

K. M. JARVIS.
Smoke and Gas Consuming Furnace.
No. 222,631.
Patented Dec. 16, 1879.

Fig:1.

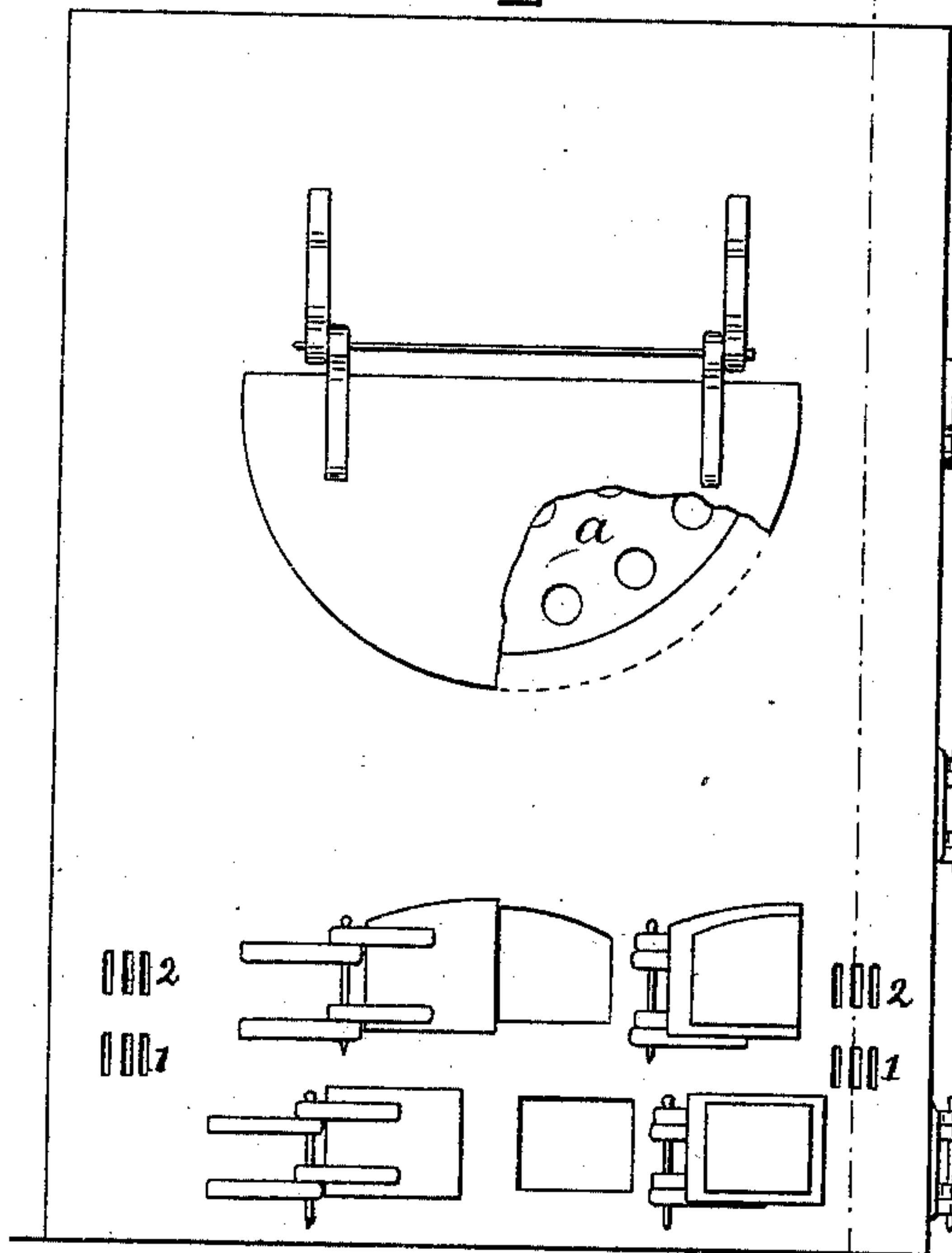


Fig:2.

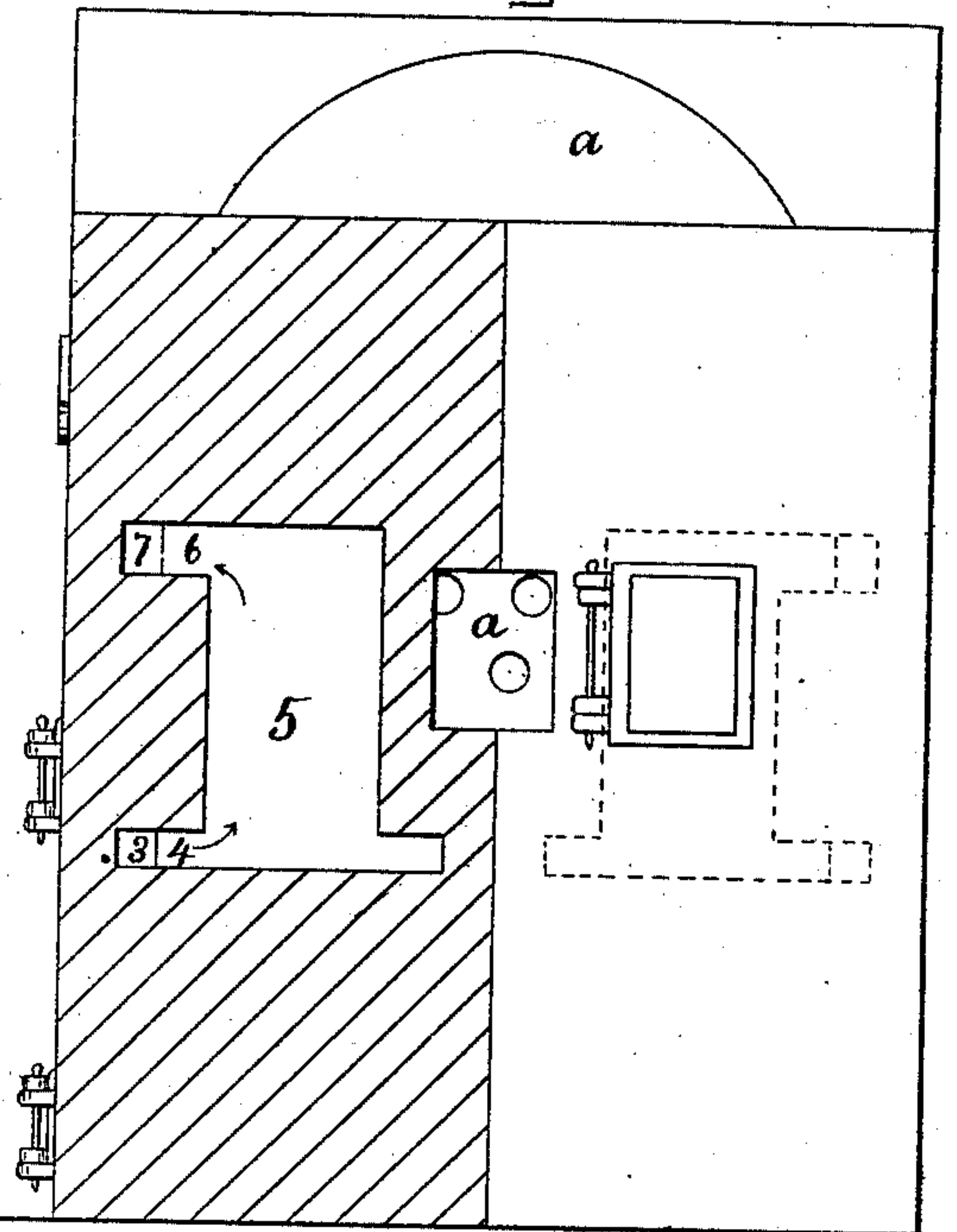


Fig:3.

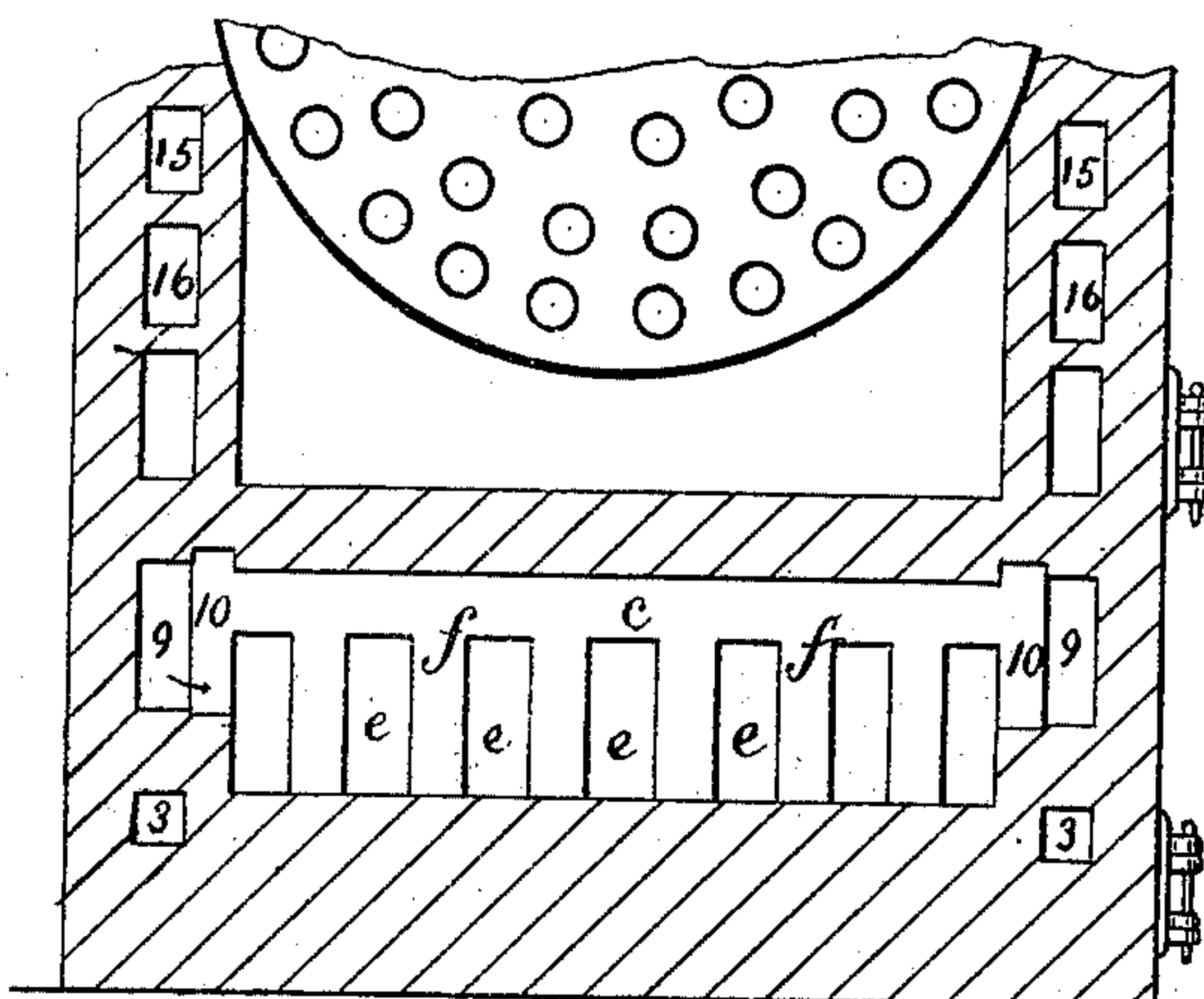
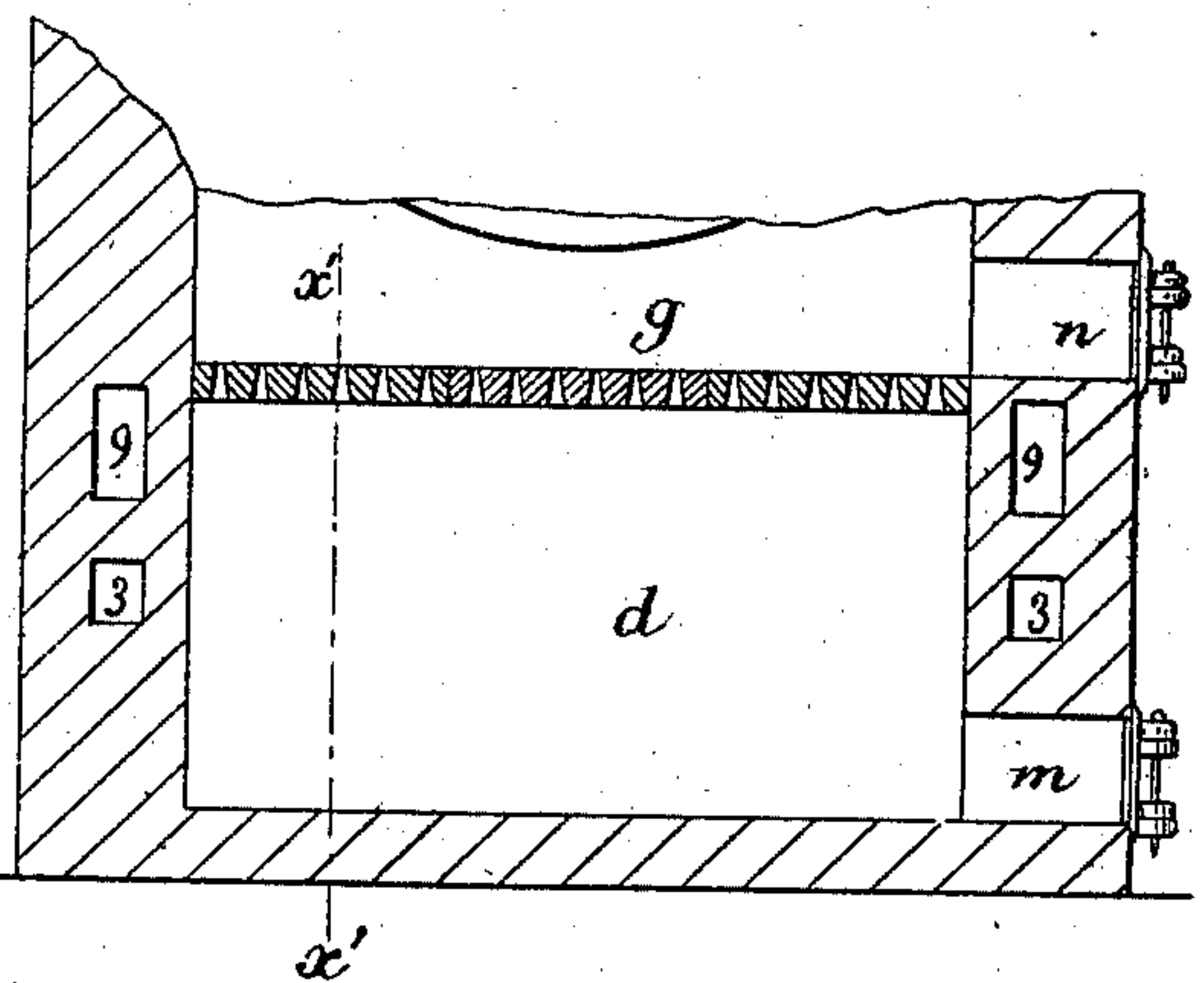


Fig:4.



Witnesses.
Jos. P. Schwimmer
L. B. Connor.

Inventor
Kingsbury M. Jarvis
by Crosby & Gregory Atty

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Fig: 5.

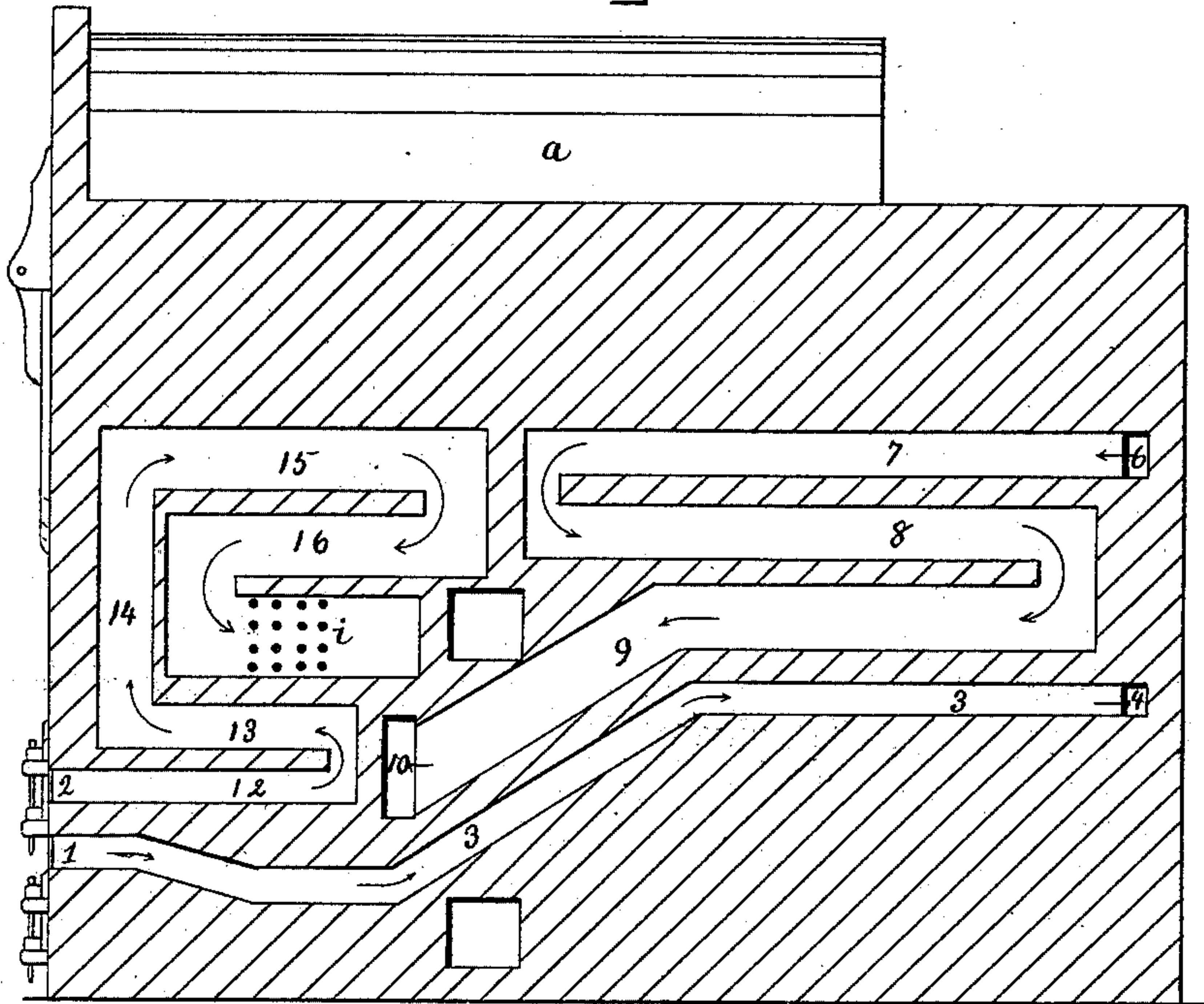


Fig: 6.

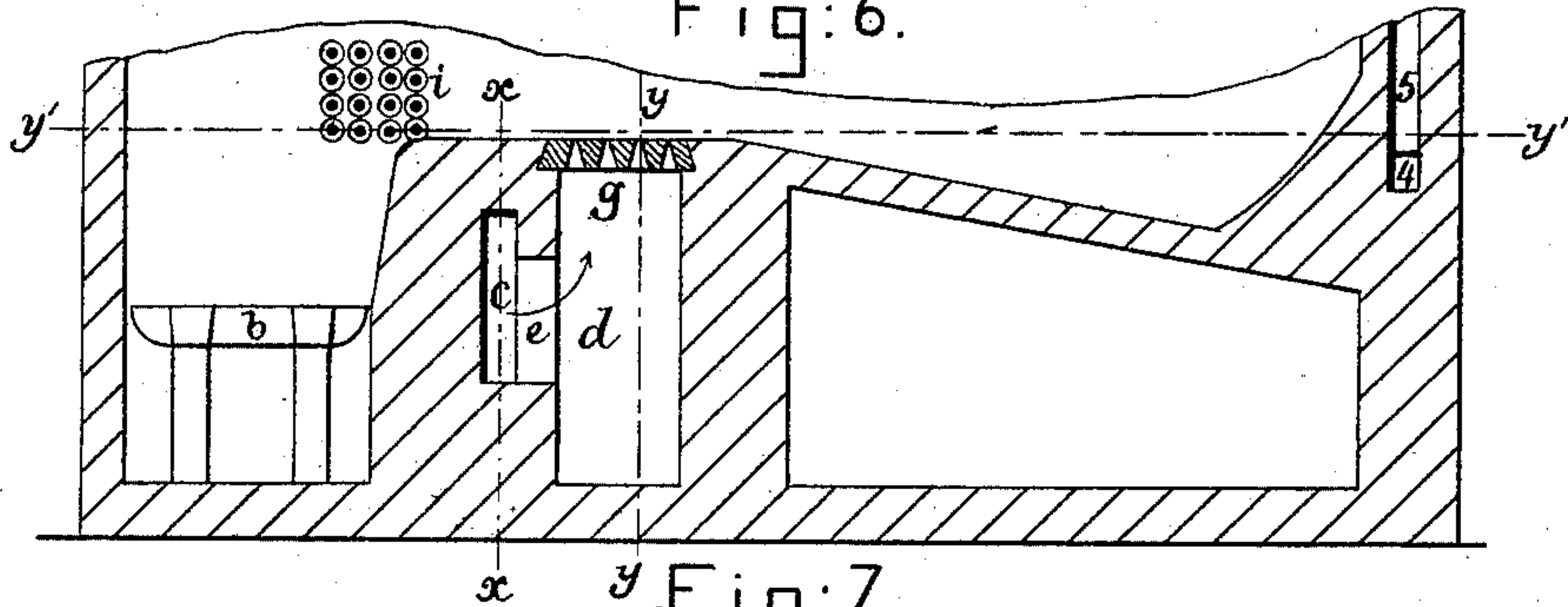
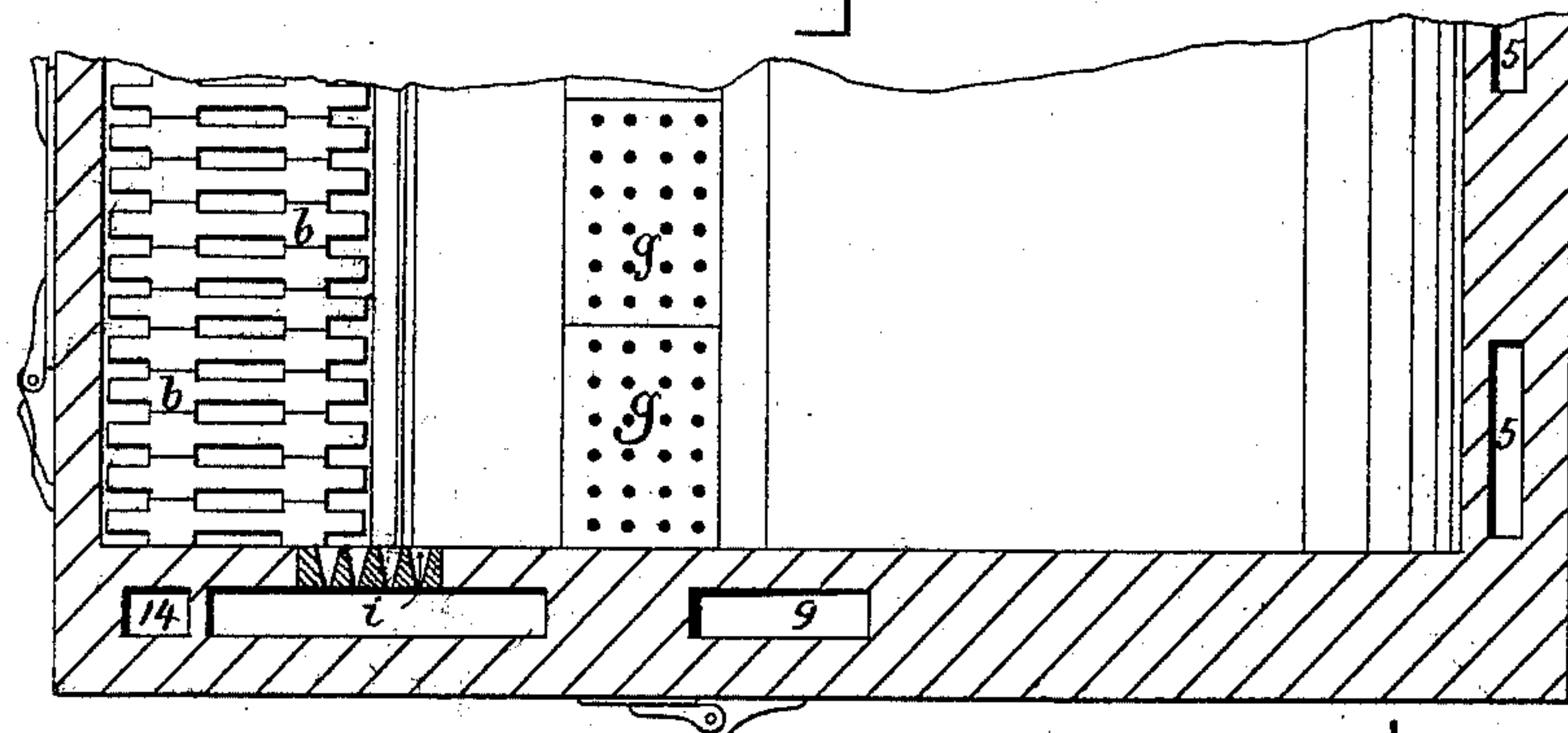


Fig: 7.



Witnesses.
Jos. P. Livermore
L. F. Connor.

Inventor.
Kingsbury M. Jarvis
by Crosby & Gregory, Attys.

UNITED STATES PATENT OFFICE.

KINGSBURY M. JARVIS, OF MALDEN, ASSIGNOR TO HIMSELF AND ALBERT F. UPTON, OF NEWTONVILLE, MASSACHUSETTS.

IMPROVEMENT IN SMOKE AND GAS CONSUMING FURNACES.

Specification forming part of Letters Patent No. **222,631**, dated December 16, 1879; application filed October 4, 1879.

To all whom it may concern:

Be it known that I, KINGSBURY M. JARVIS, of Malden, county of Middlesex, State of Massachusetts, have invented an Improvement in Smoke and Gas Consuming Furnaces, of which the following description, in connection with the accompanying drawings, is a specification.

My invention relates to furnaces for steam-boilers and other similar purposes, and is intended as an improvement on the furnace invented by me for which Letters Patent Nos. 176,639, April 25, 1876, 186,734, January 30, 1877, and 189,862, April 24, 1877, were granted, to which reference may be had. In those patents air-passages in the side walls of the furnace were described, which I denominate the "front ducts," in which the air circulates, and from which it discharges horizontally into the fire or combustion chamber near the bridge-wall. Other air-passages, which I now denominate the "rear ducts," discharge heated air into a chamber behind the bridge-wall, whence it passes through a perforated plate vertically into the combustion-chamber.

My present invention consists in a novel construction of the chamber behind and in the bridge-wall, such construction permitting the heated air to deliver more uniformly into the combustion-chamber.

Figure 1 is a front view of a furnace provided with my improvements; Fig. 2, a rear view thereof, one half the rear wall being shown in section; Figs. 3 and 4, cross-sections in the chamber behind the bridge-wall, on lines *x x* and *y y*, Fig. 6, respectively; Fig. 5, a sectional view of the side wall; Fig. 6, a longitudinal section of the furnace, on line *x' x'*, Fig. 4; and Fig. 7, a sectional plan view on line *y' y'*, Fig. 6.

The boiler *a*, fire-chamber, grate *b*, ash-pit, and combustion-chamber are all as described in aforesaid patents.

The front and rear ducts are shown as both beginning at the front of the furnace at 1 and 2.

The rear duct is shown as starting at 1 and passing along the side of the combustion-chamber, as shown at 3, and by passage 4 to the open space 5 in the rear wall of the fur-

nace, whence it returns to the side wall and winds back and forth therein, as shown at 6 7 8 9, and, finally, enters through passage 10 into the portion *c* of the chamber behind the bridge-wall.

The portion *c* of the chamber passes across through the bridge-wall, and is connected with the main portion *d* of the chamber by a series of vertical slots, *e*, in the partition *f*, separating the portions *c* *d* of the chamber.

The heated air from the rear ducts, having been received in the portion *d* of the chamber, passes up through the perforated plate *g*, where it mixes with the gases set free from the fuel in the fire-chamber, and causes complete combustion thereof, as described in my previous patents.

The front ducts, receiving air at 2 at the front of the furnace, pass, as shown at 12 13 14 15 16, back and forth in the side wall at the side of the fire-chamber, and, finally, deliver the air, heated in its passage, through the perforated plates *i* into the furnace near, but above, the bridge-wall.

It will be observed that the ducts increase in sectional area from the point at which the air is received to that where it is delivered, to allow the air to expand freely as it becomes heated in its progress through said ducts.

It will also be seen that nearly the whole heating portion of the furnace-walls is traversed by the air to be heated.

The perforations in the plates *g i*, which are preferably made of fire-brick material, are made tapering, as clearly shown in the sectional views. In the plates *g* the perforations are larger at the under side of the plate, and consequently any ashes or other matter which may have passed through the upper orifice of the perforation immediately drops down into the chamber *d* without clogging the perforations.

Doors *m n* are provided in the side walls for cleaning out the chamber *d* and the top of plate *g*.

The perforations in the plate *i* are largest at the inside of the furnace, and, besides being kept clear by the draft of air through them, also permit the expansion of said jets

of air during their passage through the plates. The direction of the air-currents is everywhere clearly indicated by arrows.

I claim—

In a smoke and gas consuming furnace, a chamber, *c d*, in and behind the bridge-wall, divided by a partition provided with openings to connect the two portions of the chamber, combined with the bridge-wall, and the heated-air ducts, arranged, as described, to wind back and forth continuously in the walls of the fur-

nace to convey air, heated in its passage, to the chamber, and the perforated delivery-plate, all substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

KINGSBURY M. JARVIS.

Witnesses:

ALBERT F. UPTON,
JOSEPH A. GRANT.