

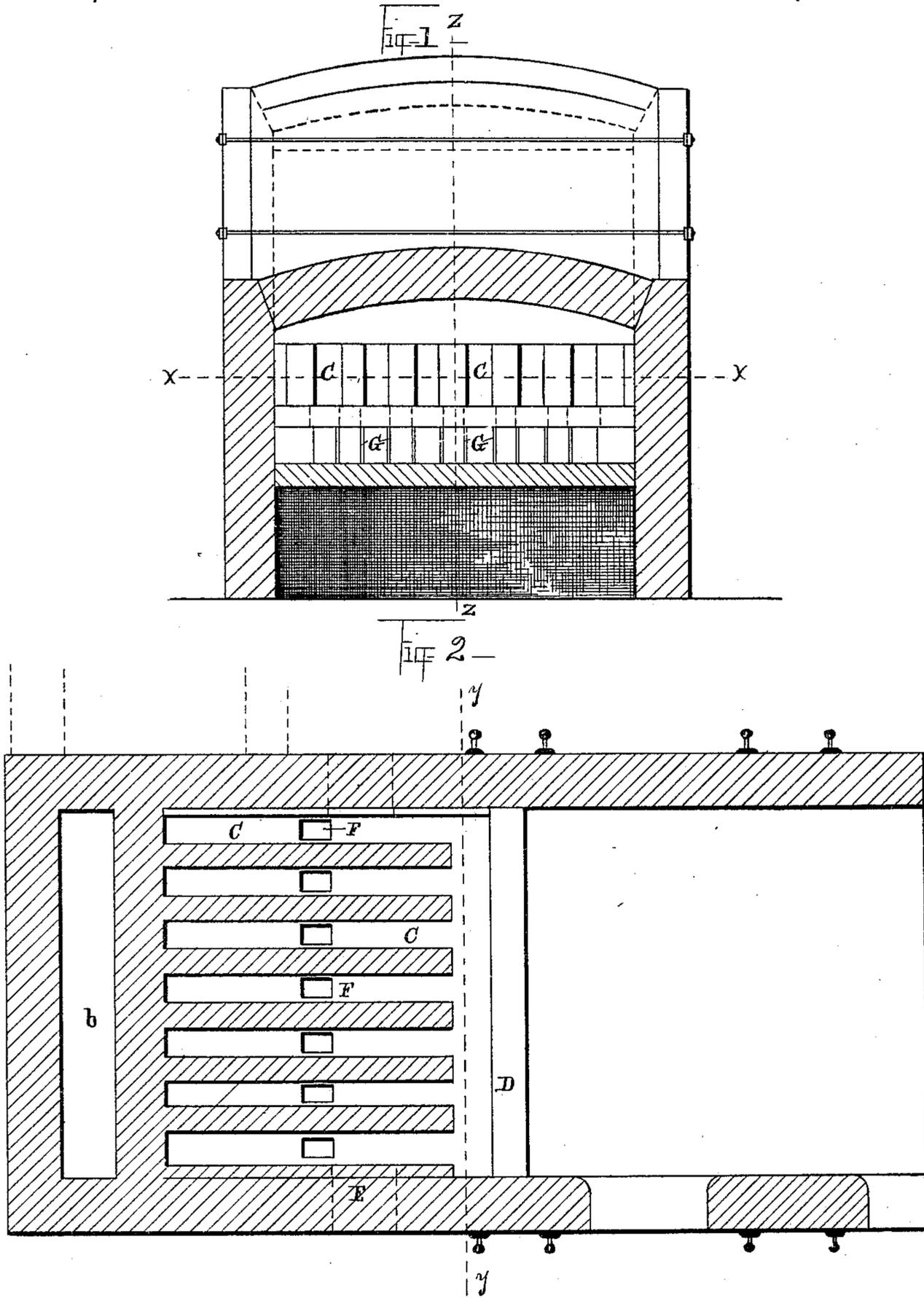
(No Model.)

2 Sheets—Sheet 1.

A. YOUNGER.  
REGENERATIVE HEATING FURNACE.

No. 414,274.

Patented Nov. 5, 1889.



Witnesses  
A. H. Fay  
J. D. Fay

Alexander Younger Inventor  
By his Attorney  
Thos. B. Hall

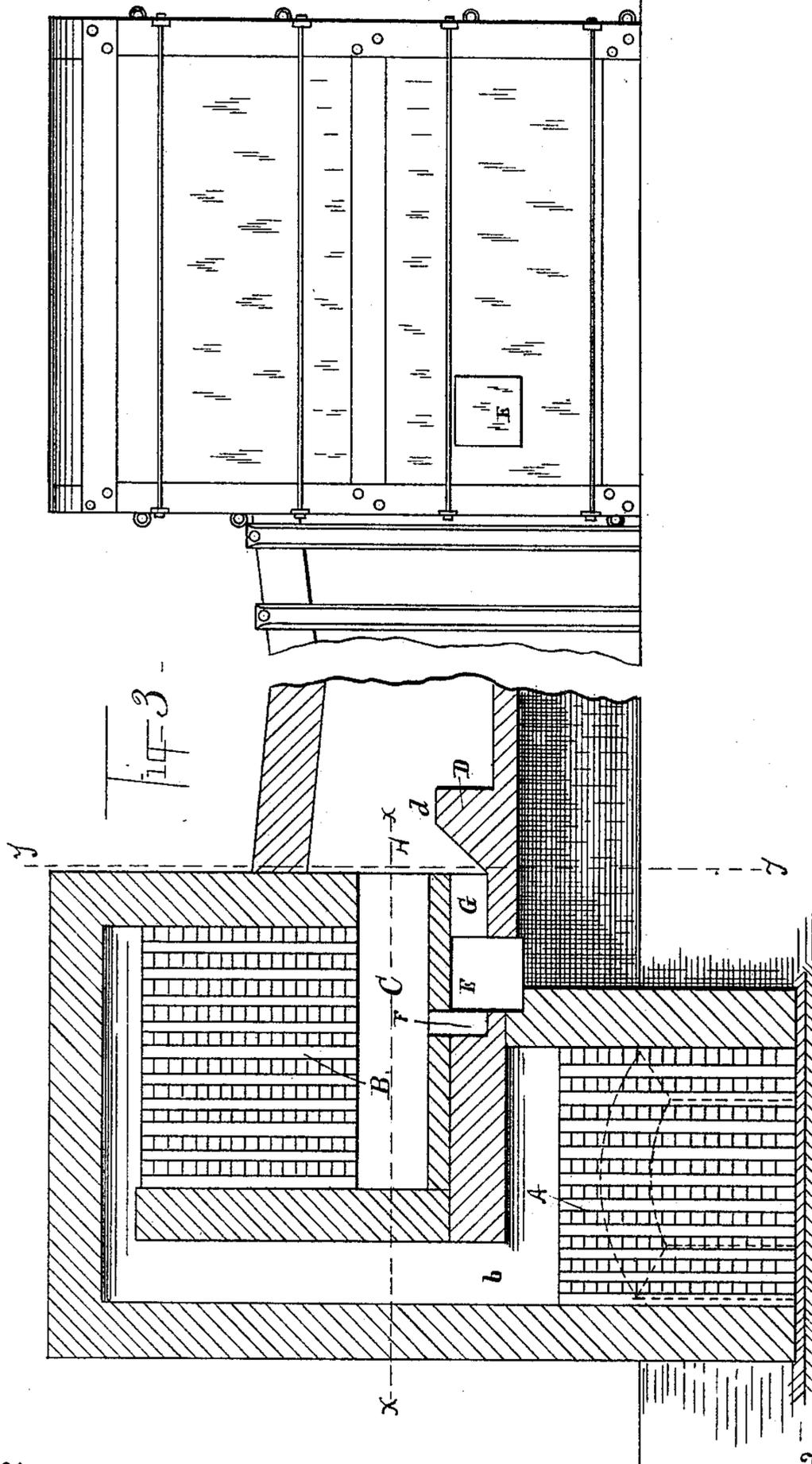
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# UNITED STATES PATENT OFFICE.

ALEXANDER YOUNGER, OF CLEVELAND, OHIO, ASSIGNOR OF ONE-HALF TO  
WILSON B. CHISHOLM, OF SAME PLACE.

## REGENERATIVE HEATING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 414,274, dated November 5, 1889.

Application filed June 5, 1889. Serial No. 313,227. (No model.)

*To all whom it may concern:*

Be it known that I, ALEXANDER YOUNGER, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented certain new and useful Improvements in Regenerative Heating-Furnaces, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle so as to distinguish it from other inventions.

The object of my invention is to construct an improved form of regenerative heating-furnace in which natural gas and Archer fuel gas and other similar kinds of fuel may be economically utilized.

The points of invention are a gas-pocket located intermediate of the regenerator and bridge-wall and provided with ports connecting, respectively, with the regenerator and opening toward the bridge-wall, whereby a portion of the current of air may be induced to pass through the gas-pocket in finely-divided streams, that it may the better and more perfectly commingle with the gas, and the pocket discharging toward the bridge-wall through a series of ports that open toward the pocket and to meet at the contracted neck of the furnace, where perfect combustion is assured. Again, when the direction of the current is reversed, a portion of the products of combustion passes through the pocket and highly heats the same, thereby raising the temperature of the gas issuing from the pocket when the current is again reversed. This heating of the pockets is a direct aid to economy and smokelessness. In the ordinary-sized furnace I contract the lateral width of the pocket, whereby I compel the heated air and gas that may pass through the pocket to more intimately and thoroughly mingle and coalesce.

Referring to the drawings, Figure 1 is a vertical sectional view taken on the dotted line  $y y$  of Fig. 3 and in the direction indicated by the arrow. Fig. 2 is a horizontal sectional view of the furnace, taken on the dotted line  $x x$  of Fig. 3. Fig. 3 is a vertical sec-

tion of the furnace, taken on the dotted line  $z z$  of Fig. 1, the right-hand portion of the view representing a portion of the furnace in elevation.

The central or metal-heating portion of the furnace being of the usual form, no description of the same is here necessary, and as the two end portions containing the regenerators are duplicates of each other it is not thought necessary to show in the drawings or describe in the specification more than one of them. So, too, it has been deemed best to omit all description of the flues leading to and from the chimney and the reversing-valve that changes the direction of the current, as any suitable flue and valve may be used.

A is the lower or primary regenerator, composed of reticulated brick-work or checker-work, a portion of it being located directly under the upper or secondary regenerator B. A flue  $b$  leads upwardly and discharges into the said upper regenerator B, that is composed also of reticulated brick-work, having the usual flues that discharge into the horizontal flues C. The bottoms of these flues C are substantially on a level with the top  $d$  of the bridge-wall D.

Intermediate of the regenerator and the bridge-wall, and located below the secondary regenerator and also below the level of the top of the bridge-wall, is the inclosed gas-pocket E, that extends transversely of the furnace and is provided with the ports F, that connect with said regenerator and open into the ports C of the same. Said pocket is also provided with ports G, that open toward the bridge-wall and discharge directly into the contracted neck H of the furnace, that is formed by the upward projection of the bridge-wall. In the usual size of furnace (which is the size shown in the drawings filed herewith) I preferably make the gas-pocket of less width than the width of the furnace proper, and thereby as the air and other gases pass through the pocket they are contracted laterally, and while passing through the neck of the furnace they are contracted vertically, whereby a better and more complete mingling and coalescing of the gases

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are produced than as if they were spread out in a broad passage. Again, by means of the regenerator, with its checker-work, the air passing through the same is divided into thin streams before it is brought into contact with the gas in the gas-pocket, and this also aids in the more complete mingling of the gases and helps combustion. A portion of the hot-air issuing from the regenerator passes through the pocket, and there a primary mingling of the air and gas takes place. Then as the gas issues from the pocket it meets the streams of air about to pass the bridge-wall and a secondary and final intermingling takes place and perfect combustion is assured. It will be noticed that no matter in which direction the current is passing a portion of the same passes through the gas-pocket, and thus the pocket becomes as intensely heated as the regenerator, which is a great aid in the economical, complete, and perfect combustion of the fuel.

The air issuing into the lower regenerator A passes upwardly through the flue *b* and into the regenerator B, thence downwardly into the ports C, where it divides, a part passing into the pocket E through ports F and a part passing out of the end of the said flue C, where it is met by the gas issuing from the pocket through the ports G. When the valve is reversed, the products of combustion pass over the bridge-wall, and then a part passes through the ports G into and through the pocket, which is thus highly heated. The remainder passes through the ports C, where it is met by the air that has passed through the pocket and up out of ports F. Thence the whole body of gases passes upward through regenerator B, and thence through regenerator A.

The foregoing description and accompanying drawings set forth in detail mechanism in embodiment of my invention. Change may be made therein provided the principles of construction respectively recited in the following claims are employed.

I therefore particularly point out and distinctly claim as my invention—

1. In a regenerating heating-furnace, the combination, with a regenerator and a heating-chamber, of an inclosed gas-pocket provided with independent ports respectively connecting with said regenerator and heating-chamber, whereby a portion of the heated gases issuing from said regenerator is caused to pass through said inclosed gas-pocket, substantially as set forth.

2. In a regenerative heating-furnace, the combination, with a regenerator and a heating-chamber, of an inclosed gas-pocket located intermediately of the two and provided with openings located in different walls of said pocket and respectively connecting with said regenerator and heating-chamber, substantially as set forth.

3. In a regenerative heating-furnace, the combination of a regenerator, a bridge-wall projecting into the neck of the furnace, and thereby contracting the same, an inclosed gas-pocket provided with a series of ports respectively connecting with said gas-pocket and furnace-neck, an opening also connecting said regenerator and neck independently, whereby a portion of the heated gases issuing from the regenerator passes through the said gas-pocket and another portion passes directly to the bridge-wall, substantially as set forth.

4. In a regenerative heating-furnace, the combination, with an inclosed gas-pocket, of a primary and secondary regenerator having flue-connection with each other, said secondary regenerator provided with a series of flues opening directly into the neck of the furnace, and also provided with a series of ports opening directly into said gas-pocket, said pocket provided with a series of ports opening directly into the neck of the furnace, whereby the body of gases issuing from the regenerator is divided, a part passing directly to the furnace-neck, another part passing through the gas-pocket and thence to the furnace-neck, where they mingle with the former portion, substantially as set forth.

5. In a regenerative heating-furnace, the combination of a regenerator, a bridge-wall projecting into and contracting the neck of the furnace, and a gas-pocket extending transversely of the furnace and provided with ports connecting, respectively, with said regenerator and opening toward said bridge-wall, said gas-pocket of less width than the body of the furnace, whereby the gases passing through the same are contracted laterally, substantially as set forth.

In testimony that I claim the foregoing to be my invention I have hereunto set my hand this 31st day of May, A. D. 1889.

ALEXANDER YOUNGER.

Witnesses:

J. B. FAY,  
N. H. FAY.