

No. 614,102.

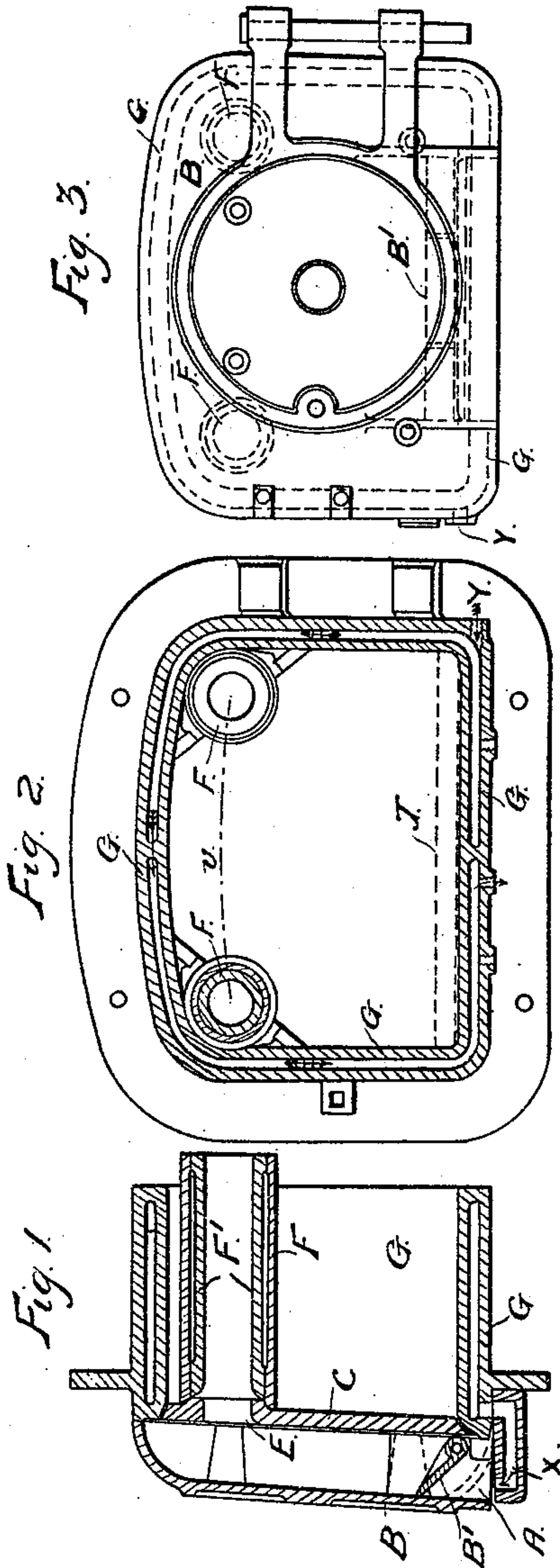
Patented Nov. 15, 1898.

W. D. HAMILTON.
BOILER OR OTHER FURNACE.

(Application filed Dec. 27, 1897.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses:

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By Richard R.

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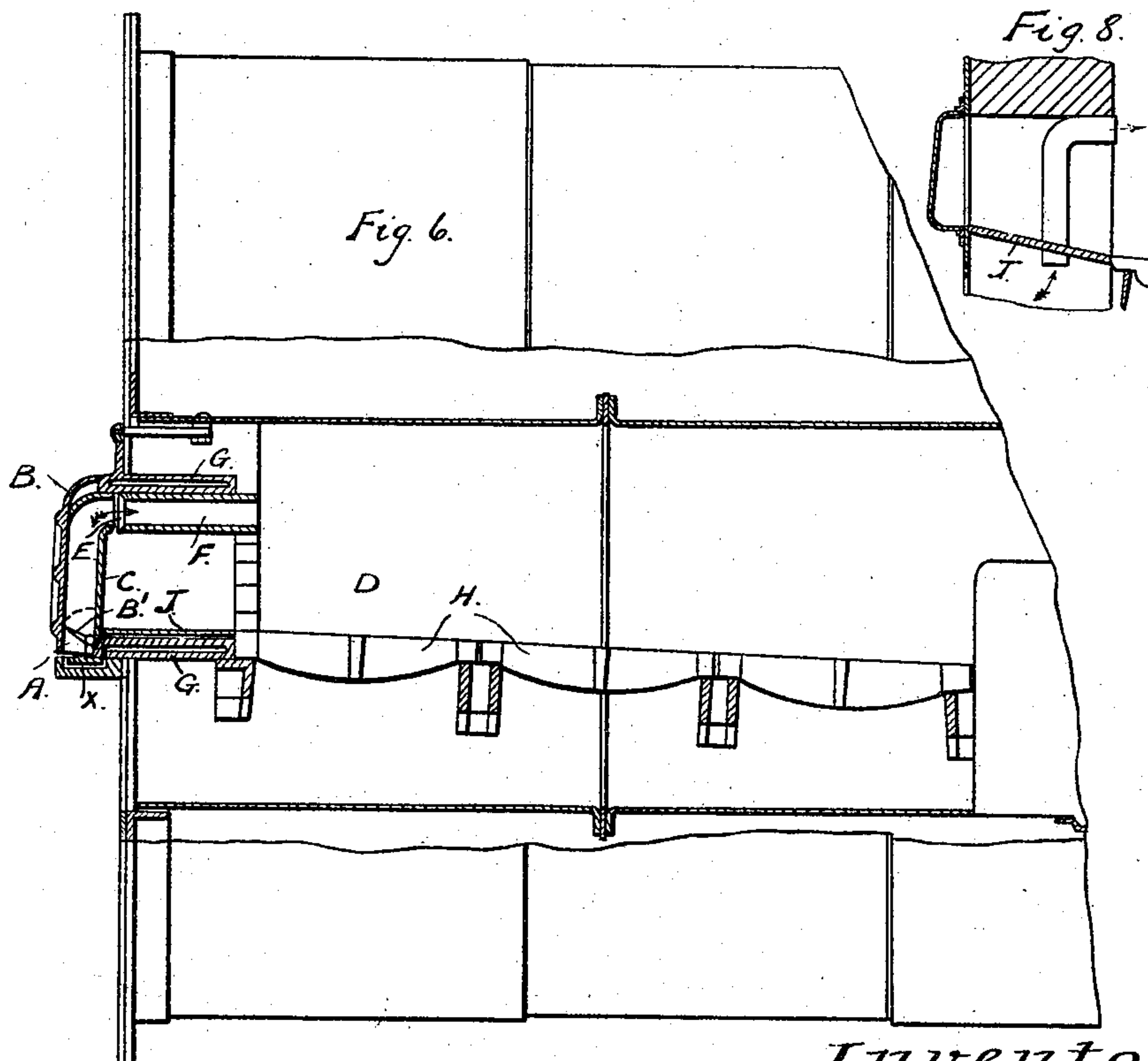
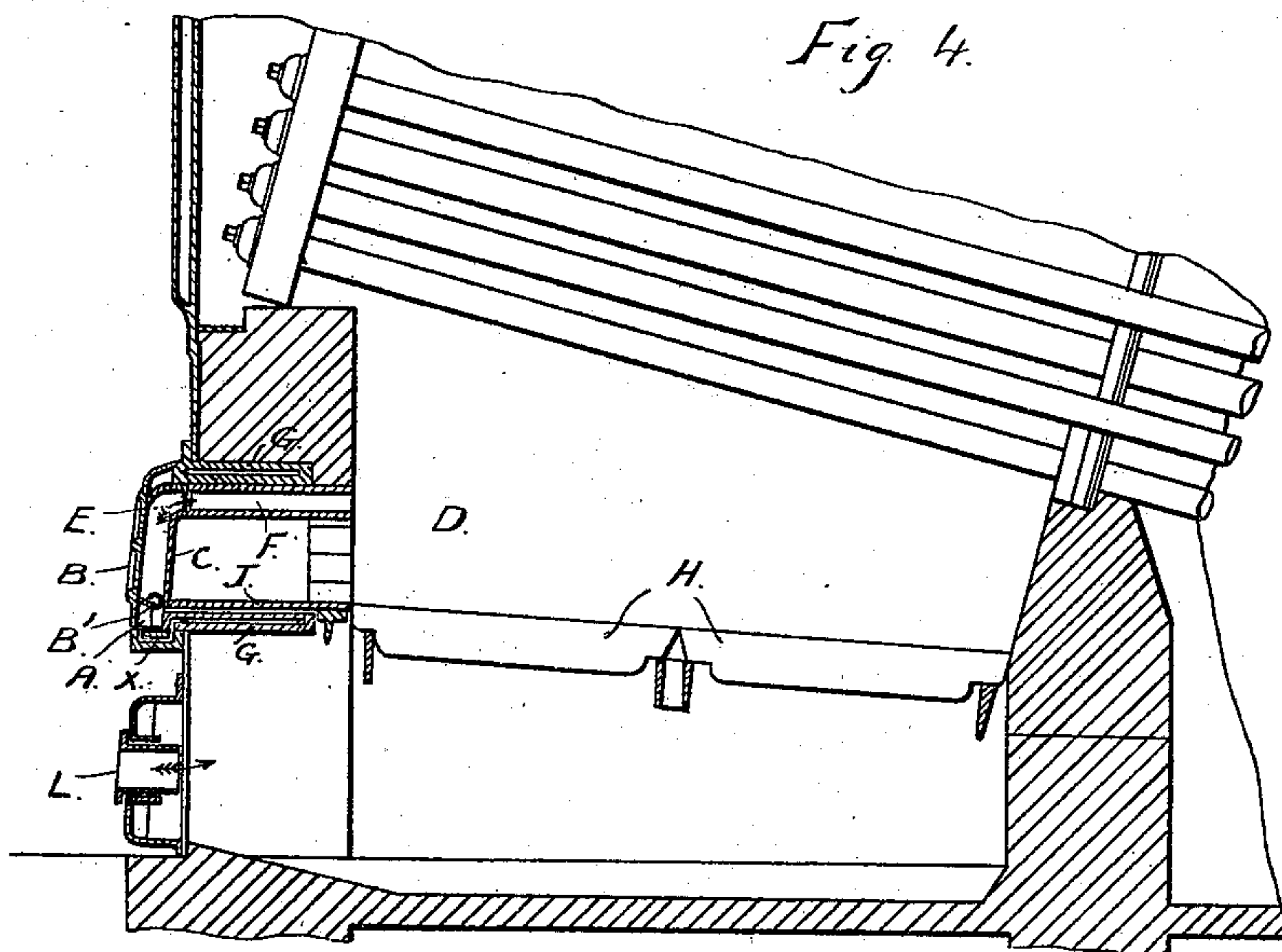
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4 Sheets—Sheet 2.



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Fig. 5.

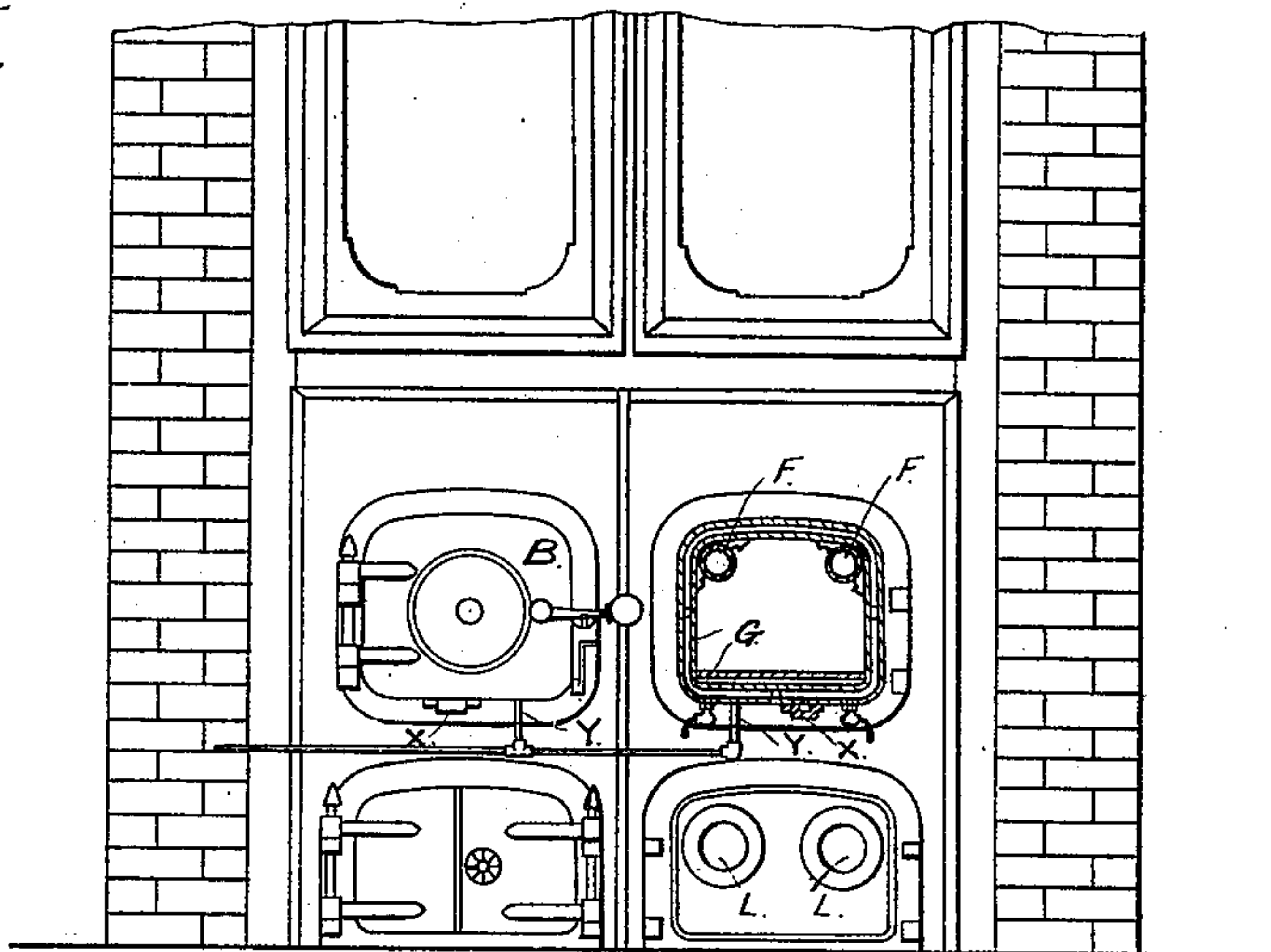
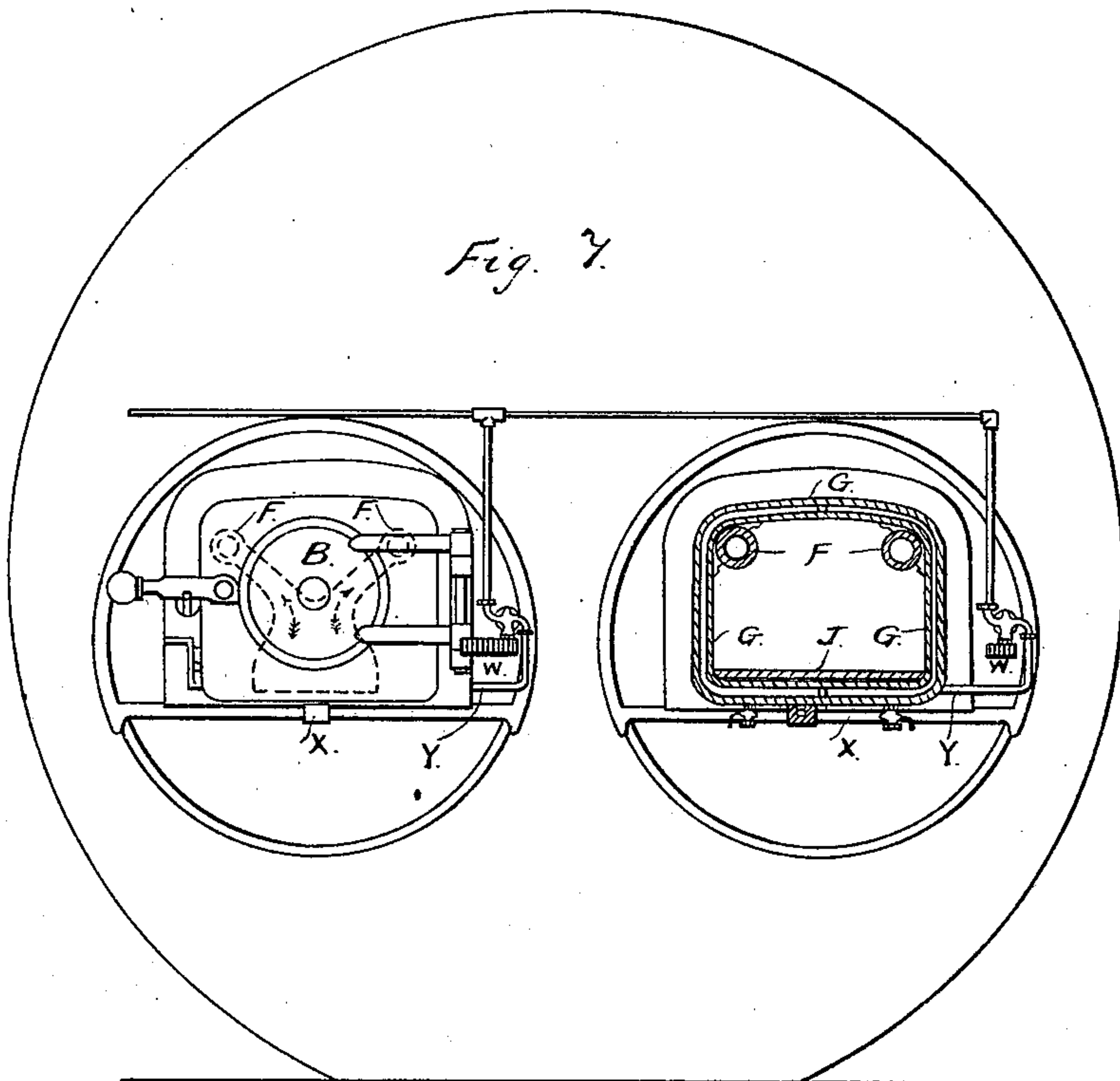


Fig. 7.



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Fig. 10.

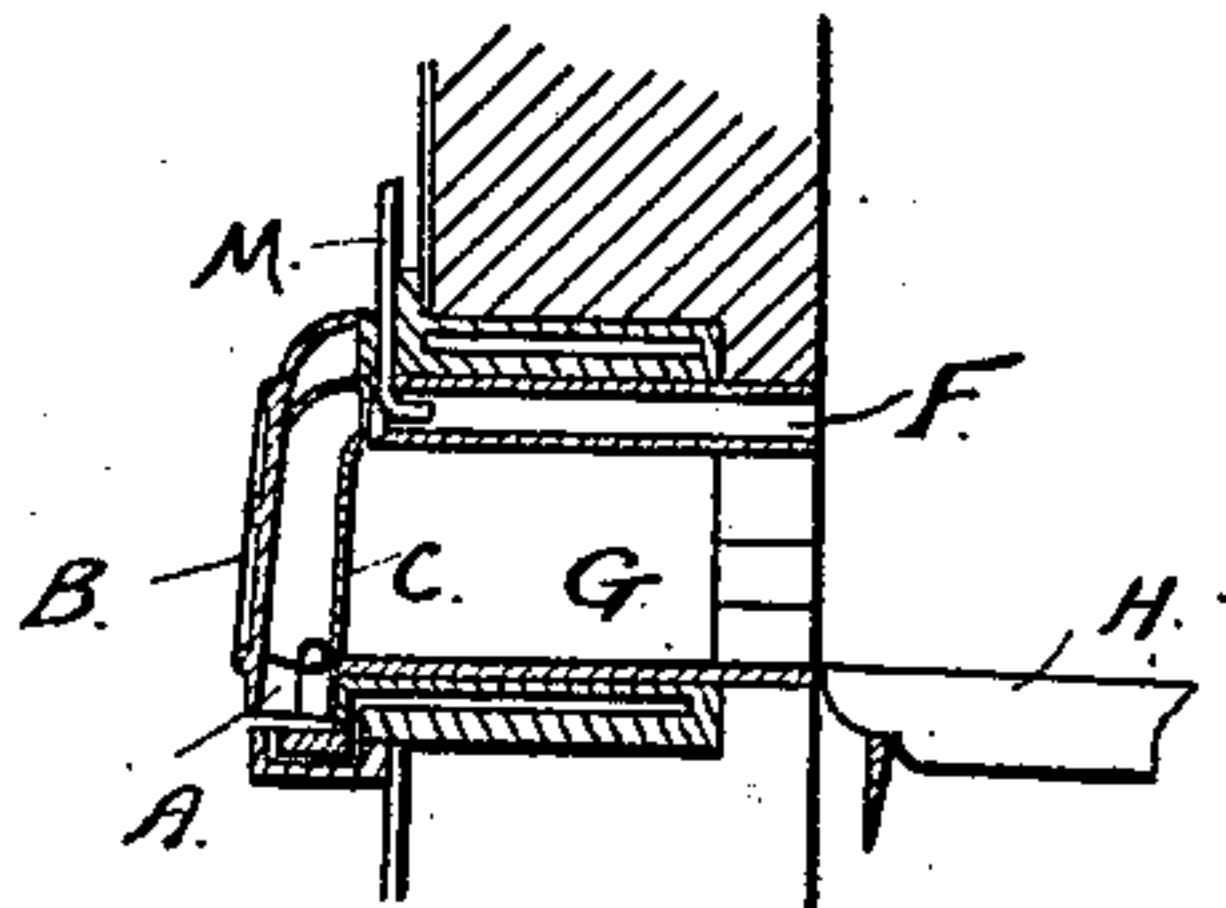


Fig. 9.

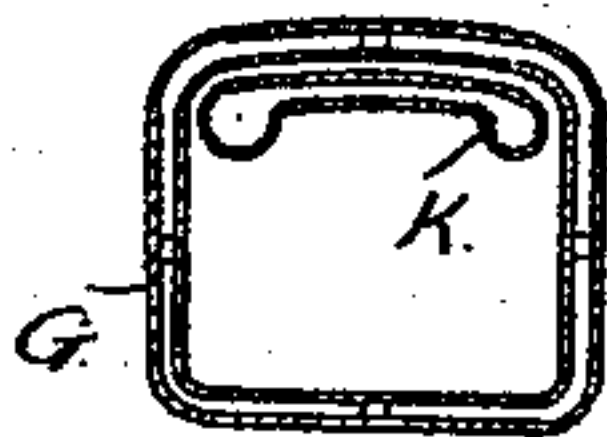


Fig. 9a.

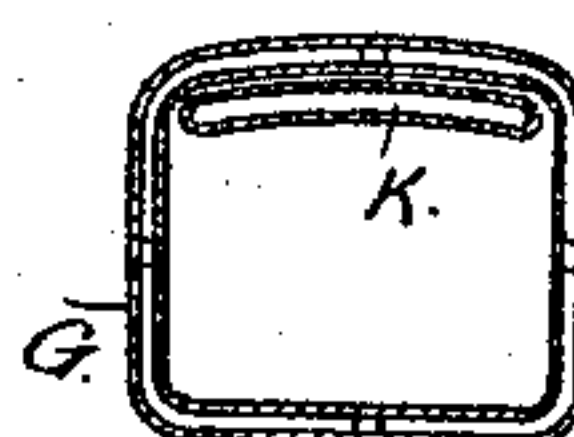


Fig. 11.

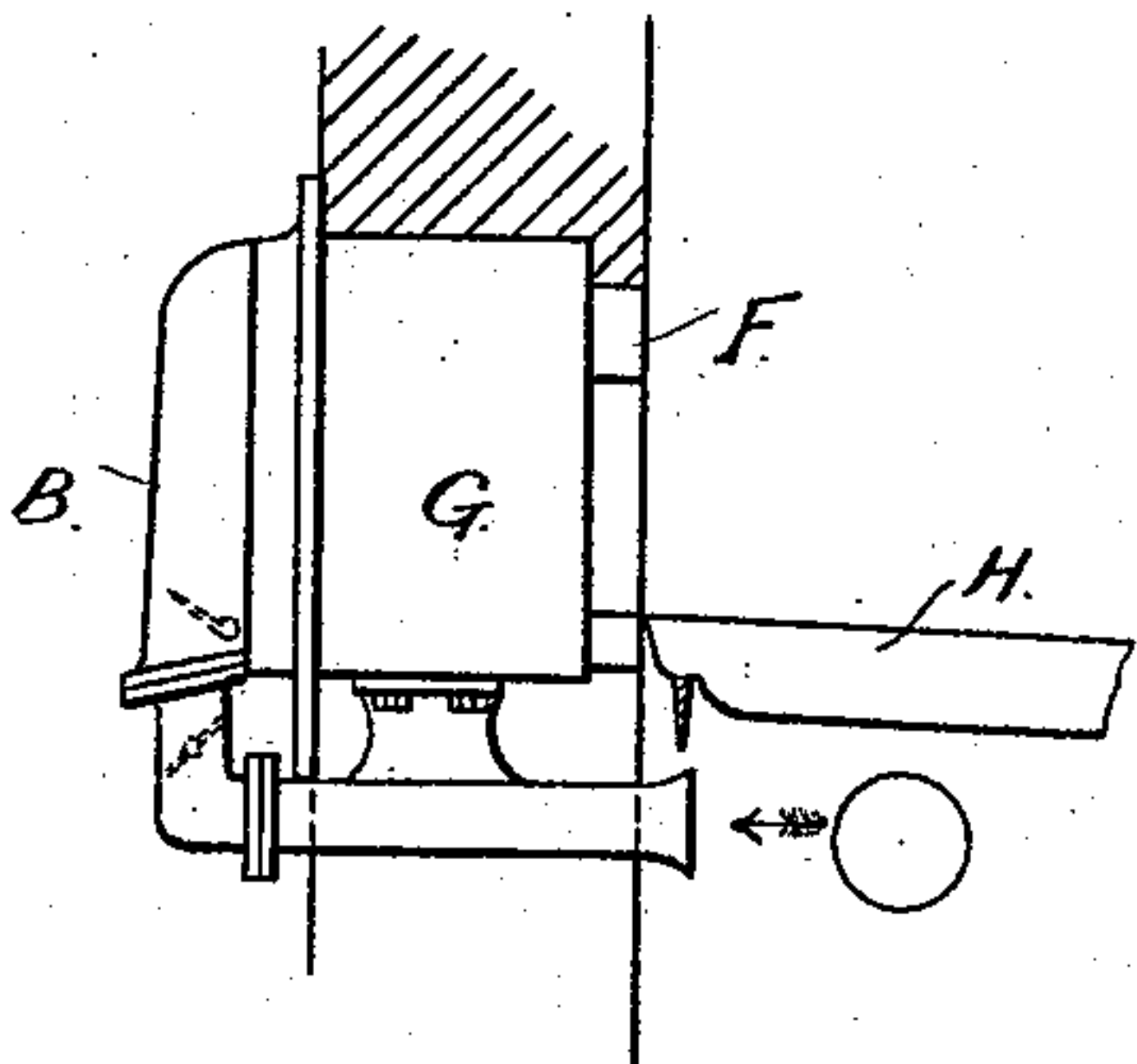
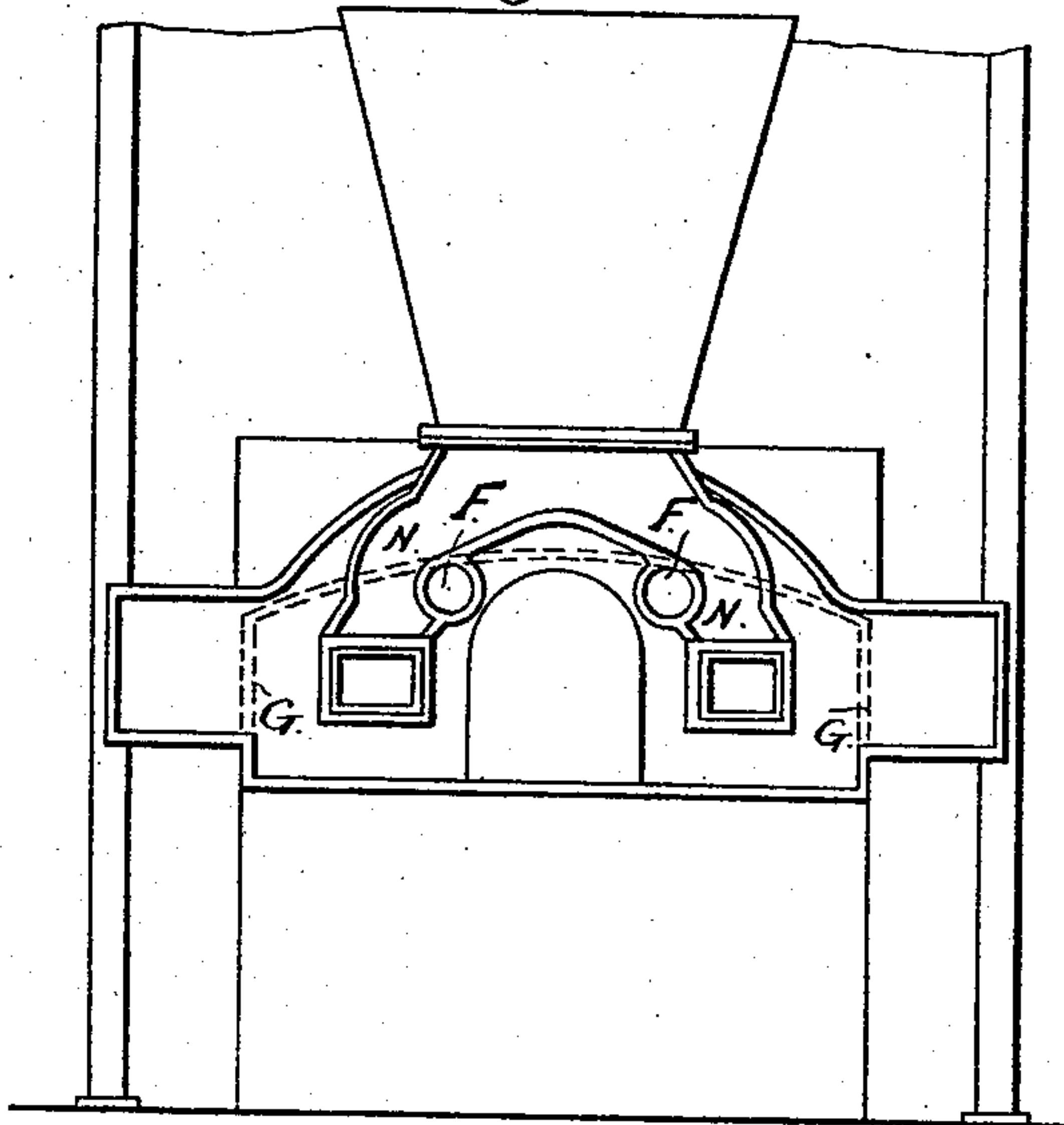


Fig. 12.



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UNITED STATES PATENT OFFICE.

WILLIAM DAVID HAMILTON, OF WHITEINCH, SCOTLAND.

BOILER OR OTHER FURNACE.

SPECIFICATION forming part of Letters Patent No. 614,102, dated November 15, 1898.

Application filed December 27, 1897. Serial No. 663,710. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM DAVID HAMILTON, engineer, of 8 Park Drive, Whiteinch, in the county of Renfrew, Scotland, have invented certain new and useful Improvements in or Relating to Boiler or other Furnaces, (patented in England November 27, 1896, No. 26,939,) of which the following is a specification.

10 This invention relates to boiler and other furnaces; and it has for its object by suitable construction of the fire-door or other parts of the furnace to insure that the inflowing air will be thoroughly mixed with the gaseous products of the fuel and that complete combustion will take place before the fire-gases come in contact with the heating-surfaces.

The invention is illustrated by the accompanying drawings.

20 Figure 1 is a transverse vertical section of the improved furnace fire-door and frame; Fig. 2, a vertical section, at right angles to Fig. 1, of the door-frame; and Fig. 3, a front view of the door. Fig. 4 is a longitudinal section, and Fig. 5 a front view, of part of a Babcock & Wilcox boiler with the improved fire-door fitted thereto. Figs. 6 and 7 are similar views respectively showing the door as applied to an ordinary Lancashire boiler, and 25 Figs. 8; 9, 9^a, 10, 11, and 12 are details and modifications hereinafter referred to.

In carrying out the invention and as illustrated by the drawings under one modification at Figs. 1, 2, and 3 I form a slot or other opening A in the lower or other side of the fire-door B for the admission of air, which passes between the door and a baffle-plate C, secured thereto, until it reaches the upper side of said door B, whence it enters the furnace 35 D by orifices E in the baffle-plate C, communicating with two or more twyers F, along the line *v* shown on Fig. 2, close to the top of the fire-door frame; but when two twyers only are used I prefer to place one at each upper corner of and formed integral with the fire-door frame or fitted in sockets *f* therein, as shown. These twyers F are preferably made conical and may have either their narrow or wide ends toward the fire-door B, according 45 to the conditions of natural draft, and they may be inclined or otherwise formed in rela-

tion to the crown of the fire-door G, the object being to direct the inflowing air down upon the gaseous products as they rise from the fuel and to admit the air entering through the door B at a velocity fully sufficient to overtake the air entering between the fire-bars H and the rising fire-gases. The admission of air may be further regulated by means of a damper B' between the outer plate of the door B and the baffle-plate C. The above-described arrangement permits of the furnace D being fired practically in any manner and close up to the fire-door. The twyers may be fitted with liners F', as shown at Fig. 1, when it is 65 desired to decrease the volume of entering air, and the twyers may either be open at their ends nearest the furnace, as shown, or be closed and have a series of perforations formed therein. 70

A special feature of the invention is the provision for concentrating the air admission at the upper corners of the fire-door in order to secure a swirling action on the fire-gases as they commingle with the air. 75

The twyers, instead of being formed with a straight cylindrical, conical, or other bore, may have a spiral twist on the bore for the purpose of still further imparting a swirling action to the entering air or air and steam. 80

Between the orifices E in the baffle-plate C, communicating with the fire-door B, I may form when desirable a number of smaller orifices or a slit permitting a portion of the inflowing air to enter the furnace by way of the channel formed by the fire-door frame G, these orifices E being formed at the same height as the twyers F and the object being to direct this portion of the inflowing air down upon the fuel lying in the fire-door frame B for the purpose already described, or the twyers may be converted into a single twyer K, delivering a sheet of air through the fire, as shown at Fig. 9^a, or a sheet of air with increased volume at the corners, as shown at 95 Fig. 9.

In order to regulate the air admission by way of the ash-pit, I may, when desirable, close this, excepting at two points which admit of twyers L being inserted, as shown at 100 Figs. 4 and 5, and these twyers may be further fitted with liners, according to circum-

stances, for the purpose of perfectly regulating the admission of air underneath the fire-bars H.

When steam is used to assist the natural draft, I make the fire-door frame G hollow, as shown particularly at Figs. 1, 2, 4, 5, 6, and 7, and cause the steam which is admitted at Y first to traverse backward and forward, as indicated by the arrows, within the door-frame G, thereby drying or superheating it before it is led at X into the space between the door B and its baffle-plate C or into a breeches-pipe I, situated in said space, as shown in dotted lines at Fig. 7, and connected to the twyers F, whence it passes, together with the air, to the interior of the furnace D. When steam is introduced through the bottom of the door, I may place a cock on the steam-pipe in proximity to the fire-door and gear this cock to the hinge, as shown at W, Fig. 7, so that the steam is shut off automatically by the opening of the door.

The steam, instead of being caused to travel between the door B and the baffle-plate C, may be led directly into the twyers F by means of pipes M, led through the fire-door frame G, as shown at Fig. 10.

When forced draft by fan or blower is used, as indicated at Fig. 11, I may form the bottom of the door with an angle having sufficient bearing-surface round the inlet to insure that the door will be practically tight when closed in the usual manner, and the pipe by which the air is forced into the hollow door may also be provided with a damper or throttle-valve.

As an alternative to the above I may lead two pipes up through the dead-plate J at opposite sides of the fire-door frame G, as shown at Fig. 8, or carry two twyers through the front or side furnace-walls immediately above and close to the fire-door B, these twyers or pipes being so situated as to direct

their air-currents upon the fuel and cause the air-currents to be thoroughly mixed with the gaseous products rising from the fuel, or the twyers may be carried directly through the door.

The hollow door may be baffled in order to cause the inflowing air to traverse in zigzag fashion between the door B and its baffle-plate C before entering the twyers, and this is attained by forming the baffle-plate C with projecting vertical or horizontal radiating ribs on the side nearest the door B, which take up the heat from the baffle-plate C and impart it to the entering air.

When the invention is applied to a furnace fitted with a mechanical stoker, the twyers F may be arranged to pass through the stoker N, as shown at Fig. 12.

Having now described the invention, what I claim, and desire to secure by Letters Patent, is—

1. In combination, the furnace-door frame having a steam-chamber encircling the same, the tubular twyers at the upper corners of said frame, and the door having an air-chamber therein, said air-chamber having exit-openings to the twyers, an air-inlet opening at the bottom and a steam-inlet opening also at the bottom communicating with said steam-chamber, substantially as described.

2. In combination in a furnace, with the door-frame, the twyers F and the sockets in which the same are seated, said socket being carried by the frame.

3. In combination in a furnace with the door-frame, the twyers, and the liners F' held within the twyers, substantially as described.

Signed at Glasgow, Scotland, this 15th day of December, 1897.

WILLIAM DAVID HAMILTON.

Witnesses:

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JNO. ARMSTRONG, Jr.