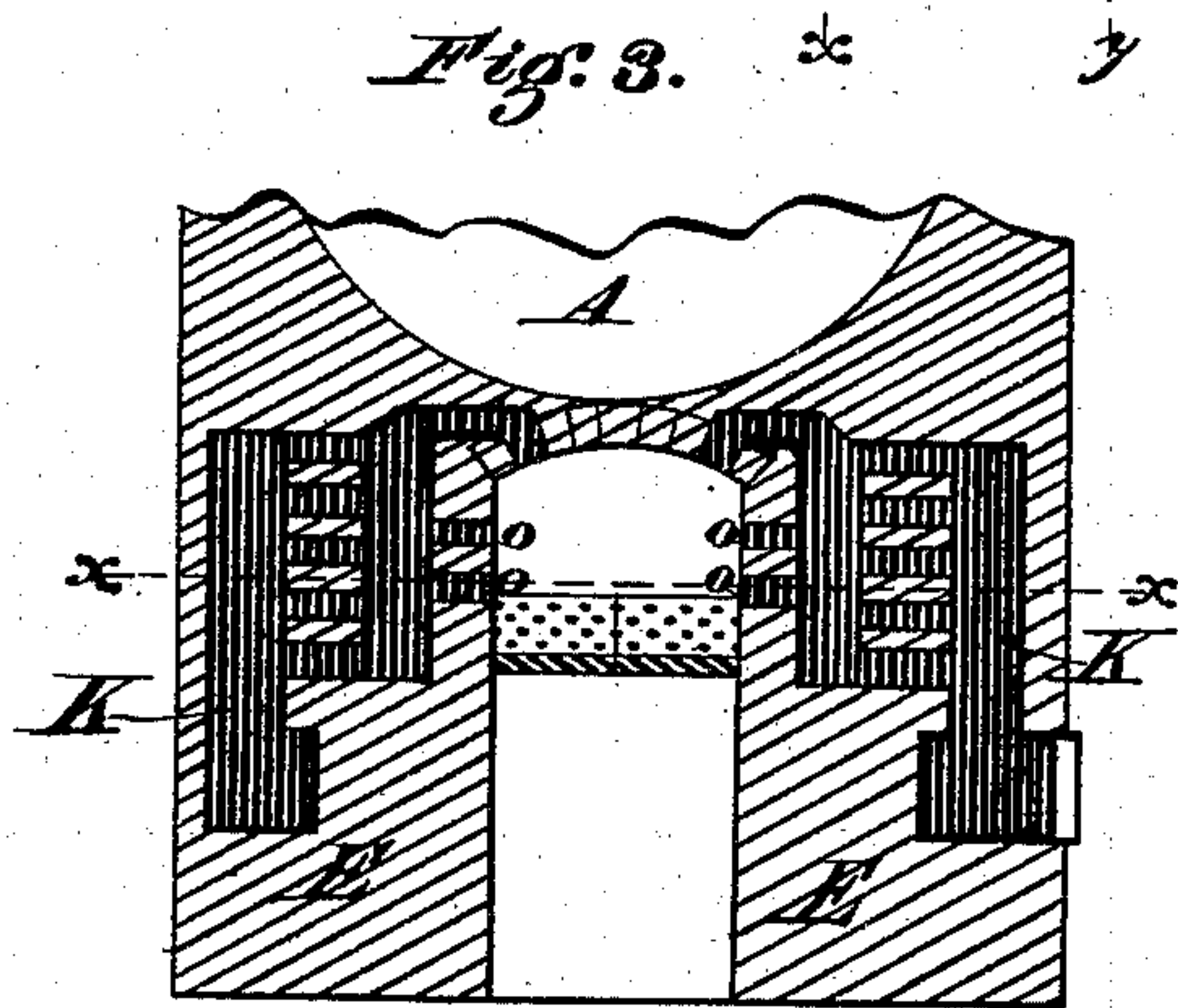
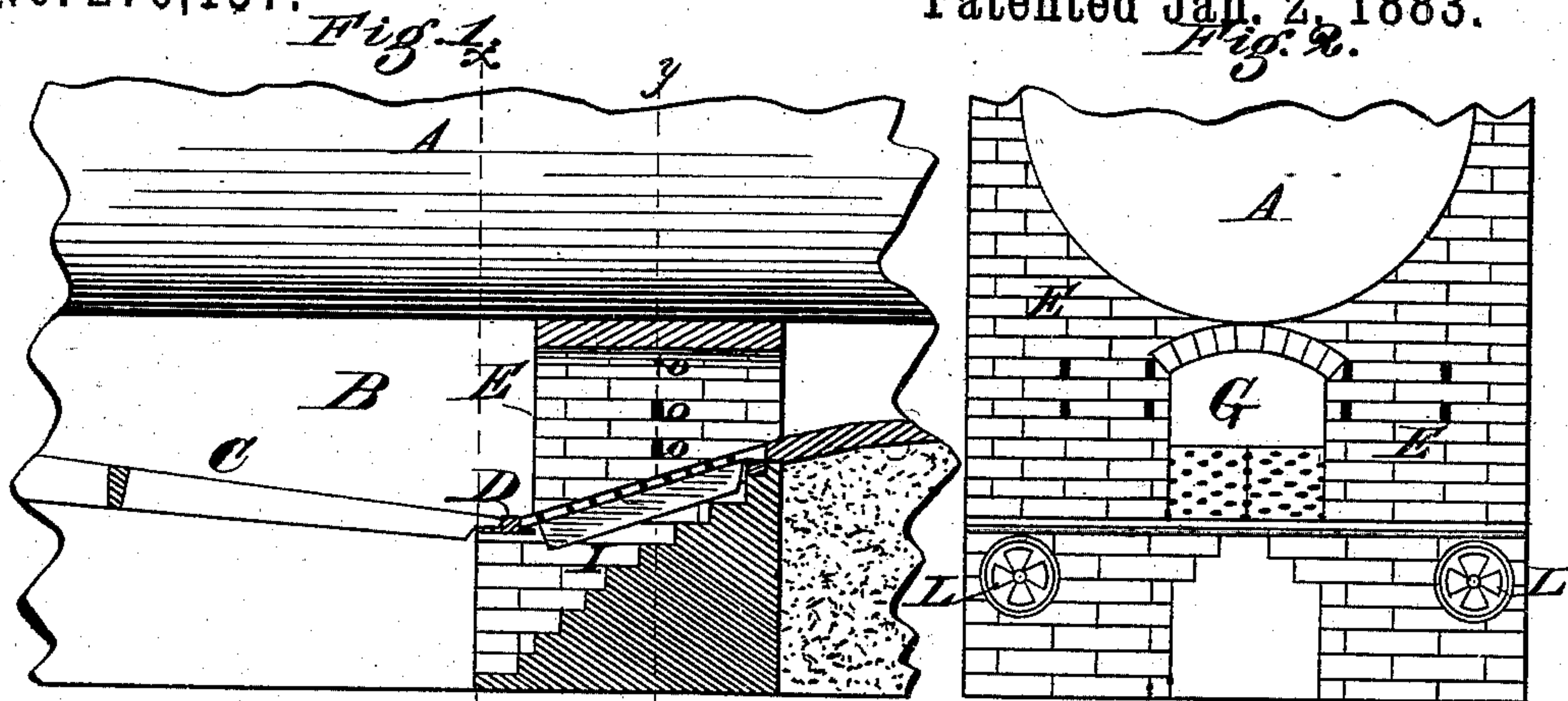
(No Model.)

E. W. VANDUZEN.

BOILER FURNACE.

No. 270,157.

Patented Jan. 2, 1883.



Attest,
Jno. E. Miles,
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Inventor;
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UNITED STATES PATENT OFFICE.

EZRA W. VANDUZEN, OF NEWPORT, KENTUCKY.

BOILER-FURNACE.

SPECIFICATION forming part of Letters Patent No. 270,157, dated January 2, 1883.

Application filed May 6, 1882. (No model.)

To all whom it may concern:

Be it known that I, EZRA W. VANDUZEN, a citizen of the United States, and a resident of Newport, in the county of Campbell and State of Kentucky, have invented certain new and useful Improvements in Boiler-Furnaces, of which the following is a specification.

My invention relates to an improvement in boiler-furnaces.

The object of my invention is to prevent smoke in the burning of soft bituminous coal by providing a thick bridge-wall at the rear of the grate-bars, through which bridge-wall an arch is sprung, with its bottom inclining upward from the grate-bars proper, and the arch itself furnishing a supplemental fire-chamber, through which the products of combustion must pass, and become heated and consumed either in the arch or in the combustion-chamber in the rear thereof. Air is provided by several methods to support combustion in the arch and rear fire-chamber, all of which will be fully explained in the description of the accompanying drawings, making a part of this specification.

Figure 1 is a longitudinal central vertical section embodying my improvement. Fig. 2 is a front elevation on line *xx*, Fig. 1. Fig. 3 is a section on line *yy*, Fig. 1. Fig. 4 is a sectional plan of the interior of the bridge-wall on line *xx*, Fig. 3. Fig. 5 shows a modification of the bottom of the furnace under the arch. Fig. 6 is a plan of one form of the bottom of the furnace under the arch; Figs. 7 and 8, other modifications of the same.

A represents an ordinary boiler; B, the ordinary furnace-chamber; C, the grate-bars, and D a cross-piece on which the grate-bars rest.

E represents a bridge-wall projecting up to the boiler in rear of the grate-bar C.

G represents an arch sprung from the rear of the grate-bars C, and extending through the wall E E', forming a secondary furnace.

H represents the bottom of the arch-chamber G. It is made inclining upward from the front of the arch for two reasons: first, to contract the arch at the rear to insure a more perfect combustion of the gases, and, second, to keep the area of the arch at its rear the same, so as not to be obstructed by cinders and ashes

accumulating in the rear. This grate-surface is perforated or made with openings through it, and with an air-space, I, underneath to keep the plate from becoming too highly heated, and to supply air to that part of the combustion-chamber within the arch G where the coked coal is consumed.

I have shown three forms of bottoms for the furnace within the arch G, one form represented by H in Figs. 5 and 7. Figs. 4 and 6 show a perforated metal plate used in lieu of the bars H, and Fig. 8 shows ordinary grate-bars, which may be used instead of the forms shown in Fig. 5 or 6.

In order to more perfectly supply air to the combustion-chamber, I make the bridge-wall E hollow or with openings K, which openings communicate with registers L below the furnace-chamber for supplying any desired amount of air.

In order to heat the air before admitting it to the arch-chamber G, I provide brick posts or winding air-passages through the hollow bridge-wall E to check the too rapid passage of the air which enters the arch G through openings O on either side of the arch.

A very important result is obtained by having the bottom of the arch G inclined upward toward the rear. It prevents the coal and incandescent fuel from working backward to obstruct the flue. It preserves the flue-area the same and allows the fuel to be stirred, carrying the ashes through the grate, and causes the fuel to incline toward the furnace. By making the bridge-wall E hollow it prevents a too high heating of the wall forming the arch, which prevents a too high degree of heat to the wall and that portion of the boiler over it.

Other forms of making hollow walls each side of the arch G may be employed instead of the form here shown. A steam or air blast may be employed to increase the draft, if desired.

S represents orifices pierced in a ledge at the rear of plate or grate bars H to admit air into the rear chamber, M, to furnish oxygen to support combustion.

I claim—

1. A boiler-furnace composed substantially of the furnace-chamber B and the secondary furnace G, formed within the arch of the bridge-

wall, and provided with the grate-bars H and air-spaces I underneath said grate-bars; substantially as described.

2. In a boiler-furnace, a secondary furnace, 5 G, formed in the hollow bridge-wall, which is provided with air-openings e, and the perforated plate or grate bars H, substantially as described.

3. In a boiler-furnace, the bridge-wall E, 10 provided with the register L and air-passages e, conveying air into the secondary furnace G, substantially as described.

4. In a boiler-furnace, the combination of the furnace B, the grate, the bridge-wall at the

rear of the grate, constructed with the arched 15 chamber G, the grate H, forming a bottom to the arched chamber, which inclines upward from front to rear, the perforated ledge under the rear elevated end of the grate H, and the air-space I under the latter, substantially as 20 described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

EZRA W. VANDUZEN.

Witnesses:

JNO. E. JONES,

J. H. CHARLES SMITH.