

(No Model.)

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W. J. LEWIS.  
REGENERATING FURNACE.

No. 371,334.

Patented Oct. 11, 1887.

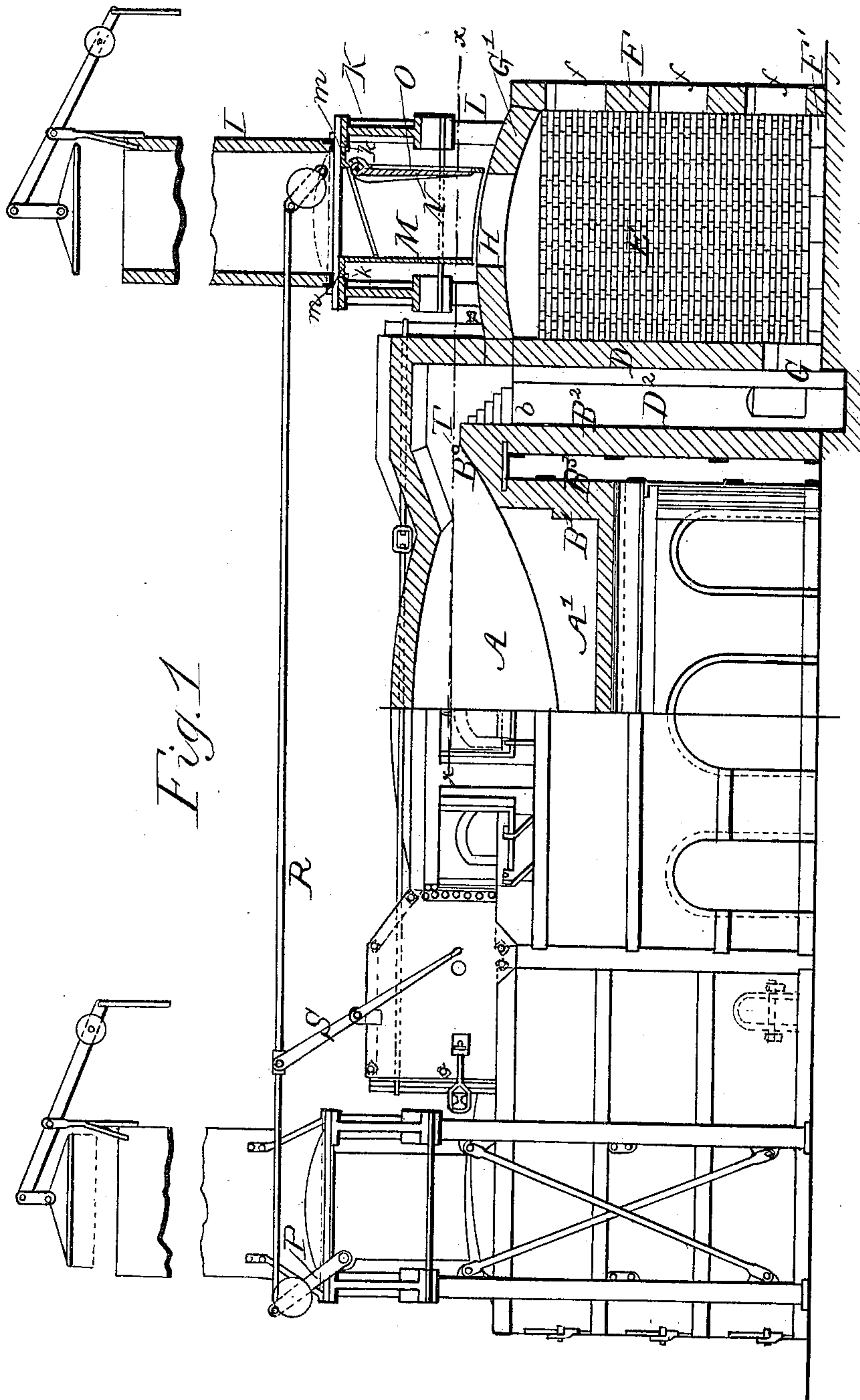


Fig. 1

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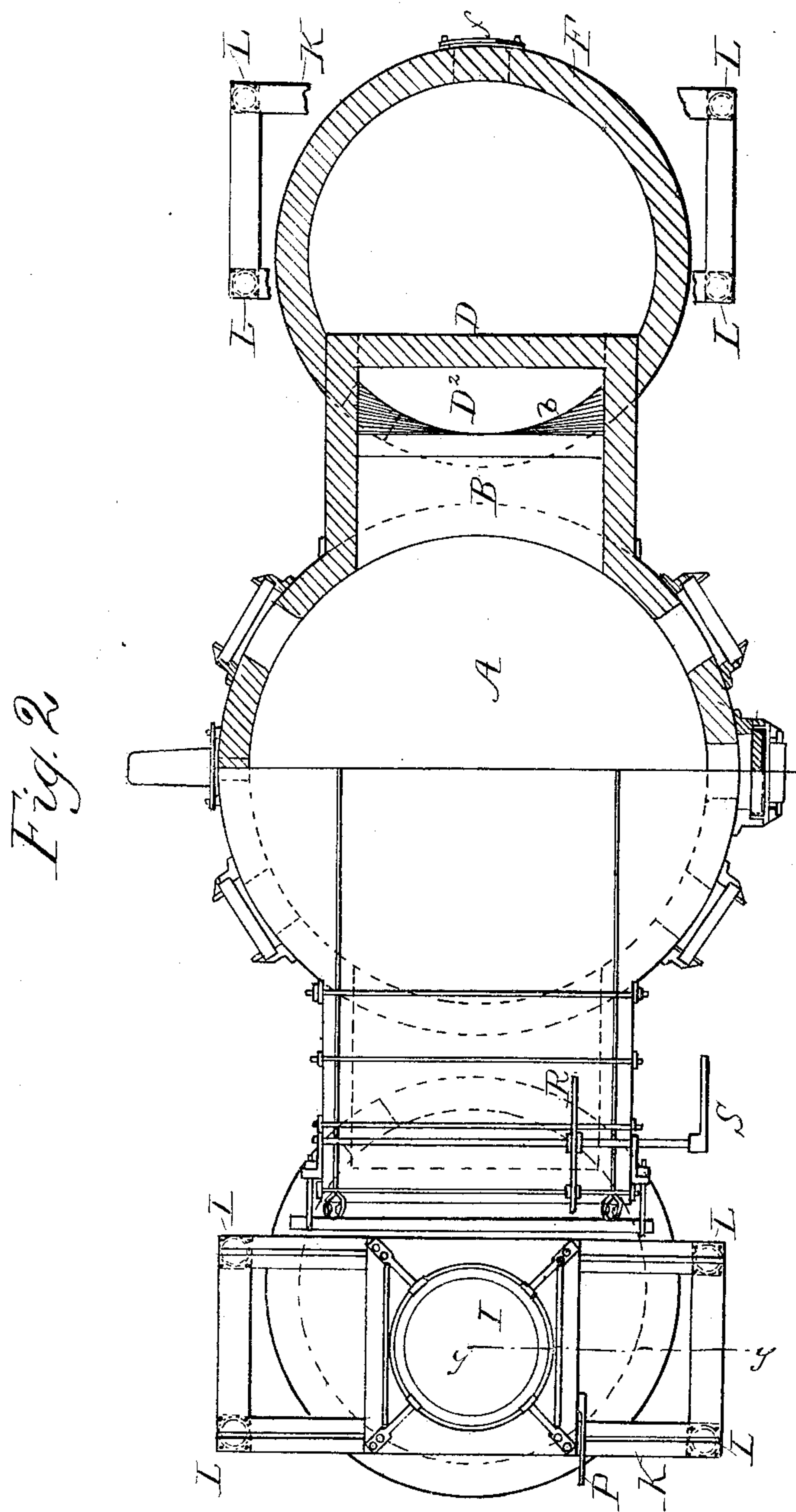
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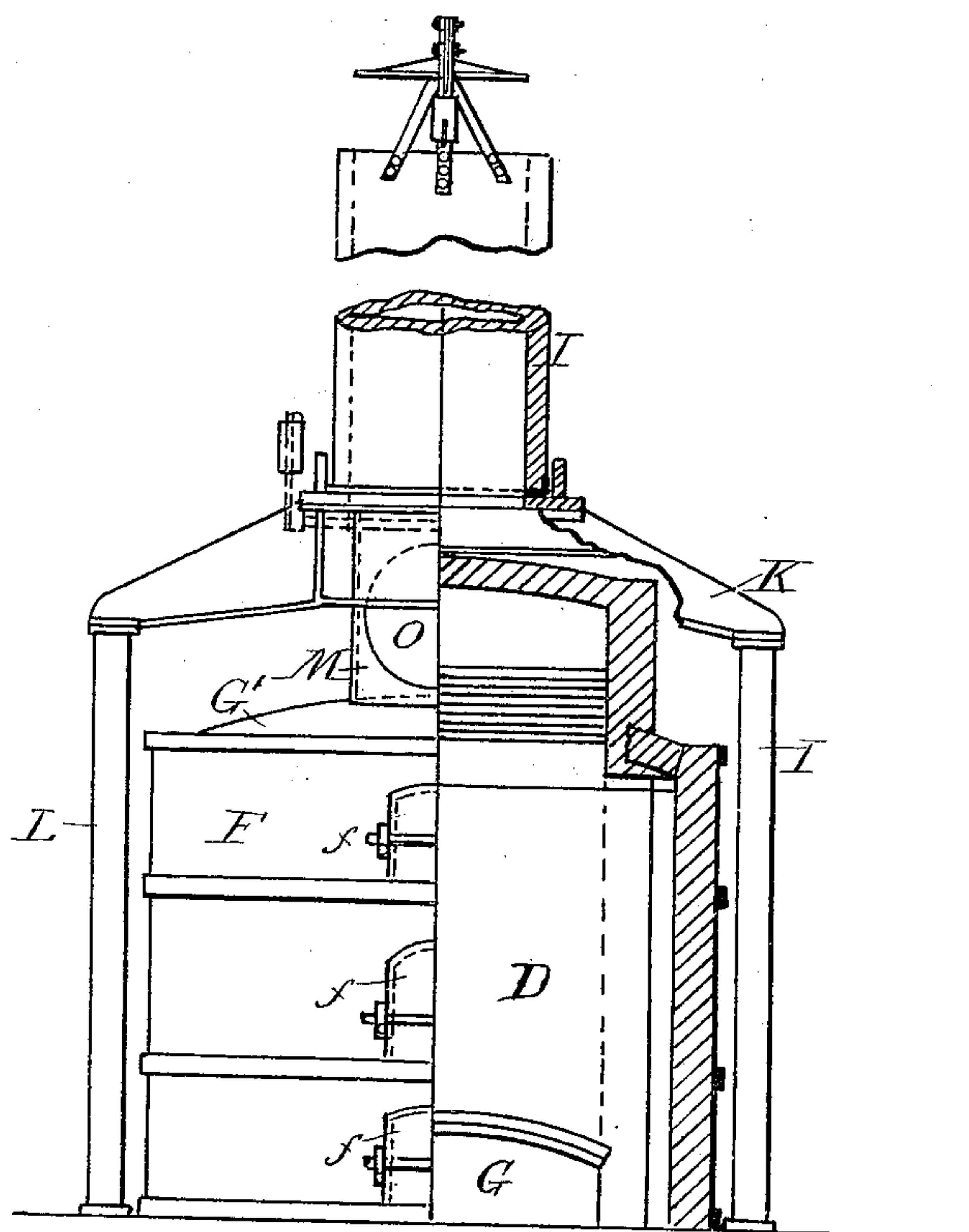
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*Fig. 3*



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# UNITED STATES PATENT OFFICE.

WILLIAM J. LEWIS, OF PITTSBURG, PENNSYLVANIA.

## REGENERATING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 371,334, dated October 11, 1887.

Application filed January 17, 1887. Serial No. 224,641. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM J. LEWIS, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Regenerating-Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, reference being had to the accompanying drawings, which form part of this specification.

This invention has relation to regenerative furnaces wherein a gaseous fuel is employed, and has for its object the provision of means for dispensing with the underground flues ordinarily employed in furnaces of this class.

My invention has for its further object the provision of means whereby the regenerating stoves or chambers and their checker-work, &c., may be removed and repaired, replaced, or altered in construction without necessity of reconstructing or in any way altering the flues and valves whereby the air is conveyed to and the products of combustion from the said stoves or chambers.

My invention has for its still further object the provision of means whereby access may be readily had to the several valves or gates by means of which the ingress of the air and the egress of the products of combustion are governed and regulated.

In regenerative furnaces it has ordinarily been the custom to introduce the air by way of an underground flue to the base of or beneath the checker-work chamber and allow it to ascend through the checker-work in said chamber, across the melting-chamber or hearth, down through the checker-work in the chamber on the other side, and thence through another underground flue to a stack or chimney common to both said flues, a "butterfly-valve" being placed in each said flue or at the point of juncture of said flues with a third flue leading to the stack, and by means of which the operation of reversing the direction of the draft was accomplished.

In carrying my invention into effect I provide two separate and distinct stacks, arranged one over each of the checker-work chambers and supported on columns or other suitable foundation entirely independent of the checker-

work chambers, and below each stack and between the base of the same and the roof of each checker-work chamber I arrange a flue or pipe having a port or opening on one side for the admission of air, and containing a suitable valve or gate, by the operation of which the port in the flue and the opening of the stack may be opened and closed alternately, the said flue and its contained valve being supported by the foundation upon which the stack is erected, and therefore independently of the checker-work chamber. The checker-work chambers are provided with openings in their roofs beneath the stacks and flues and openings at or near the bottoms of the partition-walls, which separate them from the melting-chambers, and when the furnace is in operation the air, entering the port in the side of one of the flues, descends through the checker-work chamber beneath, across the melting-chamber or hearth, and up through the checker-work chamber and into the stack on the other side.

Referring now to the accompanying drawings, illustrating my invention, Figure 1 is an elevation of the furnace with one-half in vertical section; Fig. 2, a top view of the same with one-half in horizontal section on the line *x x* of Fig. 1, and Fig. 3 an end view with one-half in section on the line *y y* of Fig. 2.

A designates the melting-chamber of the furnace, constructed in the ordinary manner and having the hearth A'.

It is to be understood in reading the drawings that on each side of a line dividing the hearth and melting-chamber vertically the several parts are identical, and that, therefore, it will only be necessary to particularly describe the construction and arrangement of parts on one side.

B designates the bridge-wall, consisting of the partition-wall B', which is built upon the foundation or supporting structure of the hearth, and the wall B<sup>2</sup>, which extends up from the ground, an air-space, B<sup>3</sup>, being left between the walls and opening into the space beneath the hearth, as shown.

The wall B<sup>2</sup> is built as a part or continuation of the external wall of the checker-work or regenerating-chamber, and where the said chamber is circular, as is the case in the fur-



nace shown in the drawings, the partition-wall conforms in shape up to the point *b*, where it is corbeled off to join the straight edge of the bridge-wall, as is clearly shown in Fig. 2.

5 D designates the side wall of the furnace, built up a short distance from the partition-wall and leaving the vertical flue  $D^2$  between.

E designates the checker-work, which is constructed in the usual and well-known manner, 10 and is erected upon an arch,  $F'$ , an arched opening,  $G$ , in the base of the wall  $D$  providing for the passage of the air and products of combustion to and from the hearth or melting-chamber.

15 F designates the inclosing external wall of the checker-work chamber and  $G'$  the roof of the same, doors  $fff$  in the wall  $F$  serving to permit the cleaning of the checker-work when necessary.

20 An opening,  $H$ , is formed in the roof  $G$  of the checker-work chamber, and through this opening passes the air for the support of combustion or, on the reversal of the direction of the draft, the products of combustion.

25 I designates the stack, which is mounted on a frame,  $K$ , which in turn is supported by pillars or columns  $L L L L$ . The frame  $K$  extends out slightly beyond the walls of the checker-work chamber and is elevated above the roof of the same, and to the under side of 30 said frame and immediately over the opening in the roof of the checker-work chamber is attached a metallic tube or flue,  $M$ , within

which is arranged a swinging valve,  $N$ , of 35 such size that when in a horizontal position it entirely closes the opening of the stack and when in a vertical position it closes a port,  $O$ , at one side of said tube or flue. Grooved

ways  $k k$  are formed on or attached to the bot- 40 tom of the frame  $K$ , and the tube or flue  $M$ , which is square in cross section, has lateral flanges  $m m$ , which slide in the grooved ways  $k k$ , thus permitting of the ready removal or

45 valve. One of the journals of the valve  $N$  extends outside the flue  $M$ , and to the journal is attached a lever  $P$ , that is in turn connected to a rod,  $R$ , that extends across the furnace and is attached at its other end to the 50 lever of the valve on the other side of the furnace. The connection of the valves by the rod  $R$  is such that when the valve on one side of the furnace is closing the stack and opening the port in the side of the flue the valve 55 on the other side will close the port in the flue and open the stack.

A suitable lever-handle,  $S$ , is attached to the rod  $R$  at a convenient point; so that the valves on each side may be operated simul-

taneously when it is desired to change the di- 60 rection of the draft through the furnace.

Operation: Gas being supplied to the furnace by a pipe or burner,  $T$ , situated just above and slightly forward of the bridge-wall  $B$ , on each side, and being ignited, passes into 65 and burns in the melting-chamber  $A$ . The products of combustion pass over the bridge-wall down through the space  $D^2$ , through the arched opening  $G$  up into the tube or flue  $M$ , and thence up through the stack. When the 70 checker-work on that side through which the products of combustion have been passing is sufficiently heated the gas is turned off from the burner first lighted and turned on and ignited at the burner on the opposite side. At 75 the same time the valves  $M M$  are operated through the medium of the rod  $R$ , thereby closing the opening of the stack through which the products of combustion have just been passing and opening the port in the tube or 80 cylinder on the same side and opening the stack and closing the air-opening on the other side of the furnace. The air now passes down through the heated checker-work on one side and the products of combustion pass up 85 through the checker-work on the other side, thereby heating the second chamber and preparing it for the next reversal of direction of the draft.

Having fully described my invention, I 90 claim—

1. In a regenerating-furnace, the combination, with a checker-work chamber, a stack located above the same, and a flue connecting the said stack and checker-work chamber, of 95 a valve hinged within said flue and adapted to alternately close the entrance to the stack and an opening in the side of the flue, substantially as described.

2. In a regenerating-furnace, the combina- 100 tion, with the melting-chamber and a checker-work chamber communicating therewith, of a stack located above said checker-work chamber and connected thereto by a flue having a valve, said stack and flue being supported 105 upon a foundation separate from the foundation of the checker-work chamber, whereby the latter may be altered or replaced without interfering with the stack or flue, substantially as described. 110

In testimony that I claim the foregoing I have hereunto set my hand this 4th day of January, 1887.

WILLIAM J. LEWIS.

Witnesses:

JOHN F. ATCHESON,  
JOS. B. CONNOLLY.