

April 18, 1933.

W. J. IRWIN

1,904,236

HEAT REGENERATOR

Filed July 6, 1932

2 Sheets-Sheet 1

Fig. 1.

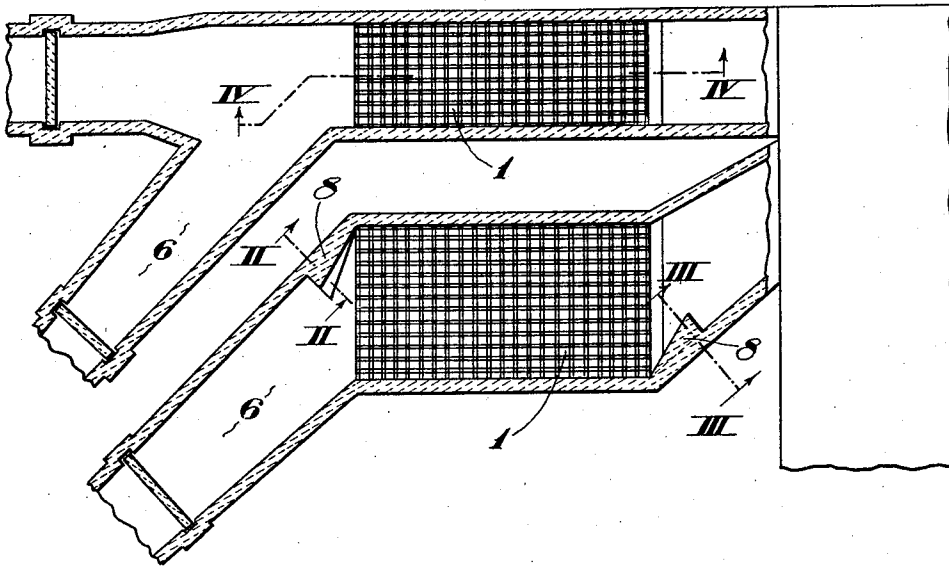


Fig. 2.

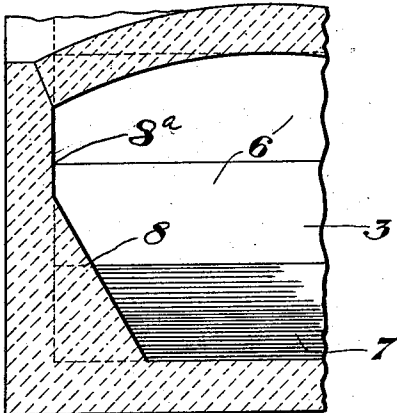
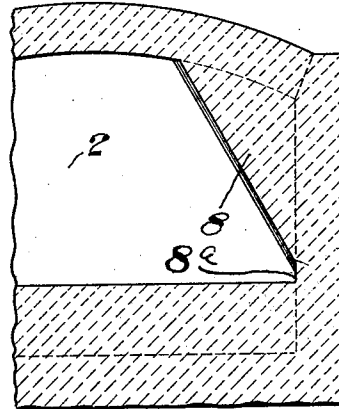


Fig. 3.



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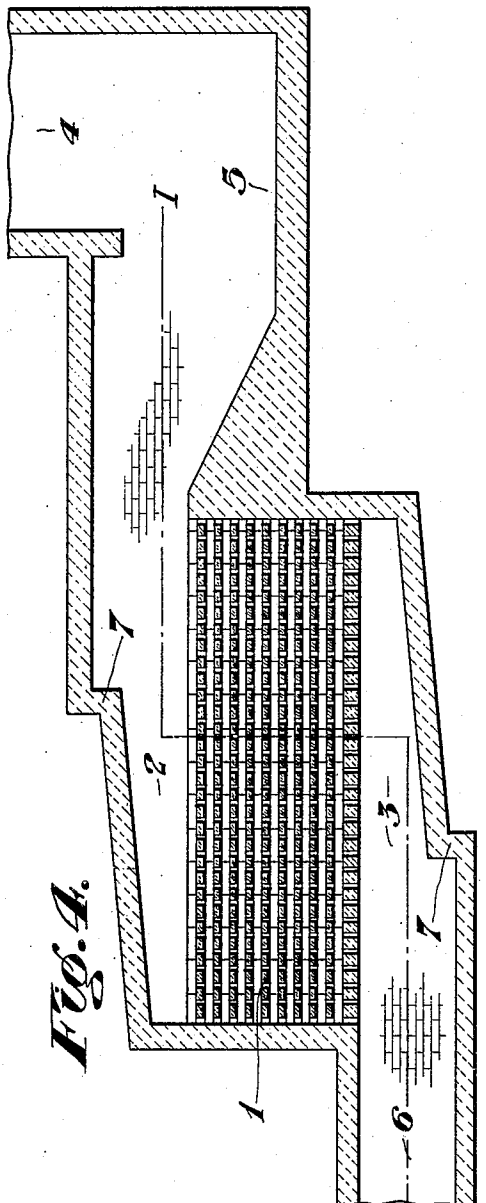


Fig. 4.

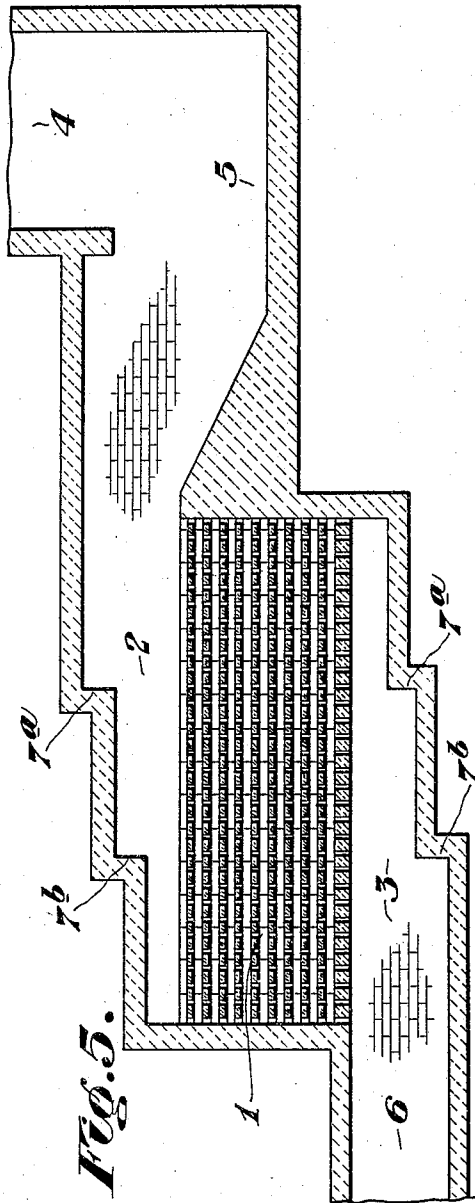


Fig. 5.

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UNITED STATES PATENT OFFICE

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HEAT REGENERATOR

Application filed July 6, 1932. Serial No. 621,118.

This invention relates to regenerative furnaces and particularly to the regenerator units thereof. In these the gas flow is generally greater through one part of their checkerworks than another and this results in undesirable hot and cold spots.

The object of the present inventor is to obtain a more even gas flow through regenerator units. Other objects may be inferred from the following disclosure of various specific forms of the invention as applied to an open hearth's checkerwork.

Having reference to the accompanying drawings:

Figure 1 is a horizontal cross-section from the broken line I—I in Figure 4 showing gas and air regenerators.

Figure 2 is a cross-section from the line II—II in Figure 1.

Figure 3 is a cross-section from the line III—III in Figure 1.

Figure 4 is a vertical cross-section from the line IV—IV in Figure 1, and

Figure 5 is a cross-section similar to the one shown in Figure 4 but showing a modification of the invention.

The above show a brick or tile checkerwork 1 having an upper chamber 2 and a lower chamber 3. A gaseous flow is introduced to the upper chamber from the furnace's combustion chamber by an uptake 4 and slag pockets 5, and to the lower chamber by a flue 6 communicating with either a stack, gas or air main. These arrangements depend upon the furnace's heating cycle and whether the particular unit described is preheating fuel, gas or air. Although the usual brick checkerwork is indicated, it is to be understood that the invention is applicable to any form of heat absorption unit.

Now the uneven flow through the checkerwork 1 mentioned in the forefront of the specification results from the velocity of the gaseous flow introduced to the chambers 2 or 3, which carries it to their ends and there forces it upwardly or downwardly. Thus, the most cooled part receives the least heat and the most heated part receives the least of the cold gases.

The present invention avoids this unde-

sirable effect by the use of gaseous flow obstructions 7 in the roof of the top chamber and the bottom of the bottom chamber. These obstructions here consist simply of a step in the chamber's structure which is located on the entrance sides of the center of the checkerwork 1. When the gaseous flow strikes these obstructions it is forced to the points usually neglected. Its velocity still tends to carry it to the end of the chambers 2 and 3 and this prevents too great a concentration of the deflected gases. The chambers may incline toward the checkerwork 1 beyond each of the sides or baffles 7.

A modification of this construction may consist in making a plurality of steps or obstructions 7^a and 7^b which effect the desired end, this being shown by Figure 5.

It might be mentioned that both the above constructions depend upon another factor than that of the simple upward or downward gas turbulencies which might be expected, that is, the reduction in area of the chambers 2 and 3 towards their ends causes a gradual decrease in pressure which offsets the undesirable effects produced by the gases' velocities.

As far as described, the invention applies particularly to a regenerator unit to whose chambers the gaseous flows are introduced in alinement with their longitudinal center lines. In practice, however, the flow introduction is frequently at an angle to these center lines. This also causes the aforementioned difficulties and may be remedied by the invention.

The undesirable effects are here diminished by obstructions 8 to the gaseous flows which function in substantially the same manner as the others. That is to say, they are in the form of steps which are placed to divert the gaseous flow from the points where they would naturally impinge if introduced angularly at their ordinary velocities. To accomplish this they are placed adjacent the sides of the passageways which form an acute angle with the regenerator unit 1.

Preferably these obstructions are constructed to vanish into the sides of the gas passageways in which they are built, leav-

ing a straight portion 8^a of the original passageway closest to the unit. That is to say, the faces of these obstructions which oppose the gaseous flows have a triangular shape.

5 The obstructions are arranged in the corners of the passageways which are farthest from the regenerator unit 1. Here they tend to divert the gaseous flows from the points in the chambers they would naturally seek if introduced angularly in the usual manner. This produces substantially the same action in a horizontal plane as the obstructions 7 do in a vertical plane.

10 The foregoing modifications of the invention may of course be used individually or in combination with each other as the construction of the particular regenerator unit requires. Also, the various proportions and shapes of all the disclosed matter may be changed to accommodate operating conditions encountered.

20 Although a specific form of this invention has been shown and described in accordance with the patent statutes, it is not intended to limit the scope thereof exactly thereto, except as defined by the following claims.

I claim:

1. The combination of a heat regenerating unit, chambers extending the lengths of the open sides of said unit and respectively constructed with one or more steps opposing these sides, and gaseous fluid passageways arranged parallel to said sides of said unit and communicating with one end of each of said chambers at diagonally opposite ends of the unit.

2. The combination of a heat regenerating unit, chambers extending the lengths of the open sides of said units, gaseous fluid passageways arranged parallel to said sides and communicating with one end of each of said chambers at an angle to the longitudinal axis of said unit and at diagonally opposite ends thereof, and abrupt obstructions arranged adjacent said unit on the sides of said passageways forming acute angles with said chambers.

3. The combination of a heat regenerating unit, chambers extending the lengths of the open sides of said units, gaseous fluid passageways arranged parallel to said sides and communicating with one end of each of said chambers at an angle to the longitudinal axis of said unit and at diagonally opposite ends thereof, and abrupt obstructions arranged on the sides of said passageways forming acute angles with said chambers, said obstructions being constructed to vanish before reaching the portions of these sides which are closest said unit.

4. The combination of a heat regenerating unit, chambers extending the lengths of the open sides of said unit and respectively constructed with one or more steps opposing these sides, gaseous fluid passageways ar-

ranged parallel to said sides of said unit and communicating with one end of each of said chambers at diagonally opposite ends of the unit, and abrupt obstructions arranged on the sides of said passageways forming acute angles with said chambers, said obstructions being constructed to vanish before reaching the portions of these sides which are closest said unit.

5. The combination of a heat regenerating unit, chambers extending the lengths of the open sides of said unit, and gaseous fluid passageways communicating with one end of each of said chambers at diagonally opposite ends thereof, one or both of said passageways being arranged in a plane parallel to that of the open sides of said unit at an angle to the longitudinal center line thereof and provided with an abrupt obstruction arranged on its side forming an acute angle with said center line and adjacent the unit.

In testimony whereof, I have hereunto set my hand.

WILLIAM J. IRWIN.