

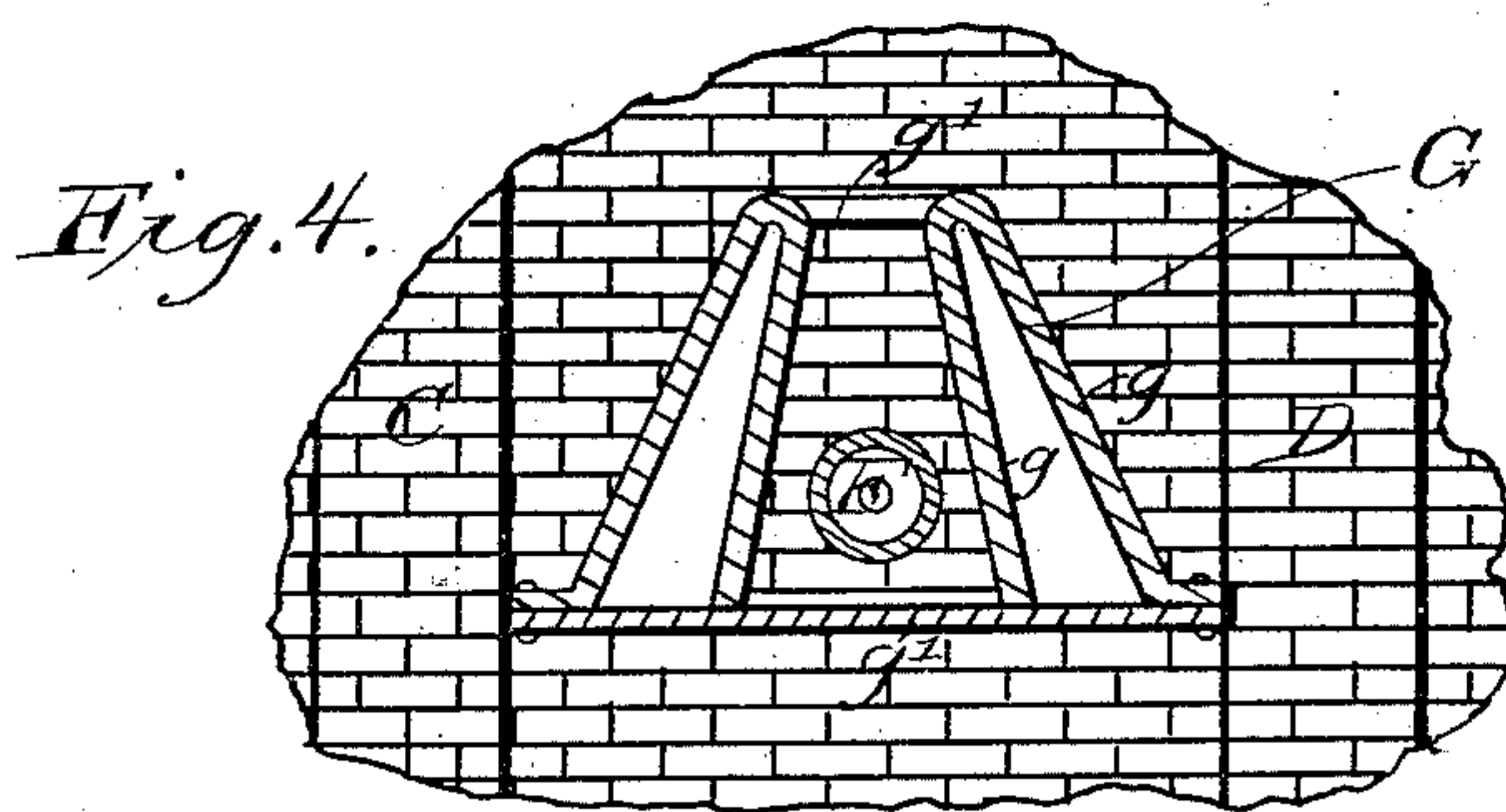
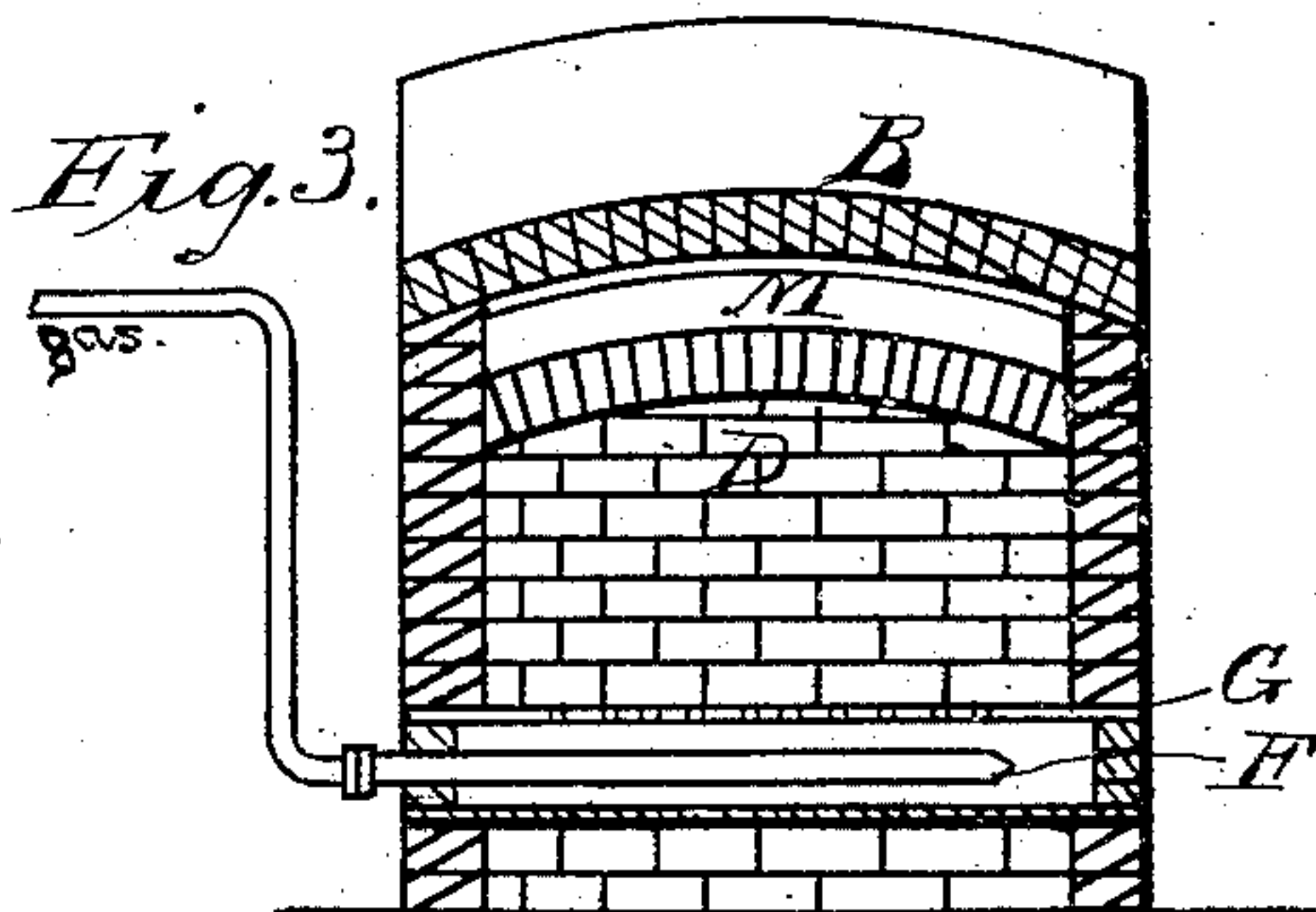
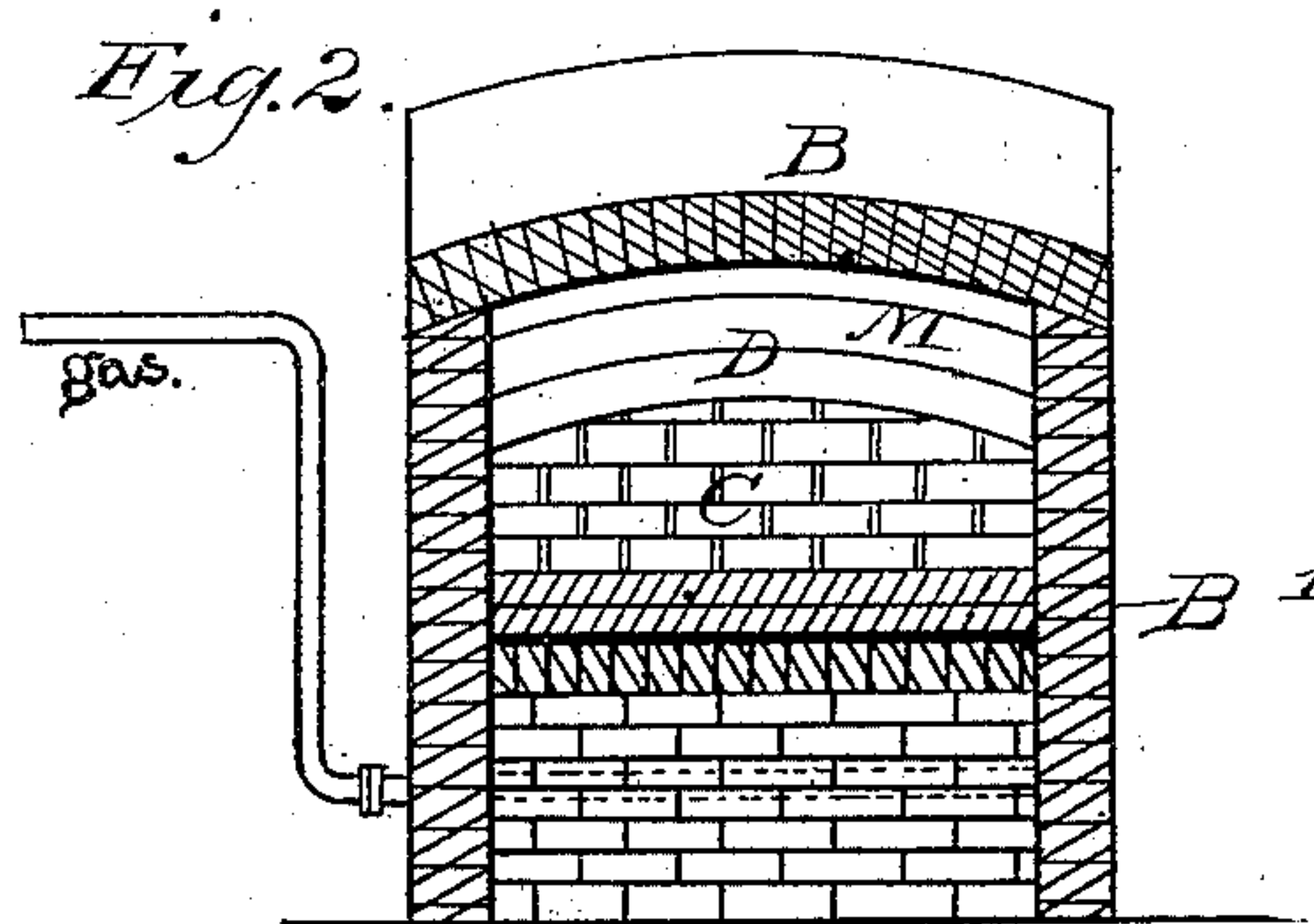
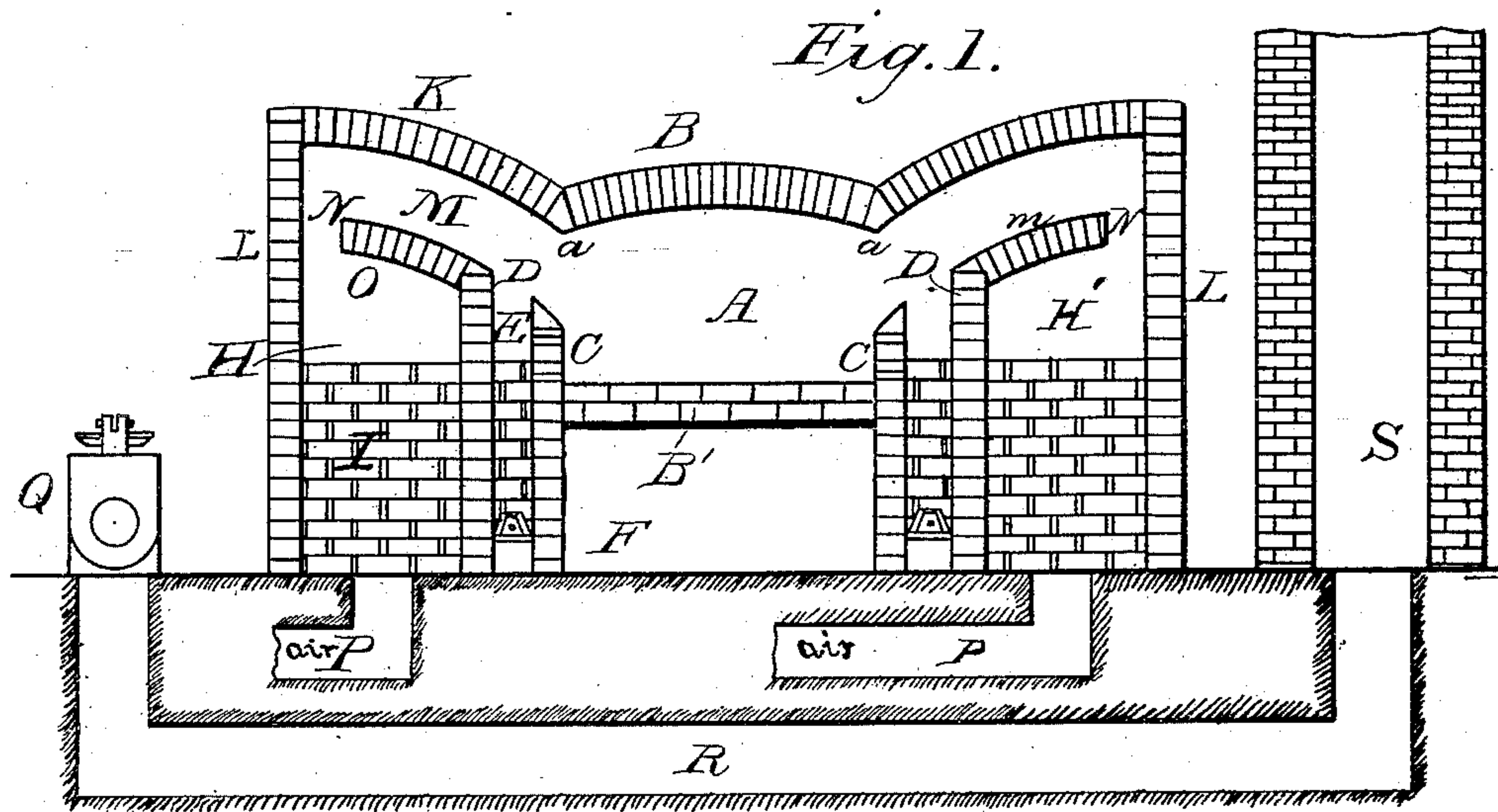
(No Model.)

2 Sheets—Sheet 1.

W. S. McKENNA.
REGENERATOR FURNACE.

No. 314,861.

Patented Mar. 31, 1885.



WITNESSES

Wm. Musser.
Chas. Julian

William S. McKenna INVENTOR
by *Connelly Bros. and Mc Tighe* ATTORNEYS

(No Model.)

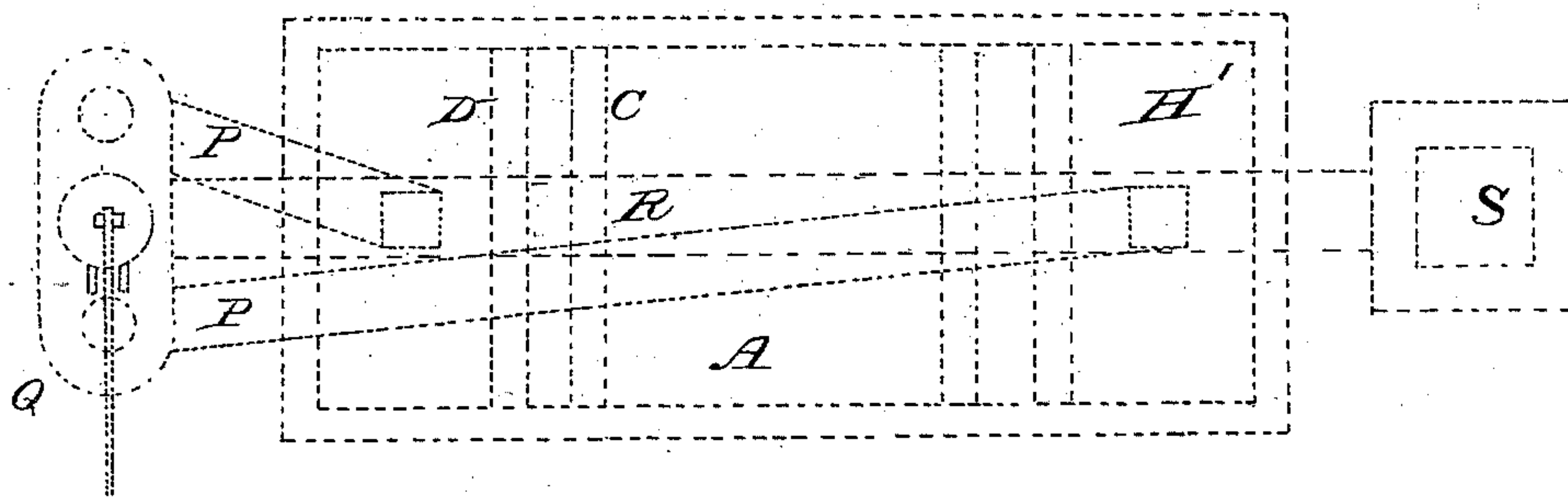
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Fig. 5.



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James Messier.
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UNITED STATES PATENT OFFICE.

WILLIAM S. McKENNA, OF PITTSBURG, PENNSYLVANIA.

REGENERATOR-FURNACE.

SPECIFICATION forming part of Letters Patent No. 314,861, dated March 31, 1885.

Application filed July 8, 1884. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM S. McKENNA, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain
5 new and useful Improvements in Regenerator-Furnaces; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to
10 make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

In regulating furnaces it has been found that natural gas may be economically used as a
15 heating agent, and various methods have been employed with a view to economy and efficiency. Among other methods it has been proposed to lead the gas in below the checker-work on each side of the furnace, mixing it
20 with the air and burning it in its passage through the checker-work. This method is objectionable for the reason that the checker-work is soon burned out by the gas, and for the further reason that the gas is partially
25 consumed before reaching the proper point—*i. e.*, the furnace-chamber. In the method just described, it will be observed, the gas is regenerated with the air in the checker-work. This heating or regeneration of the gas, aside
30 from the danger to the checker-work, caused, as aforesaid, by the burning of the gas, is unnecessary when natural gas is to be had.

My invention has relation to regenerating-furnaces, and has for its object the provision
35 of means for utilizing gas as a heating agent in a more economical and effective manner than has heretofore been done.

My invention has for its further object the provision of means for preventing injury to
40 the checker-work by the flame passing there-through after leaving the furnace.

My invention consists in the novel construction, combination, and arrangement of parts, as hereinafter described, and specifically
45 claimed.

Referring to the accompanying drawings, Figure 1 is a longitudinal vertical section of a regenerating-furnace constructed according to my invention; Fig. 2, a vertical cross-section;
50 Fig. 3, a similar section; Fig. 4, a sectional detail of the device for protecting the side walls

of the gas-opening and the gas-burner from the deleterious effects of heat; Fig. 5, a diagram illustrating the arrangement of the flues.

A designates the main chamber of the heating-furnace, B the top, and B' the bottom thereof, all constructed in the usual manner. 55

On each side of the chamber A is a bridge, C, whose upper portion is lattice or check work, as shown, and whose top is formed with
60 an arch concentric with the lateral arching of the chamber A, and a short distance from bridge C is a wall, D, also arched on top to correspond with the lateral arch of the furnace, but built up solidly, leaving a space, E,
65 between it and the bridge C. Near the bottom of space E, entering at the front of the furnace and extending to or almost to the back thereof, is the gas-pipe, F, and on both sides of said gas-pipe are the double walls of
70 a cooling-flue, G, which will be more fully described hereinafter.

H designates the portion of the furnace containing the checker-work, and I the said checker-work contained therein. K is the top of
75 the checker-work chamber, arched in similar manner to the heating-chamber A and joining the latter at a point, *a*, directly over the bridge-wall C.

In addition to the double arch, the top of
80 the chambers containing the checker-work is slightly inclined from the end wall, L, of the furnace to the top of the heating-chamber. A supplemental arched top, M, is formed in the checker-work chamber H, extending from the
85 wall D to near the end wall, L, leaving a narrow space, N, for the entrance and exit of air. The arch M is concentric with the top H, and is placed some distance above the top of the checker-work, leaving a space, O, over the
90 same, so as to permit of the ready egress of the air from the checker-work.

P designates the air-flue leading to the air-valve or "butterfly" Q at the end of the furnace, and R the flue leading from said air-
95 valve to the stack S. It will be noted that the flues P are beneath the body of the furnace, and that the flue R, leading to the stack, is beneath the flues P P. Referring now to the diagram shown in Fig. 5 of the drawings, where-
100 in H represents one of the checker-work chambers and H' the chamber on the other side of

the furnace, it will be observed that the flues P P from the checker-work chamber lead directly from the center of said chamber to the two ends of the air-valve or butterfly Q, the object of such arrangement being to cause the air to ascend in the middle of the checker-work, thereby insuring an equal distribution of the air to the latter.

Referring now to Fig. 4 of the drawings, illustrating the device for shielding the gas-pipe and the walls contiguous thereto, said device consists of a Λ -shaped box of cast-iron, having double walls $g g$ and bottom plate, g' . The box G extends entirely through the furnace from front to back, being built into the front and rear walls, having its center bricked up around the gas-burner and at the opposite end. The space between the double walls $g g$ is open at each end, and permits of a free circulation of air therethrough. Bars $g' g' g'$ cross over the open top of box G, being cast therewith, at a short distance apart.

The operation of my invention is as follows: The gas being ignited and the air being admitted to, say, the checker-work on the left-hand side of the heating-chamber, the air ascends through the checker-work into the space O and passes through the space N at the end of arch M, and thence along through the space between the arches K and M, striking against and mingling with the burning gas at the point a , forcing the said gas over the bridge-wall C and through the spaces in said bridge to the heating-chamber A. After the gas has done its work in chamber A it passes off between the arches K and M, over the checker-work on the right-hand side of the heating-chamber, down through the slit N at the end of the checker-work, thence through the checker-work to the flue P, and through said flue to the air-valve Q, and thence to the stack S by way of flue R. After a certain interval the air-valve Q is reversed, admitting air to the flue of the right-hand checker-work and connecting the left-hand checker-work to the smoke-flue R. The gas on the left-hand side of the heating-chamber is now turned off, and the gas on the right-hand side is ignited and the direction of the flames through the furnace is reversed, the products of combustion passing off through the checker-work on the left-hand side, thereby heating the same and preparing it for the next reversal of the direction of the air.

It will be observed that the arching of the checker-work and the supplemental arch, the

tops of the two walls and the top of the heating-chamber are all concentric, leaving an arc-shaped space between for the passage of the air and gas. This formation insures an equal distribution of air and gas to all parts of the heating-chamber, and it is therefore of great importance.

Having fully described my invention, I claim—

1. In a regenerating-furnace, the combination, with a heating-chamber having checker-work chambers on each side, and a gas-conveying space between said checker-work chambers and the heating chambers, of main arches and supplemental arches located over said checker-work chambers, and leaving a direct passage between them from the combustion-chamber to the checker-work chambers, said supplemental arches being elevated above the level of the floor of the combustion-chamber, substantially as described.

2. In a regenerating-furnace, the combination, with a heating-chamber, A, having checker-work chambers H H on each side, of flues P P, leading from the centers of said checker-work chambers diagonally to the two ends of an air-valve, Q, substantially as described.

3. In a regenerating-furnace, the combination, with a heating-chamber having an arched top, checker-work chambers on each side, having similarly-arched tops, of a bridge-wall whose tops are arched concentrically with the arch of the heating-chamber, substantially as described.

4. In a regenerating-furnace adapted to use gas as a fuel, the combination, with a gas-pipe, of a box having double walls with air-spaces between on each side of said pipe and in full communication with the external atmosphere, substantially as described.

5. In a regenerating-furnace adapted to use gas as fuel, the combination of heating-chamber A, perforated bridge-wall C, and space E for the reception of gas-conveying pipe F, supplemental arch M, having space N at the end, with checker-work I, flue P, and air-valve Q, all constructed and arranged substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand, this 2d day of July, A. D. 1884, in the presence of two witnesses.

WILLIAM S. McKENNA.

Witnesses:

JOS. B. CONNOLLY,
ALIA A. MOORE.