

(No Model.)

5 Sheets—Sheet 1.

W. H. SMITH.

REGENERATOR GAS FURNACE.

No. 346,508.

Patented Aug. 3, 1886.

Fig. 1.

Fig. 8.

Witnesses:
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(No Model.)

5 Sheets—Sheet 2.

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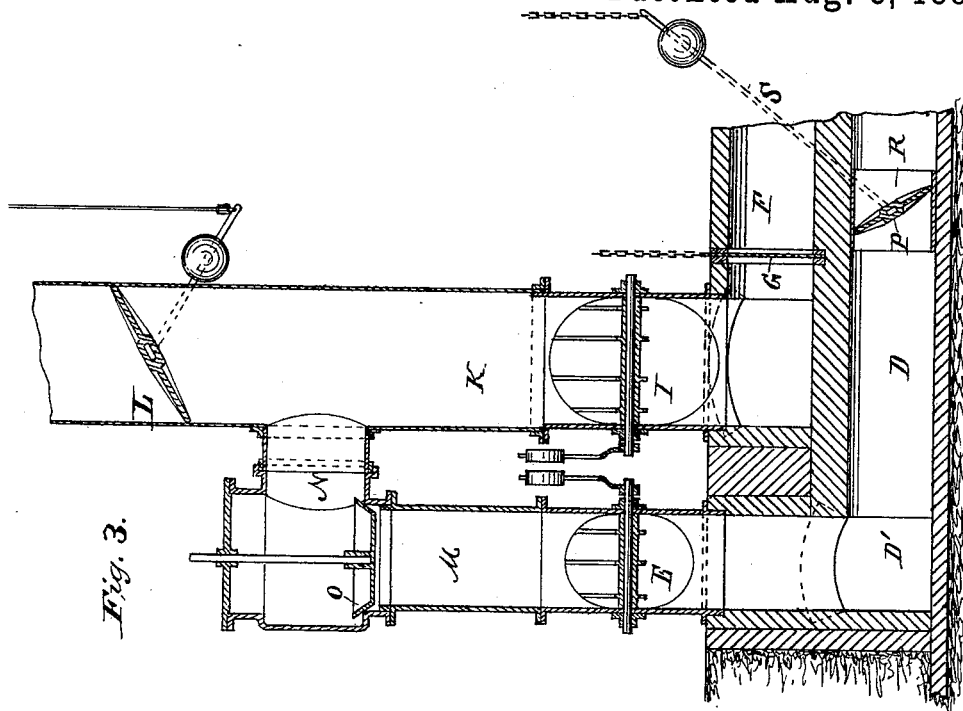


Fig. 3.

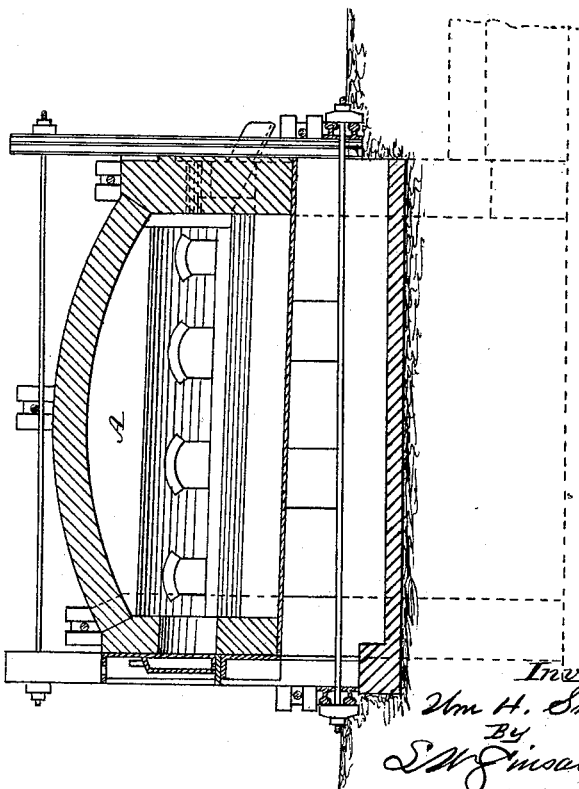


Fig. 2.

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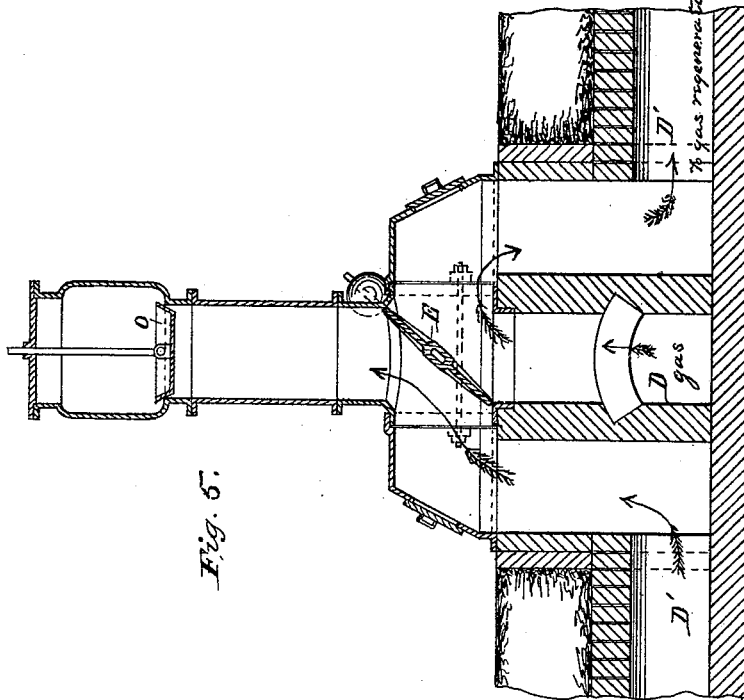


Fig. 5.

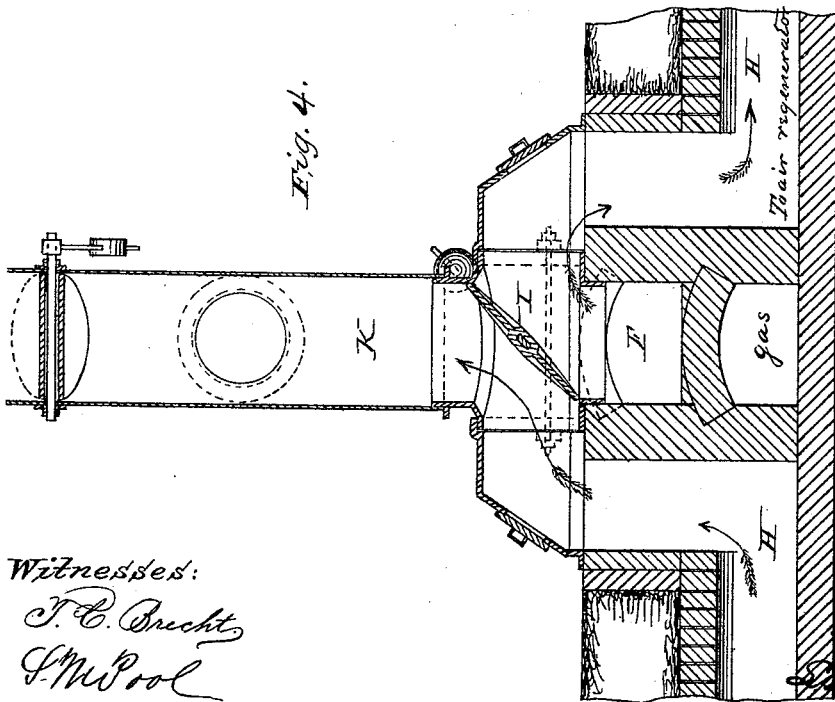


Fig. 4.

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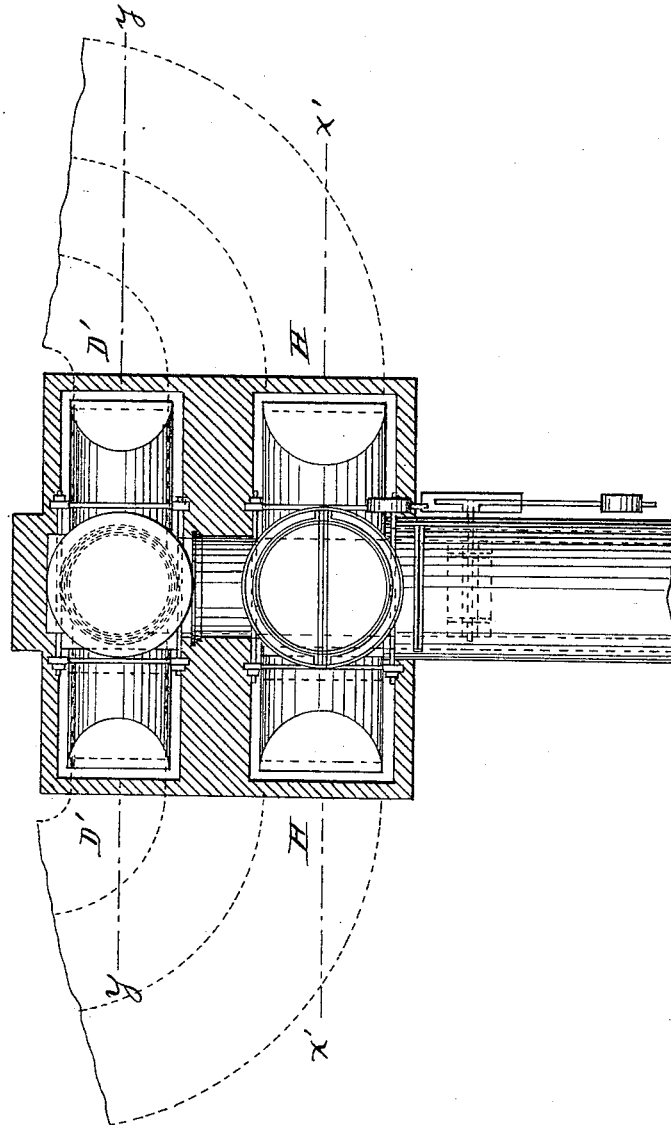
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Fig. 6.



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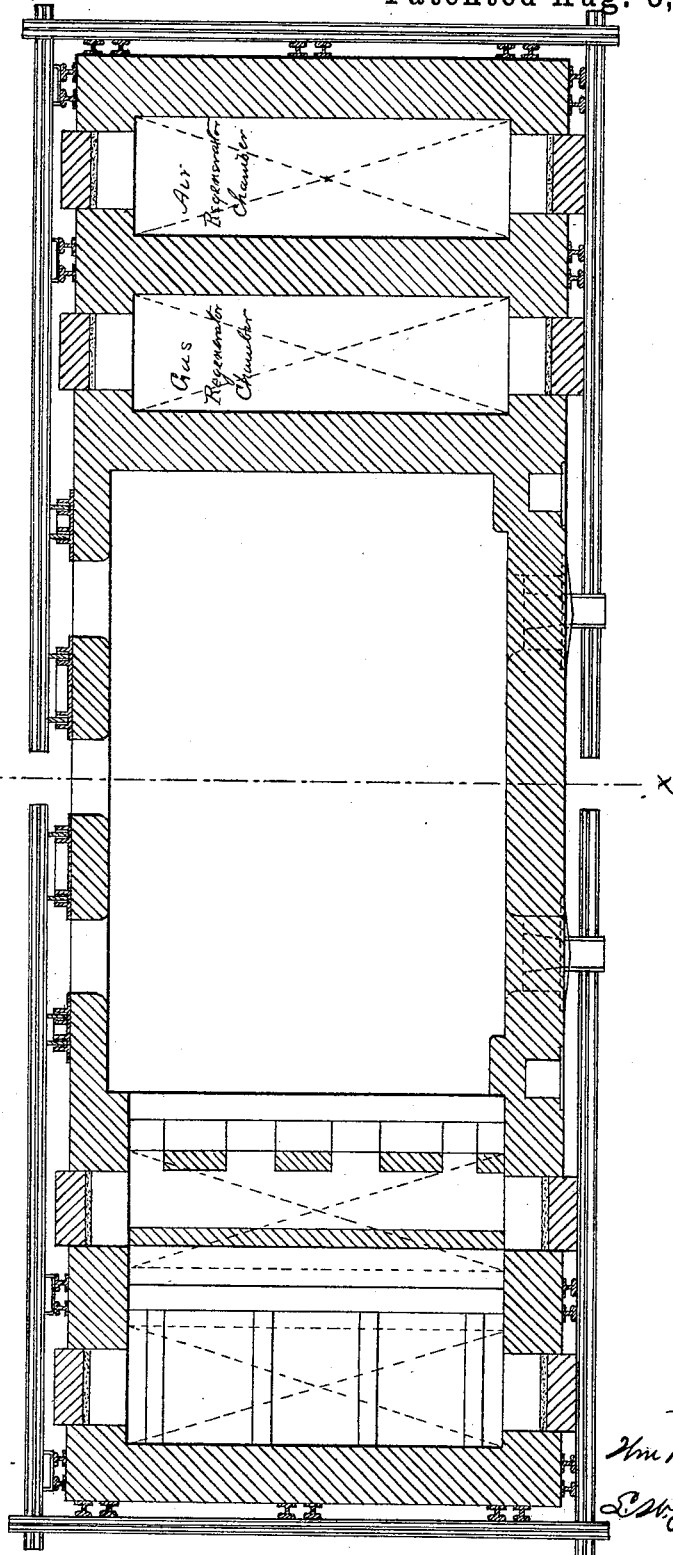
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W. H. SMITH.
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Patented Aug. 3, 1886.

Fig. 7.



Witnesses:

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UNITED STATES PATENT OFFICE.

WILLIAM H. SMITH, OF CANTON, OHIO.

REGENERATOR GAS-FURNACE.

SPECIFICATION forming part of Letters Patent No. 346,508, dated August 3, 1886.

Application filed July 21, 1885. Serial No. 172,182. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. SMITH, a citizen of the United States, residing at Canton, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Regenerator Gas-Furnaces, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to improvements in regenerators for regenerator gas-furnaces and in the arrangement of valves for controlling the ingress and egress of the air and gas to and from the regenerators.

Referring to the drawings, Figure 1 is a longitudinal sectional view of a regenerator-furnace, showing the bricks concave on their under side. Fig. 2 is a sectional view on the line *x x*, Fig. 1. Fig. 3 is a sectional view of the stacks, air and gas ducts, with the valves in their relative positions to the furnace. Fig. 4 is a sectional view of the air-valves and flues on the line *x' x'* of Fig. 6. Fig. 5 is a sectional view of the gas valve and flues on the line *y y* of Fig. 6. Fig. 6 is a top or plan view of the stack, air and gas valves, and air and gas flues in their relative positions to the furnace. Fig. 7 is a longitudinal sectional plan view on the line *z z* of Fig. 1, and the gas and air flues leading from the regenerators to the valves. Fig. 8 is a sectional end view of my regenerator-brick, showing the lower face concave.

A indicates the melting chamber or hearth of a regenerative gas-furnace having the gas-chambers B B located at each end thereof, and the air-chambers C, placed outside of the gas-chambers, as is usual in this class of furnaces, it being understood that the gas and air chambers are filled with regenerator checker-brick of peculiar construction, as will more fully appear hereinafter.

D indicates the flue or conduit leading from the gas-producer (producer not shown) to the valves which control the direction of the gas to either of the gas-regenerators, said flue being built under ground and branching off to form the flues D', which lead to the gas-regenerators at each end of the melting-hearth or combustion-chamber. The object of building the gas-flue under ground is to retain the heat of the gas which has just been made in the generator or producer, and to keep said flue

out of the way, so that the stack can be built on top of it, thus economizing space by diminishing the distance between the producer and the melting-furnace.

The gas-flue D is provided with an ordinary butterfly-valve, E, at a point where the flues D' join the flue D, so that the direction of the gas can be readily changed, as is the customary practice in regenerator-furnaces.

F is an air-flue, the outer end of which is open to the external air, said flue being provided with a damper, G, by which the amount or volume of air admitted can be regulated. The air-flue is divided or branches into two portions, H, which lead to the air-regenerators C of the furnace, said air-flue being also provided with a four-way or butterfly valve, I, by which the direction of the air can be changed, so as to be admitted to the regenerators at either end of the melting-hearth of the furnace. It will be noticed that the air is also introduced on the under side of the valve I. This enables me to keep the air and gas supply flues at a low level, so that the stacks through which the waste products of combustion pass can be built directly over the valves, as in the case of the gas-flues heretofore described.

K is the main stack, which receives the waste products of combustion coming through the air-regenerators, the draft of which is controlled by the damper L.

M is a stack, through which the waste products of combustion coming through the gas-regenerators pass, and communicates with the stack K by means of the connecting-tube N, the draft of which is regulated by the valve O, so that an excess of waste heat from the furnace can be thrown or passed down through air-regenerators when required, so as to heat the bricks in said air-regenerators more highly than the bricks in the gas-regenerators, thereby making a more perfect combustion of the gas and air in the combustion-chamber.

P is a valve or damper for controlling the supply of gas to the furnace, said valve being mounted in suitable bearings in the cast-iron box or frame R, said valve being provided with a lever, S, by which it is operated.

As before indicated, the checker-brick are concave on their under side, said brick being placed in the air and gas regenerator-cham-

bers in the usual manner. The object of making the checker-brick concave, as described, is twofold: first, to obstruct the gas and air on the incoming side, which, in their passage
 5 upward, are checked or pocketed in the concave portions and a higher degree of heat imparted to said air than has heretofore been attained before they come together in the combustion-chamber; and second, the convex surfaces
 10 of the brick forms a vortex as the waste products of combustion are passing out at the other side, which gives to the same a whirling action to free the bricks of soot or other extraneous matter deposited thereon.

15 Although not described nor alluded to before, it is understood that the action of the furnace is the same as others of this class, and that the direction of the air and gas is changed alternately to enter the combustion chamber.

20 Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a system of valves and flues for regenerator-furnaces, the gas-flues leading from the
 25 producer to the regenerators, and the air-supply flues located under ground or below the floor-level, and having the valves which control the direction of the gas and air arranged as described, whereby the air and gas will pass
 30 under said valves, as set forth.

2. In a regenerator gas-furnace, the air and gas valves arranged as described, whereby the products of combustion from the air and gas
 35 regenerators will pass out over the valves and into the stacks located over said valves.

3. In a regenerator gas-furnace, the valves for controlling the ingress of gas and air and the egress of the products of combustion, located in the flues near the floor, in combination with
 40 the stack K M, located over said valves.

4. In a regenerator gas-furnace, a valve placed in the stack over the gas controlling valve capable of being adjusted so as to control the volume of the products of combustion passing
 45 out through the gas-regenerators, whereby the air-regenerators are heated more intensely than the gas-regenerators, as set forth.

5. In a regenerator gas-furnace, one main stack, the bottom of which is secured to the air or gas flue over the valves of the same, and
 50 another stack located over the other flue and its valve, the latter stack being connected to the former or main stack, as described.

6. In regenerator gas-furnaces, the gas and air regenerating chambers of which are filled
 55 with checker-brick, the lower sides of said brick being concave, as described, whereby the air and gas entering the furnace is checked and more thoroughly heated, and the products of combustion passing out of the regenerators
 60 are whirled so as to free the bricks of soot, as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM H. SMITH.

Witnesses:

CHAS. R. MILLER,
 HENRY L. ERDMAN.