

R. L. WALKER.  
Furnace and Damper Regulators.  
No. 210,649. Patented Dec. 10, 1878.

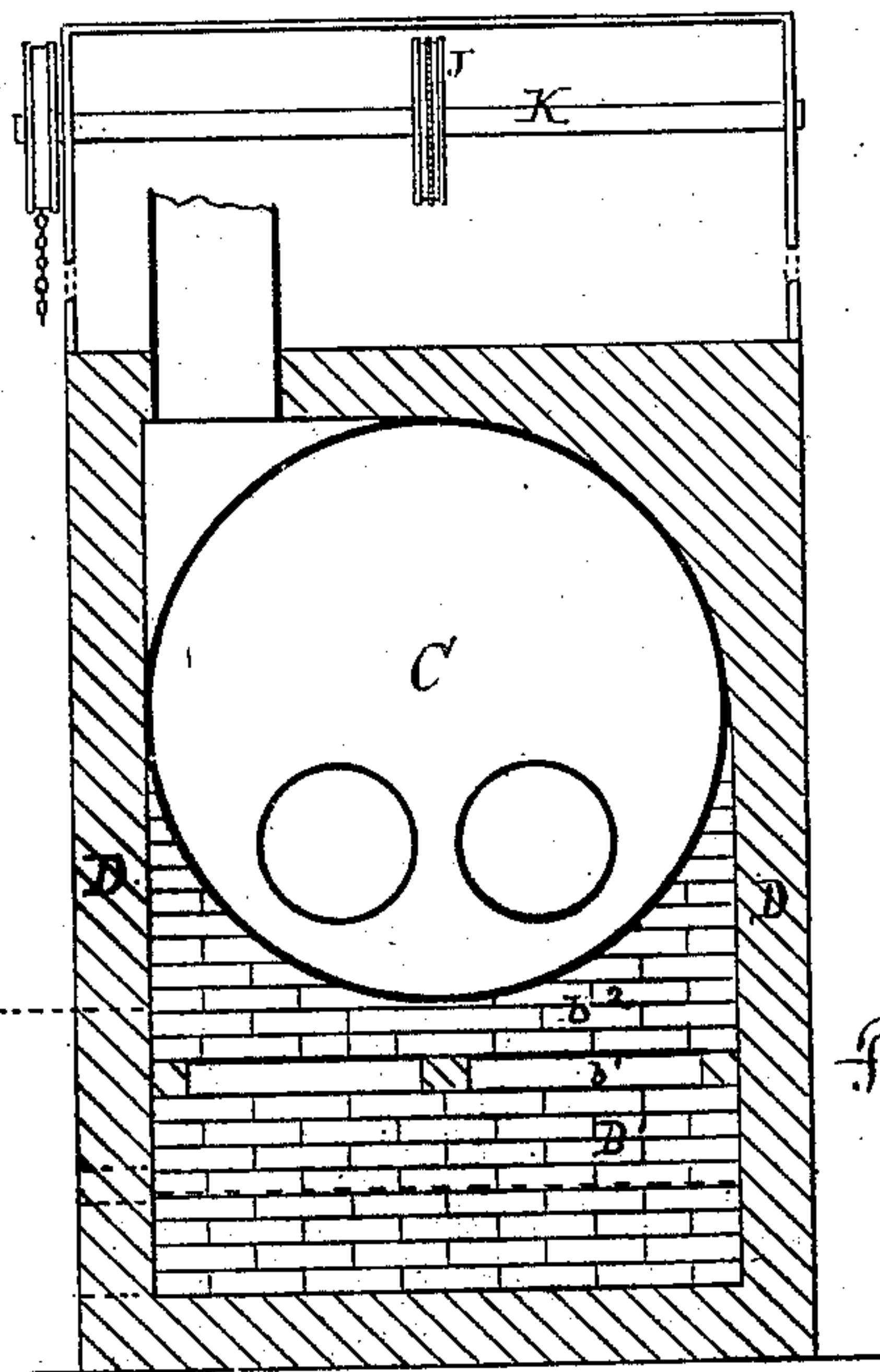


Fig 1.

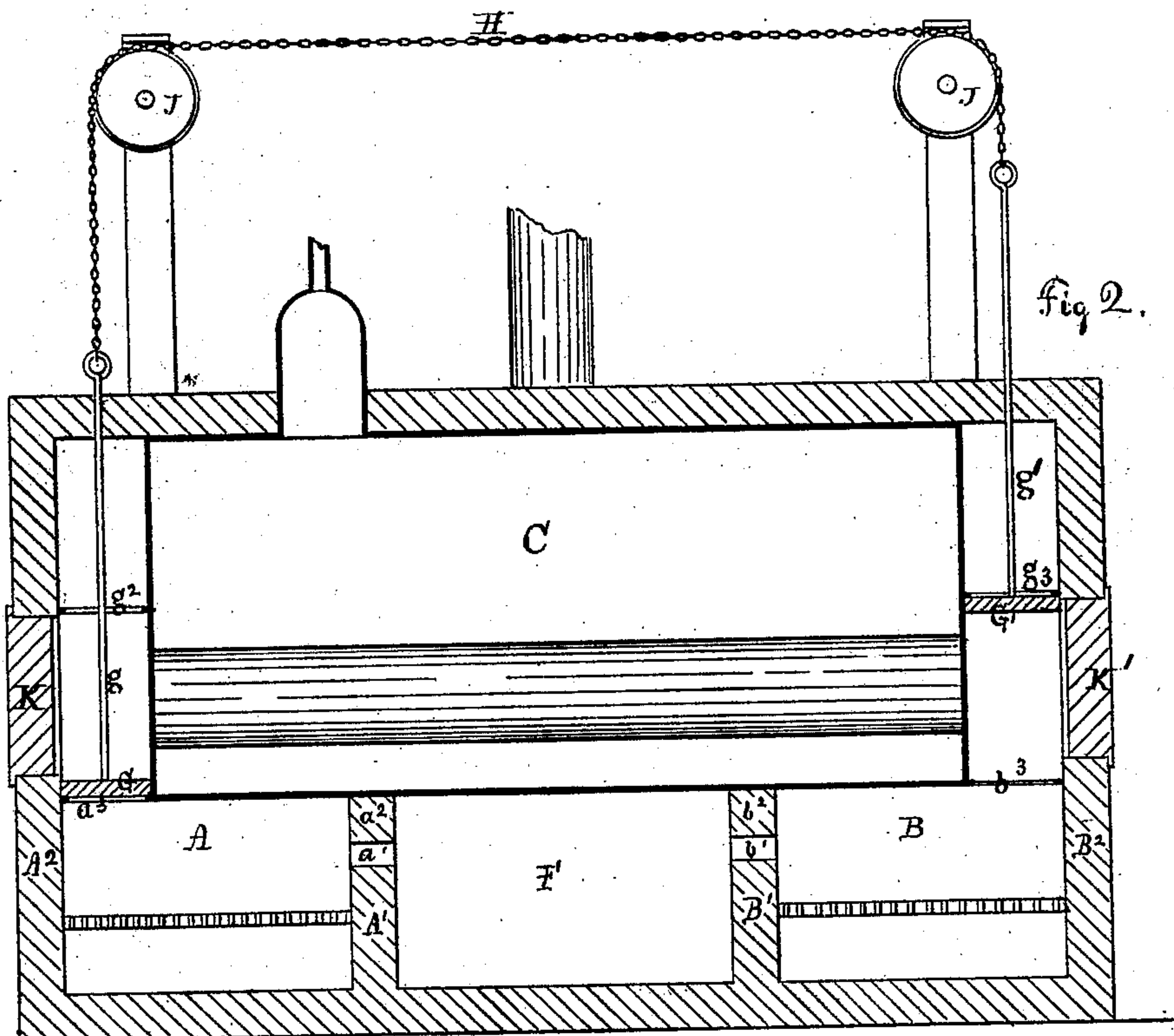
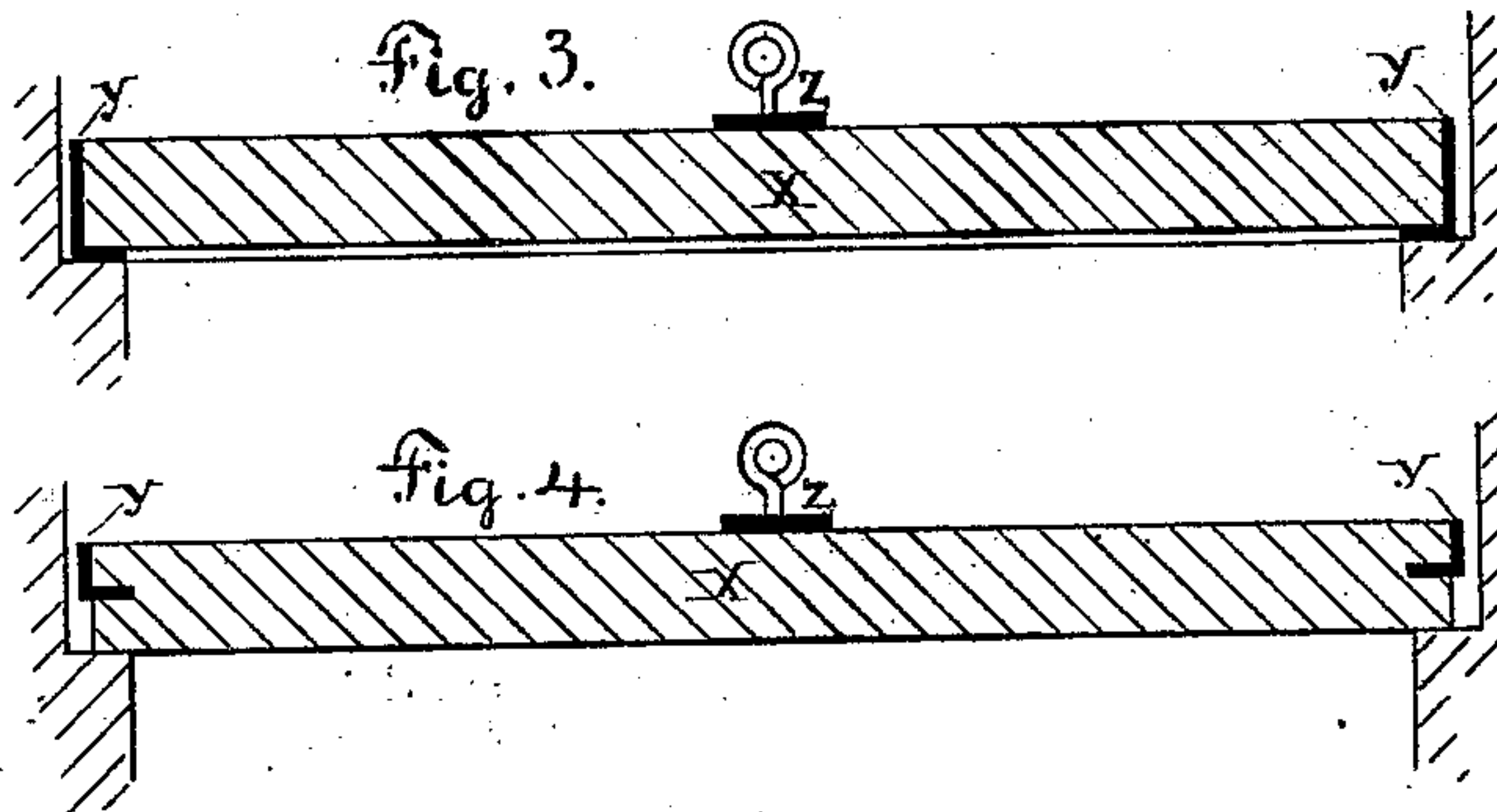


Fig 2.

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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN FURNACES AND DAMPER-REGULATORS.

Specification forming part of Letters Patent No. 210,649, dated December 10, 1878; application filed May 26, 1876.

*To all whom it may concern:*

Be it known that I, ROBERT L. WALKER, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Furnaces and Damper-Regulators, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, making a part hereof.

My present invention relates to certain improvements in the construction of furnaces embodying the invention for which Letters Patent of the United States No. 180,178 were granted to me; and consists, mainly, in a novel arrangement of the dampers for controlling and reversing the draft, and a novel arrangement of the bridge-walls.

In the drawings, Figure 1 is a cross-section of a steam-generator with my improved furnace, and Fig. 2 a lengthwise section thereof.

The fire-boxes A B are covered at the top by the boiler C, at the sides by proper brick-work D, (or by auxiliary heaters, if preferred, in a manner too well known to need description,) and at each end by walls A<sup>1</sup> A<sup>2</sup> and B<sup>1</sup> B<sup>2</sup>, (which may also be auxiliary heaters, if desired,) each of these walls being alternately a bridge-wall, and each have a proper flue, a<sup>1</sup> a<sup>2</sup>, and b<sup>1</sup> b<sup>2</sup>. The bottom of these fire-boxes is formed, as usual, by the grate-bars, and below the grate-bars is the usual ash-pit. The door through which the fuel is introduced I prefer to put upon the side, near the end, of the furnace. When used for other purposes than generating steam the top of the fire-boxes will not, of course, be formed by the boiler, but by brick-work or otherwise, according to the use for which the furnace is adapted. The two bridge-walls A<sup>1</sup> and B<sup>1</sup> also form the ends of an intermediate chamber, F, the sides of which are formed by the brick-work D and the top of the boiler C, or otherwise when the furnace is not part of a steam-generator. The smoke and products of combustion which enter this chamber F can escape from it only through one of the flues a<sup>1</sup> b<sup>1</sup>, and in order to pass through either of these flues must be deflected by the parts a<sup>2</sup> or b<sup>2</sup> and brought near to the fire-surface. This arrangement of the flues a<sup>1</sup> b<sup>1</sup> and parts a<sup>2</sup> b<sup>2</sup> constitutes one important feature of my invention.

The flues a<sup>1</sup> and b<sup>1</sup> are alternately an inlet into the chamber F and an outlet from it, and the flues a<sup>3</sup> and b<sup>3</sup> are alternately an outlet each from its fire-box, but when not serving as such outlet are closed by the dampers G or G'. These dampers are suspended upon the rods g g', and each serves two purposes—namely, first, to close the flue leading from the fire-box, and next, to close the flue leading to the chimney, these latter flues being marked g<sup>2</sup> g<sup>3</sup>. The construction of these dampers is shown in detail at Figs. 3 and 4, in which figures x represents fire-brick, and y angle-iron, the cross-rod z being secured to the angle-iron at its ends. I prefer to use a single brick or tile of the proper size, formed with a groove in its edge, as shown in Fig. 4, or inserted in the angle of the iron, as shown in Fig. 3, instead of using a number of smaller bricks.

The arrangement of the dampers G G' shown in the drawings also constitutes an important part of my invention. It is not only compact and simple, but enables me to counterbalance one damper with the other, and to hang them, as shown in the drawings, by means of a chain, H, passing over the chain-pulleys J J, one of which is arranged upon a shaft, K, which carries also some suitable means by which the attendant can revolve the shaft, and thereby not only lift one damper and lower the other, but bring force to bear upon the lifted damper, so as to force it closely into its place, and thereby effectually close the flue (g<sup>2</sup> or g<sup>3</sup>) to the chimney.

When the dampers are as shown in Fig. 2 the products of combustion from fire-box A pass through the flue a<sup>1</sup>, and in so doing greatly heat the wall A<sup>1</sup>, especially that part of it marked a<sup>2</sup>, above the flue a<sup>1</sup>. From the flue a<sup>1</sup> they pass into the chamber F, and in escaping from this chamber through the flue b<sup>1</sup> they are deflected by that part of the wall B<sup>1</sup> which is above the flue b<sup>1</sup>, and which is marked b<sup>2</sup>, and thus brought down close to the surface of the fire in the fire-box B. From the fire-box B they pass through flue b<sup>3</sup> into and through the tubes of the tubular boiler, (or over the hearth when the furnace is not used as part of a steam-generator,) and thence through the flue g<sup>2</sup> to the chimney. When the damper G' is closed and the damper G

opened, fresh fuel having been added to the fire-box B, the dense smoke and the other products of combustion of soft coal become greatly heated, when they are deflected by the part  $a^2$  and pass through the flue  $a^1$ , and are thereby more effectually consumed.

K  $K^1$  are the tube-doors, for cleaning the flues, and should be protected by fire-brick, as are the dampers G  $G'$ .

What I claim as my invention is—

1. In combination with the fire-boxes A and B, the flues  $a^3 b^3$  and  $g^2 g^3$  and the dampers G  $G'$ , each damper controlling two flues, all as set forth.

2. In combination with the fire-boxes A and B, the flues  $a^1 b^1$  and the deflectors  $a^2 b^2$ , as and for the purpose specified.

3. The combination of the dampers G  $G'$ , rods  $g g^1$ , chain H, and pulleys J J with the flues  $a^3 g^3$  and  $b^3 g^2$ , so that when the dampers close one set of flues the other set of flues will be opened, substantially as described.

4. In a steam-generator, the combination of the fire-boxes A B, flues  $a^1 b^1$ ,  $a^3 b^3$ ,  $g^2 g^3$ , tubular boiler C, and dampers G  $G'$ , all constructed and arranged together as set forth, and so that each damper shall govern two flues, as above described.

ROBERT L. WALKER.

Witnesses:

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BERNARD A. DAVIS.