A. ROBERTS.

RECUPERATOR WALL.

APPLICATION FILED JAN. 3, 1916.

1,193,069.

Patented Aug. 1, 1916.

2 SHEETS—SHEET 1.

Fig. 1.

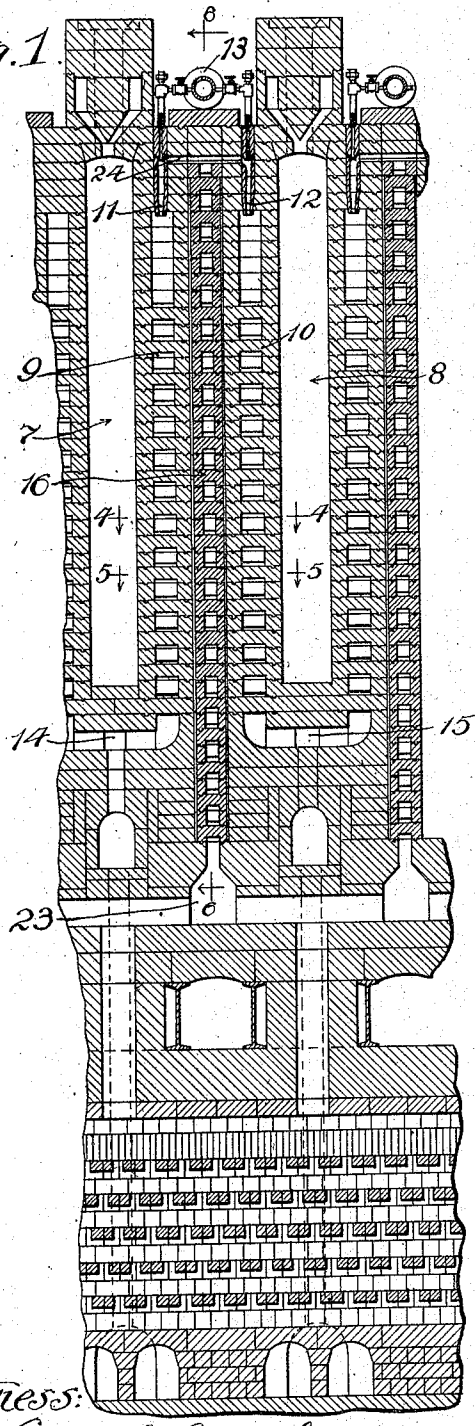


Fig. 2.

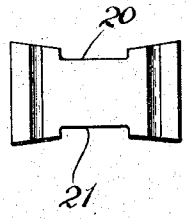
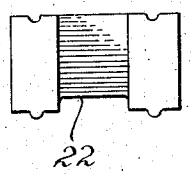


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 6.

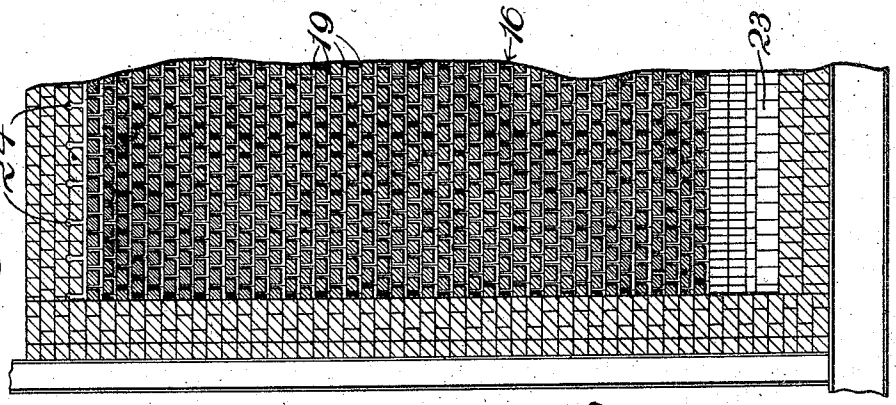


Fig. 5.

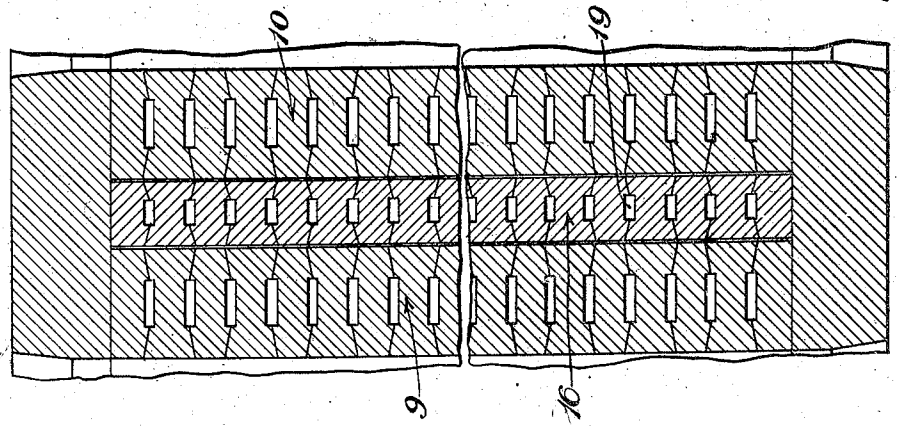
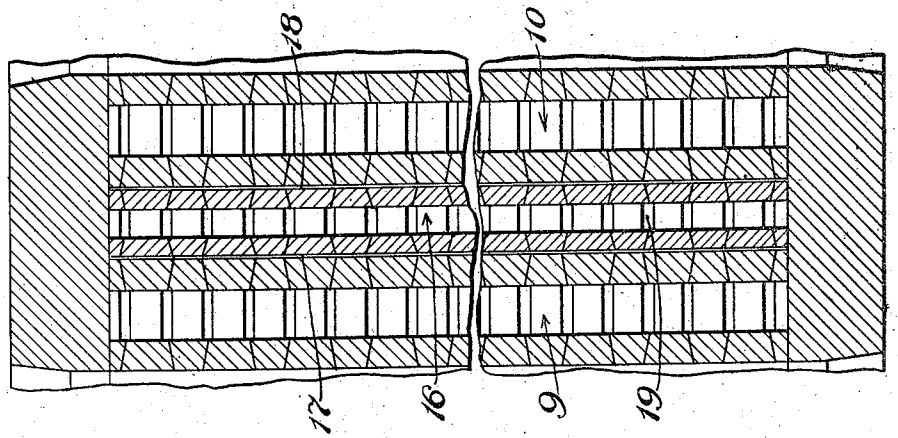


Fig. 4.



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UNITED STATES PATENT OFFICE.

ARTHUR ROBERTS, OF EVANSTON, ILLINOIS.

RECUPERATOR-WALL.

1,193,069. Specification of Letters Patent. Patented Aug. 1, 1916.

Original application filed December 4, 1914, Serial No. 875,503. Divided and this application filed January 3, 1916. Serial No. 69,995.

To all whom it may concern:

Be it known that I, ARTHUR ROBERTS, a citizen of the United States, residing at Evanston, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Recuperator-Walls, of which the following is a specification.

This application is a division of my co-pending application for Letters Patent of the United States on improvements in recuperative coke ovens, Serial No. 875,503, filed December 4, 1914.

In that application, there is disclosed a coke oven construction, in which recuperator walls are placed between the adjacent heating walls of the adjacent coke ovens of a bench, and that application relates generally to constructions in which the said recuperator walls are independent of the heating walls to the extent that they may expand and contract independently of the heating walls, and to the extent that they may be constructed or maintained as independent elements or portions of the bench of coke ovens.

This present application relates to a general type of recuperator wall construction, regardless of whether or not such construction be independent of the adjacent heating walls in the manner and to the extent of the construction disclosed in the aforementioned application.

The recuperator principle is one in which heat is constantly delivered from hot gases, usually waste gases, through a wall or the like to the air or gases traveling separately or independently of the hot gases from which the heat is being extracted. That is to say, there is a substantially constant input of heat units on one side of the structure, and a corresponding, substantially simultaneous, withdrawal of heat units from the other side of the structure. The rate at which the heat may be delivered into or withdrawn from said structure depends, among other things, upon the intimacy of contact of all portions of the heat carrying medium, or the heat extracting medium, with said structure.

One of the objects of this invention is to provide a recuperating wall construction of such form that the air or gas will be driven with great frequency and violence against portions of the structure so as to bring all portions of the said air or gas into direct and forcible contact with the structure one or more times and at one or more points during the travel of the air or gas adjacent to said structure. That is to say, the main object of the invention is to so construct the recuperating walls that the transfer of heat into the air or gas traveling through it will be occasioned largely by the impingement principle disclosed in my co-pending application for Letters Patent of the United States on improvements in the art of heating, Serial No. 43,753, filed August 5, 1915.

Another object of the invention is to provide a recuperating wall construction of extremely simple form, so that it can be built from a minimum number of block forms. Also to so construct the wall that it will be provided with a mesh of impingement passages contained within its body portion in combination with openings or passages in its upper and lower portions for the transfer of the air or gas to and from the said mesh.

Other objects and uses of the invention will appear from a detailed description of the same, which consists in the features of construction and combinations of parts hereinafter described and claimed.

Referring to drawings: Figure 1 shows a vertical cross section through two adjacent coke ovens of a bench, and through the intermediate recuperating wall; Fig. 2 shows a plan view of a simple form of block used in building up the recuperating wall; Fig. 3 shows a side elevation of the block illustrated in Fig. 2; Fig. 4 is a horizontal section through two heating walls and the intermediate recuperating wall of the particular construction shown in Fig. 1, Fig. 4 being taken on the line 4—4 of Fig. 1, looking in the direction of the arrows; Fig. 5 is a horizontal section, taken on line 5—5 of Fig. 1, looking in the direction of the arrows; and Fig. 6 is a vertical section through a portion of the particular recuperating wall shown in Fig. 1, being taken on the line 6—6 of Fig. 1, looking in the direction of the arrows.

At this point, I desire to state that the features of invention herein disclosed are adapted for use in many recuperator wall locations and in many particular recuperator wall constructions. For convenience of illustration and description, however, I have

shown said features as applied in a particular manner, said application being one in which the recuperator wall is placed between two adjacent oven heating walls. However, said features might also be applied in recuperating walls for use in many other locations than in the particular location above mentioned.

In the arrangement illustrated, the two adjacent carbonizing chambers are designated by the numerals 7 and 8, respectively. They have the adjacent heating walls 9 and 10. Each of said heating walls has on its interior, gas passages of suitable construction, and rows of nozzles 11 and 12 deliver the heating gases to the walls 9 and 10. In the particular arrangement illustrated, the fuel for said nozzles is delivered by a manifold 13. The heating gases travel down through the heating walls and collect in the sole passages 14 and 15, whence they may be withdrawn in any desired manner.

In the particular arrangement illustrated, I have shown the recuperating wall 16 between heating walls 9 and 10. Reference to Figs. 1, 4 and 5 shows the narrow spaces 17 and 18 between this recuperating wall and the adjacent heating walls. These spaces, however, are taken up by the sidewise expansion of various parts as they approach working temperature so that, when the ovens are at working temperature, the heating walls contact firmly against the recuperating wall.

Reference to Fig. 6 shows a meshwork of horizontally and vertically extending passages 19. These passages extend throughout substantially the entire height and length of the recuperating wall, or, at any rate, throughout those portions of the recuperating wall in which the features of the present invention are applied. These horizontally and vertically extending passages are in communication with each other, but they are so formed that the air or gas in traveling through them, is forced to frequently and violently change its direction of travel. Consequently, the heat will be transmitted directly between the wall and the air or gas in such a manner that a maximum efficiency of such heat transfer will be effected.

In the particular construction illustrated, the recuperating wall, with its mesh of passages, is built up from blocks of peculiar construction. These blocks have their side and horizontal faces so recessed that, when they are laid together, they provide a meshwork of horizontally and vertically extending passages in the recuperating wall. By so setting the blocks as to cause them to break joints vertically, the meshwork of passages will be zigzag in form, as shown in Fig. 6. One particular construction of such a block is that shown in Figs. 2 and 3. Examination of these figures shows that such a block as that illustrated has its side faces recessed at 20 and 21, and its bottom face recessed at 22. Examination of Figs. 4 and 5 shows that the end portions of the blocks taper alternately inward and outward, so that when the blocks are laid together, they keystone together in the manner shown in said figures.

The recuperator wall is so constructed that the air or gas can be delivered to the entire lower edge of the mesh of passages, and is, furthermore, so constructed that the heated air or gas can be directly delivered to each and every burner. For this purpose, a channel 23 extends across the bench beneath each recuperating wall, said channel communicating directly with the mesh of impingement passages throughout its entire length. The air or gas may be delivered to the channel 23 in any desired manner, and I do not concern myself in this application particularly with the manner of such delivery.

In the particular construction illustrated the recuperator wall effects the heating of the air which is to be supplied to the burners. Now referring to the upper portions of Figs. 1 and 6, it will be noted that each of the burners 11 and 12 receives its air supply from a side opening 24. These side openings communicate directly with the upper portion of the mesh of impingement passages, and, inasmuch as the burners are spaced throughout the length of the oven, it follows that the heated air is withdrawn from the recuperating wall throughout practically the entire length of the same.

It will be seen from an examination of the structure disclosed herein that the recuperator wall is provided on its interior portion with a network or mesh of interconnected passages extending in zig-zag fashion from one edge of the wall to another, so that the air or gas flowing between said edges is compelled to travel in a zig-zag manner from the one to the other. It will also be observed that as far as this particular feature of the construction is concerned, the recuperator wall may be placed adjacent to one or more of the heating walls of the oven, or may be placed at any other location desired in the particular construction to which it is applied.

I claim:

1. A recuperator wall comprising a plurality of blocks laid up in courses, the blocks of each course breaking joints with the blocks of the adjacent courses, each block being centrally recessed in its side faces and in its bottom face to thereby provide a meshwork of interconnected horizontally and vertically extending passages on the interior of the wall, a channel extending along one edge of the wall and in communication with said meshwork of passages at that edge, and a plurality of burner connections adjacent to

the other edge of the wall and in communication with said meshwork of passages at that edge.

2. A recuperator wall comprising a plurality of blocks laid up in courses, the blocks of each course breaking joints with the blocks of the adjacent courses, and each block being recessed on one vertical face and one horizontal face to provide a meshwork of interconnected horizontally and vertically extending passages, a channel extending along one edge of the wall and in communication with said meshwork at that edge, and a plurality of burner connections adjacent to another edge of the wall, said burner connections communicating with said meshwork adjacent to said edge.

3. A recuperator wall comprising a plurality of blocks, each block having one vertical face and one horizontal face recessed, and the blocks being laid up in such a manner as to present a meshwork of interconnected passages, a channel extending along one edge of the wall and in communication with said meshwork at that edge, and a plurality of burner connections adjacent to another edge of the wall and in communication with said meshwork adjacent to said edge.

4. A recuperator wall comprising a plurality of blocks, said blocks being recessed on two adjacent faces to provide a meshwork of interconnected passages on the interior of the wall, a channel extending along one edge of the wall and in communication with said meshwork, and a plurality of burner connections adjacent to another edge of the wall and in communication with said meshwork.

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